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A NOTE ON THE ECONOMIC RESOURCES
OF THE PROVINCE OF MADRAS AND
THE POSSIBILITIES OF THEIR
DEVELOPMENT

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A NOTE ON "THE ECONOMIC RESOURCES OF THE PROVINCE OF MADRAS AND THE POSSIBILITIES OF THEIR DEVELOPMENT."

(By Mr. L. B. GREEN, Director of Industries and Commerce, Madras.)

Among the difficulties which have tended in the past to restrict the development on a large scale of industries in Madras are the high price and scarcity of fuel owing to the fact that nowhere south of the Hyderabad State has coal been found to exist in workable deposits. The hydro-electric and electric-thermal projects which have been completed or are under construction or contemplation will, however, go far to remedy the deficiency and admit of the exploitation of the natural resources of the Province to the maximum possible extent, for, electricity is a more than useful substitute for any other form of fuel, although coal or other fuel is still necessary for steam raising and processing in certain industries. It was formerly believed that the development of industries in the Province was likely to be confined largely to the converting and working up into manufactured or semi-manufactured form the agricultural and forest products of the Province; but the possibility of establishing several important industries, not thought of years ago, has been opened up by the advent of electric power over a wide area of the Province. In the modern industrial world, cheap electricity is essential for certain chemical and metallurgical operations for, in addition to its use as a source of power for running machinery, electricity can be utilized to great advantage for producing high temperatures, as in operations where the electric furnace is used and in electro-metallurgy or for actually bringing about chemical changes as in the electrolytic processes for producing alkali. If cheap electricity had not been made available, it would not, for instance, have been possible to take steps for establishing an alkali industry in the Province or to consider the question of developing the Salem iron ores. The development of electricity in the Province will be realized when it is mentioned that in the last decade the number of units generated has increased from 26.4 millions to 203.2 millions. The estimated amount of continuous power now remaining capable of economic development in the Province is 90,000 K.W. Any large power generating projects which can be economically developed must be of great benefit to the Province not only from the standpoint of revenue which such schemes would produce, but also from the stimulus which they give to the establishment of industries resulting in a reduction in imports and the consequent release of additional capital for investment in the Province. The weaknesses

of India's economy were clearly revealed during the last depression when her dependence upon exports of agricultural produce brought about a very difficult position, the sharp fall in commodity values upsetting her balance of trade. The prices of primary products fell more rapidly than those of the manufactured articles imported in exchange, and if India had had a larger industrial production and there had been a greater proportion of manufactures among her exports, her depression difficulties and distress would have been less pronounced. In the meantime, there has been a marked tendency for industrial countries to become agriculturally more self-sufficing, as a result of which the demand for some of India's staple products is restricted or curtailed. Agricultural development in the industrial countries must have its counterpart in the stimulation of manufacturing industries in the agricultural countries, and the changed world conditions and the consequent restrictions on international trade render it imperative on our part to readjust our agricultural and industrial production and to endeavour to produce such of the industrial products as there is a demand for, and for the production of which facilities exist, thus achieving a more balanced internal economy as between manufacturing industries and the primary production of agricultural commodities. The cultivators suffered much more, during the last depression, than the industrial workers and the key to the problem of raising the standard of life of the Indian people is to adopt an extensive programme of industrialization and to provide on a wide scale for the introduction of improved and intensive methods of agriculture. It is also the case that the industrial position of a country whose industries depend to any considerable extent for their supplies of materials upon foreign sources, which are liable to be interrupted in the event of international complications arising, must be precariously placed. It is not satisfactory for instance that the soap industry should be dependent upon foreign sources of supply for its caustic soda, but this will be rectified when the alkali industry is established in Madras and Bengal. There can in fact, be no difference of opinion as to the advisability of encouraging in every way possible the development of new industries of basic and fundamental importance, of medium scale industries and of small scale and cottage industries, in order to increase the sum-total of production. And the only satisfactory method of approaching the problem of unemployment is by the adoption of a policy calculated to increase the national dividend of the country so that the share of the national dividend going to the classes and the masses may be increased in proportion to the increase in their number. It is generally recognized that the first step in this direction is to draw up a definite programme or plan for the development of industries on an all-India basis after conducting enquiries as to what industries of economic importance offer scope for development in the various provinces, and as is well known the initiative in the matter has been taken by the Hon'ble Minister for Industries and Labour in Madras, whose efforts have resulted in the setting

up of a National Planning Committee, the first meeting of which has recently been held. The Government of the U.S.S.R. realized at an early stage that the best method of utilizing the vast natural resources of the country was by a process of industrialization, and starting from practically nothing, the U.S.S.R. has succeeded in establishing a number of powerful industries, some of which are believed to be second to none in the world. In particular, a noteworthy advance has been made in the development of heavy industry as an essential pre-requisite to the building up of other branches of the national economy. Industry has, in fact, been the basis of the economic life of the Soviet State since the fulfilment of the first 5-year plan. Conditions in the U.S.S.R. and India are admittedly not strictly comparable, but the achievements of the U.S.S.R. in the domain of industry, and also incidentally in the sphere of agriculture, in the past twenty years afford at least a striking indication of what can be done by an orderly system of planning. Another country which has derived benefit from organized planning is Turkey. Turkey's new 4-year plan, which is now in progress, is the third project for the organization of that country's economic resources which has been undertaken. First came the 5-year plan, a scheme which covered many undertakings which are now all but completed. A plan has been launched for the development of Turkey's mineral resources, whilst the new plan will cover port improvements, power works, reorganization of the mercantile marine, and the establishment of a variety of new industries. The necessity of drawing up an orderly plan of economic development for India had become so generally recognized that even if the National Planning Committee had not been set up it would have been a question of choosing not between 'planning' and *laissez-faire*, but between having in India a number of isolated, sectional, and even conflicting plans, each laid down by some Government, group or interest, and an attempt to plan comprehensively the general policy which industries, as a whole, are to pursue. Fortunately this possibility has been avoided and it is now realized that the character of modern technical development in industry is such as to force upon us in India a publicly planned economy as a means of preventing the growth of unemployment, and that the extension of Government interference into the economic field is bound to remain a permanent feature of the new order.

2. There are four main sources of raw materials for the development of industries in a country, namely, (i) agricultural products, (ii) animal products, (iii) forest products, and (iv) mineral products. In considering the question of introducing new occupations for, or developing the existing occupations of, the people of the Province, it is necessary to examine the resources of the Province under these four heads and to aim at selecting industries, the raw material for which already exists or could be made available in the Province or could be brought from outside at sufficiently cheap rates. In drawing up a programme

or plan for the development of industries, preference should be given to those industries which utilize indigenous raw materials and for the finished products of which there is a sufficient demand within the country, although in certain cases it will no doubt be found desirable in the national interests to provide for the development of large-scale industries even if some of the raw materials required are not available in this country. In other words, Indian enterprise should first apply itself to those manufacturing industries for which India itself supplies both the raw material *and* the market and then to those for which India supplies *either* raw material or the market. There is also much to be said for the view that the object of an extensive programme of industrialization should not be merely to supply the present requirements of industrial products from home industries, but to increase the demand for industrial goods for, not otherwise will it be possible to take any large numbers away from the land and to employ them in industries. This is especially true of Madras as when exploring the possibilities of developing new industries, with reference to the resources of the Province in raw materials and the demand for finished goods, one is often brought up against the difficulty of finding an outlet for the goods produced sufficient to absorb the output of factories of economic size. In order to make this brief review more or less complete in itself, it has been considered desirable to set down the information available in regard to the resources of the Province as a preliminary to considering the potentialities of economic development generally in Madras.

3. Population—

Population of the Madras Province according to the Census of 1931 was ..	46,740,107
<i>Deduct</i> population of Ganjam and Vizagapatam districts	6,019,567
Population in the rest of the Province in 1931	40,720,540
<i>Add</i> population of new Vizagapatam district according to the census	3,444,122
Population of the Province as now constituted according to the census of 1931 ..	44,164,662
Percentage decennial increase revealed in the last census	10.4
Percentage annual increase corresponding to a decennial increase of 10.4 per cent. ..	0.99
Therefore the estimated population on 1939 of the Province as now constituted ..	47,786,467 or 47,786,000 to the nearest thousand.

4. *Classification of area and area irrigated.*—The total area of the Province in 1938-39 was 79,795,395 acres. Of this, forests accounted for 16.5 per cent, lands not available for cultivation

for 18.2 per cent, cultivable waste other than fallow for 13.6 per cent and current fallows for 12.4 per cent, the remaining 39.3 per cent of the area or 31,383,337 acres representing the extent of land brought under cultivation. The total area irrigated in the Province in 1938-39 was 8,445,762 acres and this represented only 26.9 per cent of the net area sown in the Province. Of the several sources of irrigation, Government canals are the most important and accounted in 1938-39 for 44.4 per cent of the total irrigated area. Then came tanks and next to them wells. These two sources of irrigation were responsible for 34.4 per cent and 18.8 per cent, respectively, of the total irrigated area. Private canals accounted for only 1.8 per cent of the irrigated area and other sources for the remaining 4.0 per cent.

5. *Crops irrigated.*—The total area under all irrigated crops was 10,476,310 acres in 1938-39, representing 29.1 per cent of the total area under all crops. 89.1 per cent of the total area under crops irrigated was under cereals and pulses; oil-seeds (groundnut, gingelly and castor) accounted for 2.9 per cent, cotton for 1.6 per cent, sugarcane for 0.9 per cent and other crops for 5.5 per cent. Paddy was by far the most important crop from the point of view of irrigation. No less than 76.21 per cent of the area under paddy was under irrigation. The corresponding percentages for other crops irrigated were 52.5 for ragi, 26.8 for indigo, 8.5 for gingelly, 16.4 for cotton (mainly Cambodia), 10.6 for cumbu, 11.1 for cholam and 4.0 for groundnut (mainly summer groundnut).

• 6. *Area sown with crops.*—The following table shows (i) the area under the different crops in the Province in a year of normal season, (ii) the area under the crops in 1938-39, and (iii) the percentage of the area under the different crops in 1938-39 to the total area under all crops:—

Crops.	Area in 1938-39.	Area in a year of normal season.	Percentage of the area under the crop to the total area under all crops in 1938-39.
	ACS.	ACS.	
Paddy	9,844,388	10,200,160	27.4
Cholam	4,913,710	4,632,090	13.7
Cumbu	2,717,545	2,712,090	7.6
Ragi	1,639,258	1,762,150	4.6
Korra	1,786,606	1,677,950	5.0
Varagu	1,002,284	1,075,830	2.8
Samai	548,594	589,910	1.5
Bengal gram	50,806	92,090	0.1
Horse gram	1,216,660	1,738,200	3.4
Sugarcane	98,262	115,670	0.3
Groundnut	3,771,588	3,075,230	10.5
Gingelly	876,397	761,060	2.4
Castor	270,278	293,550	0.8
Cotton	1,928,714	2,284,670	5.4
Indigo	28,676	35,410	0.1
Other non-food crops	2,016,395	1,303,450	5.7
Total of all food crops	27,039,128	27,792,580	75.2
Total non-food crops	8,92,918	8,398,520	24.8
Total area under crops	35,961,076	36,191,100	100.0

7. *Variation in acreage of crops.*—It will be of interest to study the variation in the acreage of (i) cereals and pulses, and (ii) important commercial crops during the last ten years. The statement below gives the index numbers of acreage of (i) cereals and pulses, (ii) cotton, (iii) groundnut, (iv) sugarcane, and (v) tobacco, taking the acreage in 1928-29 as 100 in each case.

Year.	Index number of acreage of				
	Cereals and pulses.	Cotton.	Groundnut.	Sugarcane.	Tobacco.
1929-30 ..	100	100	100	100	100
1930-31 ..	99.77	82.42	111.30	117.09	94.52
1931-32 ..	98.90	89.01	82.12	118.35	104.72
1932-33 ..	99.13	78.72	109.58	123.25	99.77
1933-34 ..	96.88	87.05	117.76	124.00	96.54
1934-35 ..	96.25	93.03	73.25	127.73	113.86
1935-36 ..	92.44	107.57	78.69	125.74	109.03
1936-37 ..	89.54	100.42	108.00	121.98	98.62
1937-38 ..	86.70	102.82	145.13	99.86	114.62
1938-39 ..	87.86	77.87	117.52	100.16	124.71

The above indices of acreage show that in general the area under cereals and pulses fell gradually since 1932-33 and increased slightly in 1938-39. The area under cotton steadily increased up to 1935-36 and then declined with a slight rise in 1937-38. No pronounced tendency is noticeable in the case of groundnut or tobacco though in 1937-38 a sharp rise in acreage was in evidence in both the cases. As regards sugarcane, there has been a steady increase in acreage up to 1934-35 and thereafter there was a setback which resulted in a sharp diminution in 1937-38. Considering the indices for 1938-39 there is found to be a reduction in the area under cereals and pulses amounting to 12.14 per cent as compared with 1929-30 whilst a slight increase of 1.3 per cent in the total acreage of the four important commercial crops above considered is revealed. In 1928-29, the area under food crops represented 77.8 per cent of the area under all crops; in 1938-39 the percentage fell to 75.2. These statistics therefore lead to the conclusion that in recent years, there has been a gradual replacement of the areas under cereals and pulses in this Province by commercial crops. This state of affairs is due partly to the impetus afforded by the comparatively more favourable prices which the commercial crops have in general commanded during the depression years in relation to prices of food crops and partly to the increasing exploitation of commercial crops for industrial purposes consequent on the gradual development of industries in this Province.

8. *Animal products.*—The hides and skins and leather industry is one of the most important industries in Madras judged by the test of production and export trade, tanned hides and skins having constituted one of the most important exports of Madras ever since statistics of sea-borne trade were published. The total exports of leather amount in value to about Rs. 6 crores a year whilst the value of the leather consumed in the Province must be very considerable. There are 400 to 500 organized tanneries

in the Province providing wholetime employment in normal times for about 20,000 hands. The number of livestock in the Madras Province as ascertained by a census held in 1935 (revised) is as follows:—

Cattle.

Males.

1	Breeding bulls, i.e., entire males over three years or used for breeding purposes	169,285
2	Working bullocks, i.e., bullocks and uncastrated males over three years kept for work only ..	6,177,708
3	Bulls and bullocks over three years not in use for breeding or work	655,170
4	Young stock—Under one year	916,892
5	Young stock—One to three years of age ..	1,286,279

Females.

6	Breeding cows, i.e., cows over three years kept for breeding or milk production	4,295,573
7	Cows over three years used for work	1,115,870
8	Cows over three years not in the use for work or breeding purposes	573,535
9	Young stock—Under one year	1,231,589
10	Young stock—One to three years of age ..	1,319,254

Buffaloes.

Males.

11	Breeding bulls, i.e., entire males over three years kept or used for breeding purposes ..	144,200
12	Working bullocks, i.e., bullocks and uncastrated males over three years kept for work only ..	1,116,701
13	Bulls and bullocks over three years not in use for breeding or work	130,678
14	Young stock—Under one year	496,239
15	Young stock—One to three years of age ..	408,201

Females.

16	Breeding cows, i.e., cows over three years kept for breeding or milk production	2,398,944
17	Cows over three years used for work	267,463
18	Cows over three years not in use for work or breeding purposes	221,399
19	Young stock—Under one year	852,230
20	Young stock—One to three years of age ..	778,910

Sheep.

21	Sheep	11,938,324
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Goats.

22	Goats	6,761,876
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Horses and ponies.

23	Horses	32,932
24	Mares	14,362
25	Young stock (colts and fillies)—Under one year.					3,391
26	Young stock (colts and fillies)—One to three years of age	2,173

Mules.

27	Mules	2,797
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Donkeys.

28	Donkeys	145,728
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Camels.

29	Camels	33
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As is well known the bulk of the skins and hides exported are usually crust tanned but not fully dressed, and have to be subjected to further treatment at the hands of the curriers and finishers after they reach foreign countries before they can be regarded as finished leather. There has, however, been a considerable development in the export of finished chrome leathers from Madras since 1932 when an import duty was imposed on foreign leather entering the United Kingdom, although this trade seems to have suffered a set-back during the last year or two. The finished chrome upper leathers (box and willow) which are exported from India to the United Kingdom are completely finished and ready to be cut up into uppers for the manufacture of shoes. A peculiarity of the hides and skins industry is that most of the tanneries are concentrated in a few districts and there are several districts in the Province where there are practically no tanneries in existence, though raw hides and skins are exported from them to other tanning centres in the Province. The distribution of tanneries in relation to the supply of raw materials throughout the Province appears to require study as it seems to be the case that at present raw hides and skins have often to be transported a considerable distance. The nearer a tannery is to the place where the hides and skins become available and are cured, the less will be the defects, such as stains, which manifest themselves at different stages of the tanning processes. Tanning was one of the earliest industries, other than agriculture, which developed in India, and tanning and leather working were originally village industries. The village tanners, however, are largely uninfluenced by modern practice and there would appear to be considerable scope for improvement in the methods adopted in country tanneries throughout the Province. The village chamar was a necessity in the Indian village in former days and it was his function to prepare the leather and leather articles

required for the villagers, i.e., foot-wear for the inhabitants of the village and the leather articles required by the agriculturists, such as collars for bullocks, articles of yokery and buckets for purposes of well irrigation. After the advent of the organized South Indian tanneries, the village tanning industry, which afforded part-time occupation for the village chamar or chuckler who engaged himself in other agricultural pursuits, declined as the village resorted increasingly to leather articles manufactured in the towns from leather prepared according to modern methods. If the quality of the leather produced by the village chamar could be improved and he is instructed to prepare improved leather articles, there is no reason why the village chamar should not recover, in some measure, his former position in the village. The methods of preparing leather of a better quality than is produced at present could best be demonstrated to the village chamars through the medium of peripatetic tanning parties in important centres where there are a number of village chamars. The village chamar could be shown the improved methods of preserving and curing, liming and deliming and tanning by actual practical demonstrations. As a result, the value of the skins on which he works should be increased considerably as the curing and preserving of raw hides and skins is not at present carried out satisfactorily. It is even possible that if improved methods could be introduced in the villages, small model tanneries could be set up under the auspices of the panchayats and that the tanning of hides and skins for export to Madras and other places, which is now confined to the organized tanneries in the towns, could be undertaken, to some extent, in the villages though this might be anticipating a little. Imports of leather manufactures, including belting, boots and shoes, bags and trunks, roller skins, and saddlery and harness, into the Madras Province by sea do not exceed Rs. 2 lakhs in value per annum; but it is believed that an appreciable quantity of goods is brought into the Province from Northern India in respect of which no statistics are available. The local manufacture of finished leather articles in small establishments has expanded considerably in the last few years, and there seems no reason why it should not develop still further. The difficulty which attends the establishment of factories for the manufacture of finished leather goods is that the demand in South India for any one class of leather manufactures is limited.

MINERALS.

9. Mining is carried on in the districts of Anantapur, Bellary, Cuddapah, Coimbatore, Nilgiris, Salem, Trichinopoly, Nellore, Kurnool, Kistna and Vizagapatam. The principal minerals raised in the Province are manganese, magnesite, mica, barytes, steatite, gypsum, phosphatic nodules and very small quantities of corundum and asbestos. Of the minerals mentioned only the first four are of any great importance. The following statements show the production and exports (quantity and value) of the minerals raised in

the Province during the last five years. The production figures are in respect of the calendar year, whilst the exports relate to the official year.

Manganese.

Year.	Production.	Exports.	
		Quantity.	Value in lakhs of rupees.
	TONS.	TONS.	
1935	16,135	428,356	77.35
1936	14,958	324,960	64.23
1937	21,159	631,404	128.22
1938	31,813	256,540	61.59
1939	34,640	377,968	94.05

The mining of manganese is carried on in the Bellary and Vizagapatam districts, although a few years ago a small quantity was raised in the Kurnool district also. Manganese ore is used mainly in the iron and steel industries, and manganese compounds in the electrical industry for the manufacture of cells and dry batteries, as well as in certain chemical industries. Owing to the increased demand for manganese in the iron and steel industry, consequent on the expanding needs of the armament industries, there has been an increased demand for manganese in recent years. The demand however fell last year. A large proportion of the exports shown in the Madras Customs returns are attributable to shipments of Central Provinces manganese ore through the port of Vizagapatam. The manganese ores of the Vizagapatam district are usually of second or third grade although some first grade ore has been obtained at Kodur.

Mica.

Year.	Production.	Exports.	
		Quantity.	Value in lakhs of rupees.
	TONS.	CWT.	
1935	436	15,096	10.48
1936	579	16,479	11.23
1937	684	32,166	20.24
1938	693	26,634	15.18
1939	1,07	32,349	25.62

Mica is mined mainly in the Nellore district and to a very limited extent in the Salem and Nilgiris districts. As a producer of mica, India holds the premier position in the world and among the producing provinces, Madras is second only to Bihar in importance. Mica finds its chief use in the electrical industry for insulating purposes in the form of sheets, washers, tubes and plates. In the manufacture of wall papers generally, and ceiling papers in particular, the substance which gives the silvery sheen on a white back-ground is finely ground mica. There is likely to be an increasing demand for Indian mica scrap for use in wall paper manufacture. A new development in the mica industry is the increasing use of wet-ground mica in paint. There would seem to be scope for the manufacture of finished mica products and of micanite articles.

Magnesite.

Year.	Production.	Exports.	
		Quantity.	Value in lakhs of rupees.
	TONS.	CWT.	
1935	12,840	78,805	4.20
1936	12,966	98,914	4.91
1937	23,782	171,610	8.33
1938	23,052	147,322	4.46
1939	29,903	232,741	9.22

The Madras Province is the principal producer of magnesite which is the mineral form of carbonate of magnesium, and Salem calcined magnesite is considered to be about the best in the world for certain purposes. Between the years 1929 and 1935, the production of magnesite fell considerably owing largely to the fact that the United States of America, which is the largest consumer of magnesite and which possesses large deposits of the mineral, raised its import duty on magnesite and this resulted in a heavy reduction in the tonnage exported to that country. The production in 1938 declined to 23,052 tons from 23,782 tons in the previous year. The large production in the last two years is a reflection of the increasing world consumption of magnesite consequent on the development of the manufacture of magnesium metal and of the growing requirements of magnesium compounds for chemical purposes. As the world supplies of magnesite are in excess of the demand, successful development is largely a matter of geographical position and available markets. Austrian and Grecian magnesite has the benefit of a shorter sea route to the consuming markets. Indian magnesite enjoys a preference of 10 per cent under the new Indo-British Trade Agreement. The Salem magnesite industry is capable of large expansion as will be evident when it is stated that the quarries and kilns of the Magnesite Syndicate, Limited, Salem, could cope with an output of 50,000 tons of crude magnesite, and 18,000 tons of calcined magnesite per annum, whilst there are other magnesite deposits in the adjacent Chetti Chavadi Jaghir. Magnesite is used in India for the manufacture of magnesite bricks which find application in the linings of basic open hearth and other furnaces, and also to a limited extent in the manufacture of composition flooring and magnesite flooring plaster, tiles, etc., the demand for which purpose seems to be capable of considerable expansion. The calcined magnesite exported from India is chiefly used in the composition flooring trade as the comparatively low iron content of Indian magnesite does not make it an ideal furnace lining material. Ferric oxide is sometimes added to Indian magnesite in order to render it suitable for metallurgical purposes. There is also a demand for

raw magnesite for chemical and other needs in industry. An industry based on magnesite which offers considerable scope for development is the production of electrically fused magnesite and the manufacture of magnesium metal and of fused magnesium bricks. Magnesium metal is lighter than aluminium of which it has become already a very dangerous competitor, and in view of the rapidly increasing consumption of magnesium alloys in the aeroplane industry and for other purposes, it has a great future before it. In fact, it is probable that the most important outlet for calcined magnesite in the future, will be for use as a secondary raw material in the electrolytic process for the production of magnesium metal, for there is little reason to doubt that the light metals will be the metals of the future. Magnesium metal is not made in India at present, but it is hoped that in course of time, it will be possible to establish the industry in the Salem district. A new outlet for magnesite is for the manufacture of special paints. The gas yielded on calcination of magnesite is chiefly carbon dioxide which can be used for the manufacture of solid CO_2 or dry ice. This is steadily coming into use and with the increasing attention, which is now being given to modern methods of refrigeration, the time will probably come when the demand for this product will become of major importance. In the process of calcination of magnesite, fifty per cent of carbon dioxide gas is evolved, and if relatively simple steps for its conservation are taken, it becomes a very profitable by-product, otherwise it is lost.

Barytes.

Year.	Production.	Year.	Production.
	TONS.		TONS.
1935	.. .. 3,347	1938	.. .. 9,517
1936	.. .. 2,375	1939	.. .. 15,868
1937	.. .. 9,056		

Barytes, the sulphate of barium, is a white mineral which finds its chief application in the paint industry. It is employed as a white pigment and inert extender in paint manufacture, and also to a lesser extent as an inert filler in paper, cloth, linoleum, etc. The barytes industry in India is yet in its youth, the first production of barytes in India of which statistics are available being in 1918 when 2,724 tons were produced from the mines in the Dhone taluk of the Kurnool district. The industry is gaining in importance in the Anantapur and Cuddapah districts. The deposits of the Ceded districts are recognised to constitute the largest reserves of barytes in India. A new demand has arisen for barytes in recent years for weighing the mud fluid in rotary drilling, but the barytes produced in the Ceded districts has not, so far as is known, been employed for this purpose up to the present. Dr. Coggin Brown of the Geological Survey of India expressed the opinion some years ago that the possibilities of the large-scale exploitation of the Indian deposits of barytes

would appear to depend on the future expansion of the paint and colour industry in India itself. Dr. A. L. Coulson of the Geological Survey, who wrote a memoir on barytes in the Ceded districts in 1933, agreed with Dr. Coggin Brown that it is improbable that Indian barytes could compete in overseas markets and that the Indian producer should devote his attention to the capturing of the import trade of barytes into India. It was pointed out, however, that he was up against a fundamental difficulty immediately, i.e., the long railway distances and consequent heavy freight charges. Dr. Coulson considered it improbable that Madras barytes would ever be able to compete with foreign barytes in Sind and the Punjab as the railway freights from the producing centres to these places are excessive, and the Alwar State in Rajaputana is better situated as regards these markets. It was pointed out, however, that the Madras barytes has the advantage over the Alwar deposits as regards Calcutta and Assam, though the nearer deposits in Bihar and Orissa are more favourably situated. Apparently the needs of the various oil companies in Burma are being met by importation of barytes, and it would seem worth while examining whether Madras barytes could not be transported by sea to Rangoon and sold at a price to compete successfully with the foreign product, if it is the case that a trade with Burma in this product has not yet been developed. The rapid increase in the production of barytes is due to the development of the paint industry in Calcutta. The development of a paint industry in South India might be expected to stimulate still further the demand for the barytes of the Ceded districts.

Steatite.

Year.	Production.		Year.	Production.	
	TONS.			TONS.	
1935	..	246	1938	..	25
1936	..	74	1939	..	34
1937	..	150			

One of the most widely distributed minerals in India is steatite or soap-stone either in the form of a coarse potstone—so-called on account of its general use in making pots, dishes, etc., or in the more compact form suitable for carvings, and in its best form suitable for the manufacture of gas-burners. Pure steatite has many applications in the arts and is used extensively in the paper, textile, rubber and soap industries. The powdered mineral commonly known as 'French Chalk' forms the basis of many toilet preparations. In India, steatite is carved into images, bowls, plates and ornamented articles. In 1912, the steatite deposits at Muddavaram and Musila Cheruvu near Betamcherla in the Kurnool district were opened up, and consignments were shipped to America. Most of the steatite derived from Musila Cheruvu appears to have been of the green variety although white steatite was also exported. At Muddavaram, the steatite is ivory

white associated with quartzose, rock and magnesite and is suitable for small articles such as gas burners. The output from the Kurnool deposits, which in 1914 was 210 tons had all but ceased a few years later for reasons which are not on record. The question of whether the steatite deposits of Anantapur and Kurnool districts could not be developed would seem to be worth examination.

Asbestos.

Year.	Production.		Year.	Production.	
	TONS.			TONS.	
1935	1938	..	24
1936	1939	..	38
1937			

Asbestos is found in the Cuddapah and Kurnool districts, but the Cuddapah deposits appear to be by far the most important. The existence of asbestos in the Anantapur district, although improbable is certainly not impossible. The existence in the Cuddapah district of asbestos in workable quantity and sufficiently good quality, has only been known in the last few years. Asbestos in this district was first discovered in 1924 in a well at Lingala by a cultivator, and specimens which were sent to the Wembley Exhibition secured a bronze medal. The production of asbestos in Cuddapah district in recent years has been small and there was practically no production during the last year. A question which came under examination by the Department of Industries was the manufacture of asbestos cement products, the development of which it was thought could be taken up by a cement manufacturing concern in a factory adjacent to its cement works or as a separate industry. The raw materials required are asbestos, cement and water. Most factories of Europe obtain their supplies of asbestos from Canada and Russia and to a lesser extent from South Africa, Czechoslovakia and Cyprus. So far as information is available, Cuddapah asbestos has not been used for the purpose. There is one factory in India near Calcutta, but the possibilities of establishing a factory in this Province for the requirements of South India and with a view to developing an export trade with Ceylon, Burma and the Federated Malay States seem worthy of consideration. Five small samples of asbestos from the Cuddapah district were sent to an asbestos cement manufacturing concern in Germany and their report is to the effect that one of the samples is not suitable, but that two of the samples are of a quality similar to the Russian asbestos of the third and fourth qualities, that the strength of the fibre is good and that it would be possible, by a right preparation of the mixture to manufacture asbestos cement sheets of good quality. Before any definite steps could be taken by Government or by private enterprise to set up an industry, it would be necessary to examine further, the asbestos deposits in the Cuddapah district in order to determine how far the asbestos, or as much of it as might prove suitable, could be made available as a raw material for a local industry, for although the asbestos deposits

of the Ceded districts have been examined by Dr. A. L. Coulson, it is stated in his memoir that there has been no systematic proving of reserves and that it is not possible to give even a rough approximation of the potential reserves of asbestos in the area. In order to determine whether or not there would be a sufficient supply of the material careful proving of the deposits would be necessary.

Gypsum.

Year.	Production.		Year.	Production.	
	TONS.			TONS.	
1935	..	528	1938	..	9,381
1936	..	1,506	1939	..	9,812
1937	..	1,597			

It will be noted that the production of gypsum, which occurs along with the sedimentary rocks in the Trichinopoly district, took a sudden leap during last year owing to the requirements of the cement industry. These deposits are of considerable potential importance, as it might be practicable to use the gypsum for the manufacture of sulphuric acid or directly for the conversion of ammonia into ammonium sulphate, the possibility of which industry is at present under investigation. Unfortunately little information is available in regard to these deposits which require to be scientifically investigated.

Magnetite iron.—With the rapid march of civilization and industrial progress, iron and steel have become an indispensable part and parcel of modern life. The rapidity of the economic development of a country may, in fact, ordinarily be gauged by the iron and steel consumption per head of the population and by the magnitude of its iron and steel industry. The question of the development of the Salem iron ores has been subjected to a close examination during the last three years. Briefly stated, the obstacle in the way of the development of the Salem iron ores has been the difficulty of obtaining a continuous and sufficient supply of cheap fuel, and it was considered that the advent of cheap electric power in the area would justify a re-examination of the question. The quantity of magnetite ore in the district may be considered almost inexhaustible, but a good deal of doubt has existed in regard to the quality of the deposits and as to whether the iron content is high enough to render exploitation commercially feasible. As a result of an examination of the question, it was considered that there are distinct possibilities in regard to smelting the Salem iron ores by using for heating purposes the electric energy from Mettur and for reduction, charcoal from local sources. Accordingly arrangements were made for a field study of the Kanjamalai hills to be undertaken by Dr. V. S. Dubey of the Benares Hindu University with a view to determining the quality and quantity of the ore. Dr. Dubey's investigation has revealed that a very large amount of magnetite

ore exists in the Kanjamalai hill which should be sufficient to satisfy the requirements of a 100-ton steel plant for centuries. This was more or less a foregone conclusion as the quantity of ore available does not seem to have been questioned at any time. The iron ore of Kanjamalai is composed of a mixture of silica and magnetite in about equal amounts and the small scale experiments conducted at the Benares Hindu University have shown that no special difficulty need be apprehended in concentrating the ore, and that after powdering the rock and passing it through the separator almost pure magnetite is obtained, it being possible to carry the concentration of magnetite up to 90 per cent. The character of the ore is such that it cannot be used directly in the electric furnace as it contains a considerable amount of silica, but the proposal is to concentrate the ore by electro-magnetic concentration so as to increase the percentage of magnetite to at least 90 per cent and possibly to as much as 95 per cent, and to reduce the silica to 8 or 9 per cent. Ore of this composition, it is understood, is utilized in Norway and Sweden for the manufacture of iron and steel. Pig iron would first be manufactured and then refined into steel in a Thomas convertor. For a smelting capacity of 110 tons of pig iron per day, the cost of the crushing, concentrating and separating plant, furnaces and steel making plant is estimated at about Rs. 25 lakhs. On the preliminary data, it would appear to be profitable even to manufacture ordinary steel if a market could not be found for a sufficient quantity of alloy steels. The further steps to be taken in regard to the exploitation of these ores are (i) the several iron ore deposits around Salem, other than the Kanjamalai hill should be examined with a view to fixing the most suitable site for the steel works, (ii) the apatite (phosphorous salt) deposits in Trichinopoly should be investigated as it will be essential to add this material in the process of steel manufacture at Salem if Swedish practice is to be followed, (iii) about one ton of magnetite ore should be sent to each of the manufacturers of electro-magnetic separators with a view to getting it concentrated, arriving at large scale concentration costs and obtaining quotations for suitable units of crushing and separation plant after actual trials, and (iv) the concentrated ore should be sent to steel plant manufacturers in Norway and Sweden to enable smelting tests to be carried out with a view to arriving at the actual manufacturing cost per ton. The investigation into the possibilities of exploiting these ores is obviously of the greatest importance as if steel can be produced at an economic price in the Salem district, it will render possible the establishment of several subsidiary industries to the great economic advantage of the Province.

Hematite iron.—There is a reference to the existence of hematite iron in the Gazetteers of Kurnool and Bellary districts. It is also stated in the Gazetteer of the Cuddapah district that iron ore is scattered pretty generally over the country but only in any quantity at two or three localities, in the neighbourhood of

benefit to the cottage industrialists. It may be necessary later on in the light of the experience gained in the running of the museum, to consider the establishment of an emporium and show room for the products of cottage industries in which not only would samples be displayed, but retail sales effected and possibly wholesale orders executed. As a result of the initiative of the Hon. Minister for Industries and Labour, district museums for the products of cottage industries have already been established at Tinnevely, Vellore and Mangalore and it is probably only a question of time for each district to have a museum of this description. In many cottage industries there is great scope for the introduction of improved apparatus and appliances, and the question of providing facilities for the conduct of experiments in connexion with the devising of such appliances is engaging attention.

Handloom weaving.—The handloom weaving industry of the Province and the ancillary operations connected with it, in India as a whole, ranks in importance and magnitude next only to agriculture. From the standpoint of the well being of the rural population, the industry plays a conspicuous part as there is no other occupation so remunerative as weaving to absorb the population not engaged in agriculture, or to keep the agriculturists occupied when there is no work for them in the fields. It serves also as a suitable part-time occupation for the families of the agriculturists. The question of affording adequate protection to the handloom weavers is beset with many difficulties and it is indeed a complex problem to reconcile the different interests of the large mass of cottage workers, the Indian mills, and the consuming public with their desire for cheap cloth, even though it may be conceded that the interests of the cottage workers should be paramount. In recent years, handloom weavers have had to face increasing competition from Indian mill-made fabrics, and disquieting reports and a number of representations have been received from handloom weaving centres in regard to the state of unemployment which prevails in them. Nevertheless up to last year the handloom weaving industry of the Province appears to have held its own fairly well judged from the statistics of the quantity of cotton yarn left over for consumption by handloom weavers, the figures being 78.8 million pounds in 1934-35, 83.4 million pounds in 1935-36, 86.8 million pounds in 1936-37 and 75.7 million pounds in 1937-38 as compared with an average annual consumption of 59 million pounds in the decade ending with the year 1920-21. No entirely satisfactory explanation of the apparent paradox of increased yarn consumption and growing unemployment is forthcoming, although it is possible that owing to the depression in agriculture, more people have taken to handloom weaving and that there are now more handloom weavers than there is work for. There is the possibility also that the handloom weavers are now weaving more coarse cloth than

formerly. The consumption of yarn by handloom weavers, however, after rising steadily during the years 1933-34 to 1936-37 showed a decline in the year 1937-38 to 75.7 million pounds, and there is ground for apprehension that from now onwards, the industry may find it increasingly difficult to maintain its position in view of the ever-growing competition of mill cloth. If statistics of the five years ending 1937-38 of the yardage of piece-goods of (i) foreign origin, (ii) Indian mill origin, and (iii) produced by handlooms, are examined, it will be seen that in only one year—1937-38—was the handloom weaving industry in the Province less than four times as important as the power loom industry in respect of production, whilst it is of course many times more important in respect of the employment which it provides. The statistics show that the consumption in the Madras Province of foreign cloth, is steadily decreasing and that the competition which handloom cloth has mostly to fear is that of the Indian mills. In the last few years there has been a growing volume of public opinion in favour of some adjustment of the spheres of production of the power loom and the handloom and regulation of the classes of fabrics to be produced by each. This difficult and complex question is at present under the consideration of Government. Suffice it to say that the adoption of measures to bring about the adjustment of production of the power loom and the handloom or to restrict the production of mill cloth by a quota or otherwise would involve the introduction of legislation by the Government of India and would have to apply to the whole of India including the Indian States, the latter of which might, or might not, be prepared to co-operate. In 1937, the Madras Government enacted a law under which dealers of cloth in this Province are required to obtain a licence and a fee is levied on shops dealing in mill cloth at the rate of Rs. 2 per annum where the monthly turnover does not exceed Rs. 5,000 and Rs. 5 in other cases. As an alternative to the regulation of production between the power mill and the handloom, protection could be afforded to the handloom weaver by increasing the present scale of licence fee imposed on dealers of mill cloth to an extent which would in itself be sufficient to offset the higher cost of handloom cloth in relation to mill cloth and to render it unremunerative for dealers of mill cloth to ply their trade in rural areas.

In 1934, the Government of India announced their decision to assist by the grant of a subsidy, schemes drawn up by Provincial Governments for developing co-operative buying and selling on behalf of the cotton handloom weavers and generally for the better organization and improvement of the handloom weaving industry. The scheme prepared by the Madras Department of Industries and approved by the Government of India provided for the setting up of a central weavers' co-operative society at Madras with a number of district primary production societies

linked to it. The production societies are assisted by the central society in securing supplies of raw materials such as yarn, dye-stuffs, chemicals and also improved appliances and designs, and in the disposal of the surplus stock of goods left over after local sales. In pursuance of the scheme, a Provincial society was formed under the name of the Madras Handloom Weavers Provincial Co-operative Society, Ltd., and it was registered under the Madras Co-operative Societies Act VI of 1932 with an authorized share capital of Rs. 5 lakhs divided into 10,000 shares of Rs. 50 each. The Provincial society is rendering useful service to the handloom weaving industry through the affiliated production societies in the several districts, the central emporium and sales depots which have been established in order to popularize and find an outlet for the cloth produced by the primary weavers societies, and the district staff of supervisors. With the initial facilities afforded by the Provincial society, departmental hand sizing machines have been taken up by two of the affiliated societies. The Provincial society maintains an emporium at Madras and sales depots at Bezwada, Bellary, Calicut, Vellore, Madura, Tinnevely and Coimbatore. If certain classes of handloom cloth are to compete with mill made cloth and sales are to be effected in bulk, the goods will have to be finished and calendered and arrangements are in progress for the setting up of a power driven finishing and calendering plant. A number of new designs for hand-woven cloths have been introduced. On 31st March 1939, there were on the rolls of the Provincial society 131 weavers co-operative societies, 88 individual members, 27 central banks and co-operative societies and nine firms, and the paid-up share capital amounted to Rs. 37,835. During the year, 40 additional societies were given subsidies to meet their establishment charges and for financing the purchase of appliances and the total amount of subsidies so provided was Rs. 25,817. The policy of issuing cash credit loans to supplying yarn, on the guarantee of the Provincial Society and advancing money on goods sent for sale by the primary societies was continued in 1938-39 and the Provincial Society sanctioned cash credit loans to the extent of Rs. 96,350 and yarn guarantees of Rs. 55,463. Yarn to the value of Rs. 30,284 was supplied on the guarantee of the Provincial Society to the primary societies from the approved mills. Sales to the value of Rs. 86,623 were effected by the sales depots. The total sales of the primary societies during the year amounted to Rs. 5,48,683.

Hand spinning.—A provision of Rs. 2,00,000 was made in the budget for 1938-39 for the development of the hand spinning and khadi industry but this was not fully utilized and a similar provision has been made in the budget for the current year for the purpose. The All-India Spinners' Association submitted a scheme for the utilization of the provision of Rs. 2,00,000 in 1938-39 and Government sanctioned an amount of Rs. 90,162 to be utilized by

the branches of the All-India Spinners' Association for the Tamil Nadu (Tiruppur), Kerala (Payanur) and Andhra (Masulipatam), to finance the designing, manufacturing and supply of gins, bows with guts, and spindles with thin pulleys, speed wheels, vertical and horizontal charkas, fly shuttle looms and fittings and also for the conduct of research work in carding, spinning and printing, dyeing and weaving, and for the training of 86 workers and the employment of these workers as instructors in the villages with a view to increasing the efficiency of the artisans and the implements used. The All-India Spinners' Association considered it essential that in addition to this grant, a subsidy should be provided to cover possible losses caused by inexperienced workers in the initial stage and also to enable it to give adequate wages to the spinners and other artisans, and suggested that it should be based on the actual increase in the production effected during the year. Government, therefore, granted a subsidy up to a maximum of Rs. 1,00,257 on the actual increase of production of khadi during the year calculated at the rate of one-anna per square yard of increase. Special provision has been made for the organization of hand-spinning centres in the Bellary and Kurnool districts and in Moplanad.

Woollen cumblly weaving industry.—The spinning of wool and the weaving of blankets and cumblies is an important industry in the districts of Anantapur, Bellary, Kurnool and Kistna where the number of looms engaged in the weaving of cumblies is 1,671, 860, 295, and 189 respectively. The cumblly industry is largely carried on as a part-time occupation mostly by Kurubas who belong to the shepherd class. The industry does not provide continuity of work for the Kurubas owing to the lack of pastures for sheep, and an improvement in the breed of sheep should be aimed at with a view to improving the quantity and quality of wool supply. From the year 1937, the Government of India has provided a subvention for the benefit of the cottage and small scale woollen industries in the several provinces and the assistance to the woollen industries in Madras has taken the form of (i) organization of co-operative societies in the cumblly weaving areas and the establishment of a sales depot at Bellary for marketing their products, (ii) organization of a central co-operative society of weavers engaged in the pile carpet industry at Ellore, and (iii) employment of a designer to assist in the development of both sections of the industry. Four cumblly weaving societies have been started—one at Kudatini, an important cumblly weaving village, and another at Bisalahalli in the Bellary district, and at Kanumolu in Kistna and Dharmajigudem in West Godavari districts. In the depot at Bellary, samples of cumblies are exhibited and sold, and merchants and other buyers are placed in touch with the production societies. Active steps are being taken to extend and develop the market for cumblies to the extent that this is

possible. The object of the formation of the cumbly-weaving societies is to assist the cumbly weavers by arranging for the joint purchase of wool and sale of the cumblies, whilst demonstrations of the use of the fly shuttle loom with a view to increasing the daily output of the cumbly weavers and so reducing to some extent the cost of production and also of the working of the hand-driven warping and sizing machines for preparing long woollen warps are being given in the villages. Demonstrators have been appointed to train the local weavers in the use of the fly shuttle loom. The capital required for the purchase and introduction of improved appliances, working capital and also the recurring expenditure of the societies is provided from the Government of India subvention grant, whilst the pay of the demonstrators is met from Provincial funds. A co-operative inspector has also been appointed to supervise and assist the working of the societies. The cumbly-weaving societies are undoubtedly of considerable assistance to the weavers in arranging for the supply of wool, and the disposal of the finished cumblies, but it is only too apparent that the great need of the cumbly-weaving industry is the provision of additional pastures for sheep in order to improve their breed and to augment the supply of cut wool and the deterioration in the condition of the industry in the Ceded districts may be traced largely to lack of suitable grazing facilities for the sheep. Another adverse factor affecting the industry is the scarcity and high cost of wool, as much of the wool produced locally appears to be bought by agents from Bombay and Bangalore.

Ellore pile carpet industry.—The cost of running the Ellore Pile Carpet Weavers' Society, which was registered in June 1937, is met partly from the Government of India grant and partly from funds made available by the Provincial Government, the Government of India providing the working capital and defraying the rent, pay of the designer and special co-operative inspector and their travelling allowance and the pay of the clerk and peon, and the Provincial Government meeting the cost of the dye-house equipment, rent of the dye-house and the pay of the dyer and the day watchman besides some miscellaneous expenditure. The possibilities of developing the Australian and United Kingdom markets for Ellore carpets is receiving close attention. An overseas order for a thousand square yards was executed by the society. Arrangements for the appointment of sole agents for the sale of the society's carpets in the United Kingdom and Bombay were in progress at the end of 1938-39, whilst a few samples of the carpets produced have been sent to America for exhibition at the World's Fair at New York. The organization that has been set up is capable of supplying carpets of good quality and uniform standard provided a demand can be created for them, and it is hoped that, as a result of the efforts made to extend the demand for these carpets, employment will be found over a period for an increased number of weavers at Ellore.

Sericulture.—The Kollegal taluk of the Coimbatore district is the only centre where the rearing of silk worms and the reeling of cocoons are carried on on an intensive scale under purely cottage conditions, and sericulture forms the main occupation of the people in almost all the villages. In 1937–38, about 7,060 acres were devoted to mulberry cultivation in the Kollegal taluk against 15,387 acres in 1924–25, the reduction in acreage being attributable to the fall in the price of silk and the inadequate rate of protection accorded to the industry. In 1938–39 the area under mulberry declined to 5,735 acres on account of the total failure of rains. In the year 1919, it was found that the rearers of Kollegal were losing two out of every six or seven silk worm crops raised annually by them owing to (i) the prevalence of the disease ‘pebrine’ in the untested silk worm seeds used by the rearers, and (ii) the irrational methods of rearing adopted by the rearers owing to their ignorance of scientific methods resulting in a yield of only 25 lb. of cocoons for every 100 layings. In order to minimize the losses of the rearers, the problem has been tackled in two directions, namely, (i) by the production and distribution of ‘Cellular’ seed so as to eradicate pebrine, and (ii) by improving the methods of rearing. The first Tariff Board, as also the Industries Conference held at Simla in 1934, considered that the distribution of ‘Cellular’ seed was the first problem which had to be solved if sericulture was to be improved and developed, and as a result, the Government of India decided to distribute annually for five years among the several provinces, grants amounting to rupees one lakh a year. A subvention was granted to Madras for the purpose of increasing the supply of tested seed with a view to rendering Kollegal self-sufficing in the matter of its tested seeds supply within five years, as also for the conduct of such research on pebrine as was possible in connexion therewith. Since then the supply and distribution of cellular seed has been gradually increasing and in 1937–38, as much as 93 per cent of the total seed requirements of the Kollegal taluk were met by ‘Cellular’ seed, thus practically solving the first important problem of controlling the pebrine disease. By successful demonstration and propaganda, the rearer who is the cause of most of the diseases has also been shown how to adopt scientific methods of rearing. In the result, the quality of the cocoons produced to-day is far superior to that of the cocoons produced in 1919, the normal yield now being 50 lb of cocoons with cross-breeds and 35 lb. with pure Mysore variety for every 100 layings as against 25 lb. some years ago. Not satisfied with this achievement, the Department of Industries has been endeavouring to evolve a hardier race of worms that would yield cocoons of a superior quality with richer silk content, and has been conducting a series of experiments and researches with a view to (i) enhancing the rearer’s and reeler’s income, and (ii) bringing down the cost of production of raw silk, to such a level as would enable it to compete with the high quality imported silk. Attention will now be concentrated on the production of

cross-breed seeds which are proving very popular in Kollegal owing to the benefits derived by the rearers in the shape of (i) increased yield of cocoons to the extent of 40 per cent more than that of pure Mysore, (ii) richer silk content enabling an increased output of raw silk to be obtained, (iii) shorter period required for rearing, (iv) higher prices realized than for pure Mysore to the extent of four to eight annas per maund, (v) greater resistance to disease, and (vi) less quantity of leaves required to produce one pound of cocoons. A programme has been drawn up under which, it is hoped, to supply cent per cent of the seed requirements of the Kollegal taluk in the form of cross-breed seeds within a period of five years. If this programme is put into effect and adequate protection is afforded, there seems no reason why the acreage under mulberry cultivation in Kollegal should not gradually increase from the present figure of 7,000 acres to 25,000 acres and the production of silk from its present level of 111,000 lb. to 500,000 lb.

Ericulture.—The Department of Industries has pioneered in recent years a new industry called ericulture which is the culture of silk worms that feed on castor leaves. These worms are bred entirely in cottages. The eri worm is hardier than the mulberry worm and as no life taking is involved as in sericulture which is against Hindu sentiment it is easier to propagate. There are about 250,000 acres under castor cultivation in the Province chiefly in the Northern Circars, Ceded districts and the Central districts, and the cultivation now is for seed purposes only. If the castor leaves now wasted are utilized to rear the eri worms, an important industry can be developed without any detriment to the seed. Ericulture is pre-eminently suitable for development as a cottage industry as the apparatus is inexpensive and the work involved is simple and can be carried on by women and children in their spare time in their own homes. Demonstrations of eri silk worm rearing have been successfully carried out at different centres of the Province, but little progress has been made with the development of the industry as there is little or no demand in South India at present for cloth woven from the yarn spun from eri cocoons. The outlook has altered considerably, consequent on the Mysore Government having set up a waste silk spinning plant in the Mysore State and enquiries are proceeding as to whether the plant will be in a position to absorb the eri cocoons produced in Madras at a price of about As. 8 per pound. If it is not found possible to develop this outlet for eri cocoons, the question of setting up a plant for the manufacture of spun silk from silk waste in Madras will have to be actively investigated, endeavours also being made to spin a better yarn from which a saleable cloth can be woven.

Other small industries.—Apart from textiles, including sericulture, which have already been referred to, the more important

of the non-textile cottage industries in the Province include, basketware, brassware, bronze and bell-metalware, copperware, metalware, cigars and cheroots, coir working, rattan work, slate manufacture and toys. A reference to the village tanning industry has been made earlier in this note and need not be again referred to. Oilseed crushing is practised as a village industry on a considerable scale. During the year 1938-39, eight candidates were deputed to Wardha for training in oil pressing and they completed their course satisfactorily. Their claims for employment as teachers in the Government or aided industrial schools are kept in view and those among them who desire to start the industry in their own places have been encouraged to apply for financial assistance under the Madras State Aid to Industries Act 1922. Soap manufacture and the process of refining vegetable oils on a cottage industry scale, as evolved in the Kerala Soap Institute, Calicut, is a suitable rural industry since most of the raw materials are available in the Province, and the processes involved are fairly simple, whilst plant of the cheapest description may be employed and the demand for soap is decidedly on the increase. Some of the vegetable oils extracted in the villages could be utilized, and if the villagers are properly instructed, cheap washing soaps of good quality could be manufactured and sold at low prices. The Department of Industries has conducted demonstrations of white sugar manufacture from palmyra juice with the aid of centrifugals at Rettakulam in the Tinnevely district and at Navadur in the West Godavari district, and the results of these experiments went to show that it is possible to prepare from palmyra juice, jaggery of a superior quality, which should realize a higher price than the jaggery at present prepared, that it would generally be more profitable to prepare improved jaggery than sugar and that this is likely to remain the case unless a greater yield of sugar is obtained or the price of jaggery declines appreciably. Steps are in progress for organizing co-operative societies for preparing improved jaggery in the West Godavari district. There seems no reason why the preparation of jaggery from sweet toddy should not be extended and developed in the palmyra and date palm tracts. With a view to finding employment for the former fermented toddy tappers, successful demonstrations of the manufacture of improved jaggery from coconut and palmyra sweet toddy were carried out by the Department of Industries in the Salem district, and it was shown that a superior quality of jaggery could be prepared from coconut sweet toddy and that the jaggery is suitable for refining into sugar. Now that prohibition has been extended to other districts, demonstrations of the manufacture of improved jaggery will no doubt be carried on at other centres though it may be necessary to develop an outlet for the jaggery for sugar refining purposes, in view of the fact that the Province is already self-sufficient in regard to jaggery production and that any considerably increased production of jaggery, not intended for refining purposes would tend to create a glut in the market.

On the other hand, the production of sugar is, as stated elsewhere, only about one-third of the consumption in the Province. In areas where paddy is produced rice pounding by hand, either by the old method under which a conical plastered pit in the ground and a wooden pounding bar with an iron shoe at one end are used, or by an improved rice pounder such as the one which the Department of Industries is at present experimenting with, would be preferable to rice milling by machinery not only for the employment which hand pounding would provide, but also in the interests of the health of the people as Vitamin B is practically absent in polished rice. The manufacture of school slates at Markapur in the Kurnool district which appears to have been started in 1921 has since developed considerably, the slates finding a gradually increasing sale owing to their cheapness. The splitting, polishing and mounting of the slates is conducted on a cottage industry basis. A slate manufacturing factory at Kallai, Malabar, has also developed and is manufacturing, on a small scale, good quality slates out of slabs imported from Markapur and the proprietors of the factory have acquired a plot of land at Markapur on a mining lease. The greater portion of the wooden frames required for the Markapur industry is supplied from this factory at Kallai. The slate frame manufacturing company at Kallai manufactured during the year 1937-38, 4,320,000 running feet of frames which provided framing for the manufacture of 96,000 dozen of slates. The question whether the Forest department could arrange for the supply of light wood for slate frames, a good deal of which is at present being imported from Hyderabad, has recently been under examination. The glass bangle industry is still carried on in the districts of Kurnool, Bellary and Anantapur and probably in some other districts also, although it is gradually decaying. There should be scope for resuscitating the manufacture of cheap glass bangles provided that suitable coloured glass blocks could be supplied sufficiently cheaply by the glass factory at Madras or arrangements made by the introduction of suitable furnaces for it to be produced locally. It is unlikely that the problem of cottage industry development would be solved by the revival and resuscitation of the existing cottage industries alone, and it is very necessary that steps should be taken to introduce new ones. There would seem to be scope, for instance, for the development of the fruit preservation and canning industry on a cottage as well as on a factory basis, one or two primary societies of fruit growers and canners being formed in each fruit-growing area, and the members of the societies required to use up-to-date steam pressure cookers such as those used in thousands of American homes for domestic canning. In these cookers, the fruits available could be preserved in tins, the tins being closed with a small hand sealing machine. In the districts where primary societies are started, there should be central societies in charge of persons who

have specialized in fruit preservation and these societies would maintain and operate the can-making equipment, consisting of reforming, flanging and double seaming machinery. A class of paints that could be worked as a minor industry with a small capital and with a not elaborate technical training is the manufacture of mixed paints for household use. The possibilities of developing a hand-made paper industry in some areas of the Province would also appear to be reasonably promising in view of the fact that grasses such as 'Botha' (*Cymbopogon Coloratus*) and leaves of certain plants which are available in plenty and have hitherto been regarded as of little economic value could be employed as raw material for the production of pulp. Ten students were deputed to Wardha to receive instruction in the hand-made paper industry and the first batch of students returned in December 1938. Two training centres in paper making, one each for the Tamil and Telugu areas, were opened in 1938-39 the classes being attached to recognized industrial schools, namely, the Harijan Industrial School, Kodambakkam, near Madras and the Bharadwaj Ashram, Peddakadubur, Bellary district. The classes were placed in charge of men who had undergone training in Wardha. Two other industrial schools, one at Rajahmundry and one in Malabar, have on their own initiative started courses in hand-made paper employing the services of men trained at Wardha. The constitution of a coir-working party in Malabar with a view to introducing the spinning of finer and more evenly twisted yarns for which better prices are forthcoming has already been referred to. It is hoped that as a result of this demonstration it will be possible to develop a coir mat and matting industry in Malabar. The possibilities of developing the coir industry in other areas of the Province is receiving attention. Bee-keeping and poultry-rearing are rural industries which seem to offer scope for further development. Other manufactures which could be carried on on a cottage or small scale industry basis are agricultural implements, finished leather goods, soapstone articles, fireworks and crackers, distillation of essential oils, dry cells, toys and school models, rubber dolls, tents, etc., combs in wood and horn, buttons, earthenware, furniture fittings, such as drawer handles, door knobs, hinges and locks, umbrella fittings, electroplated articles, sheet metalware, wire nails and screws, pins, clips, pen-holders and other stationery sundries and brushes.

PROSPECTS OF DEVELOPMENT.

14. We have recounted, albeit somewhat briefly and with an eye to considerations of space, the economic resources of the Province and discussed the industrial development that has taken place in recent years and trade trends. There remains to be considered the possibilities of further developing the economic

resources of the Province which have been referred to. The possibilities of a few industries including the manufacture of alloy steels, of magnesium metal and of titanium oxide, have already been discussed. The chief products of industrial importance, are ground-nuts, hides and skins and cotton, the exports of which in 1937-38 amounted in value to Rs. 879.72 lakhs, Rs. 456.00 lakhs and Rs. 107.58 lakhs, respectively.

Oil seeds and similar products.—These are of great economic importance to the Province owing to the variety of the seeds and the extent of their production. Only a very small percentage however, of the annual outturn of oil-seeds is converted into oil, the greater portion being exported to foreign countries as such. It has been pointed out on numerous occasions that it is unsound economically to export the seeds in large quantities instead of manufacturing oil and oil cake in the Province itself, since not only does it take away from the country much useful material in the form of cattle food and manure, but it also gives the manufacture to other countries. The possibility of exporting groundnut oil has been investigated on various occasions, but it has not been found possible up to the present to develop an export trade with Europe in the oil though an export trade in groundnut oil from Madras has been developed with Rangoon, Kuala Lumpur and Singapore. It seems to be the case that no appreciable expansion of Indian groundnut oil exports can take place unless facilities are provided for exporting the oil in bulk from this country, and it would be necessary to provide not only deep tank facilities on ships but also storage tanks of sufficient capacity at the shipping ports. Government have recently sanctioned the carrying out of a survey of the oil-crushing industry in Madras and when it is completed, the question of developing an export trade with Europe in vegetable oils, especially of groundnut oil, will be further investigated. From the information at present available it would appear that the total capacity of the existing oil mills is in excess of the demand with the result that the crushing capacity of the mills is not fully utilized, so that if the industry is to be further developed, it will be necessary to find new outlets for the oil. An industry based on vegetable oils which would seem to offer scope for development is the manufacture of vegetable ghee and refined and deodorized edible oils since hardened fats are used both in the manufacture of toilet soaps and as a substitute for ghee. At present, Indian manufacturers have to depend largely upon tallow in the manufacture of high-class toilet soaps. Local tallow is of a very indifferent quality and is extremely wasteful to refine, while the quantity available is neither steady nor sufficient. Tallow imported from Australia and other countries is expensive and to that extent soap manufacturers in India who have to use an expensive tallow for high-class soaps are at a disadvantage in

competing with soap-makers in Europe. An assured and cheap supply of tallow substitute prepared from vegetable oils in Madras would give an impetus to the development of the toilet soap industry. "Vegetable product" is a term which has been applied to pure vegetable oils hardened and brought to the consistency of genuine ghee or of butter by a special chemical process of manufacture known as hydrogenation. It has a white granular appearance, resembles very closely genuine ghee and is entirely free from rancidity. Vegetable product manufactured by chemical processes is certainly preferable to anything but pure ghee. The refining and deodorizing of vegetable oils is already carried out at the Kerala Soap Institute and it is hoped that it will be possible eventually to refine and prepare a castor oil suitable for medicinal purposes. The preparation on a laboratory scale of toilet creams, brilliantines, hair oils and dentifrices, etc., has been undertaken at the Kerala Soap Institute. The object of these small-scale experiments is to determine whether creams, brilliantines or other cosmetic articles as such will find a ready sale, can be produced at the Institute, and if the results of the experiments are satisfactory, it is intended to take up the commercial manufacture of the products, since this would not only extend the industrial utilization of some of the raw materials available in the Province, but also enable small concerns to be started and additional employment created, whilst the present volume of imports of cosmetic products would be reduced. Further, the commercial manufacture of the products in the Institute would expand the scope of training at present given to the students. In view of the resources of the Province in essential oil-bearing materials and the desirability of exploiting them to the fullest advantage, experiments in the manufacture of essential oils at the Kerala Soap Institute have been initiated. The object of the scheme of experimental work is to develop an essential oil industry and incidentally to provide, at a reasonable cost, some of the essential oils required for the soap manufacturers of the Province. The prospects of developing an essential oil industry on the West Coast appear to be promising owing to its favourable situation in regard to the supply of raw materials. Experiments on the extraction of essential oils from cloves, ginger, cinnamon, ajowan, zedoary, vetivert, worm-wood, linaloe and patcha have so far been conducted. An industry which has made phenomenal progress in recent years is the cashewnut kernel industry, exports having increased from 4,246 tons valued at Rs. 48.82 lakhs in 1933-34 to 13,167 tons valued at Rs. 124.34 lakhs in 1938-39.

Leather.—There has not been any marked improvement in the Province in utilizing the hides and skins locally available so as to work them up into manufactured form, although there has been some development in the chrome-tanning industry to which a

reference has been made elsewhere. There should be some scope for the further development of the leather goods manufacturing industry in the Province.

Textile industries.—In addition to the imports by sea of yarn and cotton piecegoods, there are also considerable coastwise and rail-borne imports. The imports into the Province from Bombay and Ahmedabad consist mainly of the finer varieties of goods, such as coloured shirtings, bleached twills, sarees, dhoties and mulls; suiting cloth and tussures are also imported to some extent. The tendency in India to-day is to spin finer and finer counts of yarn and to weave superior qualities of cloth with the assistance of imported American and Egyptian cotton and there is room in Madras for the spinning of finer counts of yarn for the production of some of the superior classes of bleached fabrics, whilst there can be no question that having regard to the quality of cotton available in the Province and the market for yarn and piecegoods in it, there is still scope for the setting up of additional mills in some areas. Mention has already been made of the establishment at Mettur of a cotton bleaching and finishing mill and it is to be hoped that more mills of this type will be set up during the next few years. The advent of power from the Papanasam hydro-electric project may stimulate the establishment of further cotton mills in the extreme south of the Province, especially as American and Egyptian cotton required for mixing in the production of finer counts of yarn and superior qualities of cloth, could be imported through Tuticorin. It is understood that power will be available for cotton mills in the area served by the Papanasam project from .4 to .6 anna per unit depending on the load and the rates will therefore be on a par with those charged to the cotton mills in the Pykara area. There would seem to be scope for the setting up of more than one spinning mill in the Ceded districts as a considerable quantity of cotton suitable for the spinning of yarn of coarse and medium counts is grown in the area, whilst large quantities of yarn are imported into the Ceded districts from mills in other parts of the Province as well as from outside. It should redound to the benefit of the considerable number of handloom weavers in the Ceded districts if they could be supplied with their requirements of yarn from local mills. The development of the cotton spinning and weaving industry in the Ceded districts would be greatly facilitated if, as a result of the Tungabhadra project, it was found practicable to introduce the cultivation of irrigated Cambodia cotton as in this case it would be possible to spin yarn of higher counts and to weave finer qualities of cloth. It is very desirable that a larger proportion of the cotton grown in the Province should be worked up into manufactured form, since there is a possibility that the overseas demand for raw cotton may diminish during the next few years. It is a question for close examination whether instead of

setting up additional weaving mills in some areas, the installation of individual power looms driven by electric motors in cottages should not be encouraged, and a close examination of the relative economics of weaving the various styles of cloth on single-power looms and the weaving of similar cloths in mills seems to be indicated in view of the spread of electricity in the Province. Power warp preparation units, for the supply of warp to knitting machines and to cottage cotton power looms, tape and ribbon weaving, hosiery manufacture and silk twisting, should all be encouraged. The question of manufacturing absorbent cotton and surgical wadding has been taken up by an enterprising person in the Madura district who has been granted a loan under the State Aid to Industries Act for the purpose of preparing these products from the short staple cotton available in the area. Another textile industry which offers prospects of development, subject to further investigation, is that of staple fibre which is likely to replace cotton to an increasing extent in the future. The question of establishing the industry in Madras is therefore of great importance. Staple fibre consists of rayon filaments supplied in very short lengths, for spinning into twisted yarn, similar in construction to cotton or worsted yarns on cotton or worsted spinning machinery. The question of utilizing the bamboo available in the vicinity of Mettur as a raw material for the production of cellulose required for the manufacture of staple fibre has been under consideration for some time past and arrangements were made for two companies of standing to send separate consignments of bamboo to Europe for test with a view to ascertaining inter alia the yield of alpha cellulose from bamboo and whether it could be extracted at an economic price. Apart from bamboo, a possible basis of cellulose for the manufacture of staple fibre is the eta reed which is available in quantity in the Tinnevely forests. It is understood that cellulose now being made in Manchuria from reeds has a higher content of alpha cellulose than that made from wood pulp and that the Japanese are using this pulp in the manufacture of rayon. There would therefore seem to be considerable possibilities in regard to the utilization of the eta reed available in the Tinnevely forests for the manufacture of staple fibre. The world depends at present almost entirely for raw cellulose material on high-grade wood pulp and chemical cotton produced from cotton waste or linters. There are distinct possibilities in regard to the setting up of a plant for the utilization of silk waste for the manufacture of spun silk. In the production of raw silk, and in the processes connected with the preparation of the silk yarn for the loom, several valuable by-products, which form the raw material for spun silk, are produced. These by-products are generally termed silk waste. The quantity of silk waste produced in the Kollegal area every year is about 55,000 lb. Spun silk yarn is distinguished for its strength, lustre and purity, and in

India its increasing use in many important weaving centres satisfied the Tariff Board in 1934 that there was in this country a market sufficient to justify any steps which might be taken for its production. Italy and France have well-organized factories in which, in addition to waste produced locally, large quantities of imported silk waste are also consumed, and although England is not a silk-producing country, she manufactures spun silk from waste silk imported from China and India. Japan which was formerly exporting silk waste has also set up plants for the utilization of the waste silk. It is very desirable therefore that the silk waste produced in Kollegal, which has up to now been exported, should be retained in the country and converted into spun silk, thus reducing the import of silk yarn. An intimate connexion exists between the price of silk waste and the prosperity of the raw silk industry and if the price of this by-product improves, it must inevitably reduce the cost of production of raw silk. The setting up of a waste silk plant would also give a distinct impetus to the ericulture industry which has been referred to elsewhere as it would provide an assured outlet for the eri cocoons which could also be utilized for the manufacture of spun silk. It is doubtful whether the Mysore waste silk plant will be able to absorb the eri cocoons produced in this Province and if this proves to be the case the question of setting up a plant for the manufacture of spun silk from silk waste and eri cocoons will have to be actively investigated.

Sugar.—There are 13 cane and palmyra sugar factories in the Province, but the production of sugar is only about one-third of the estimated consumption. There should therefore be scope for the further development of the sugar industry in the Province provided that a reasonable level of prices is maintained. In Madras, the main difficulty attending the further development of the industry is the comparative absence of areas under sugarcane sufficient in extent to support sugar factories of a size generally regarded as representing an economic unit, and this explains why some sugar factories of small capacity have come into existence. These small sugar factories were planned and set up before even the original excise duty was thought of, and they have not yet been established on a profitable basis. In general, the situation of the sugar industry in Madras calls for the better organization of the factories on the agricultural side and the introduction of early and late ripening varieties of cane which would enable the crushing season to be prolonged and permit of the factories obtaining a higher average recovery on the season. As prohibition is extended to more and more districts in the Province, it may be possible to produce on an appreciable scale, palmyra and coconut jaggery for refining into sugar and in that way to lessen the gap between the production and consumption of sugar in the Province.

Fertilizers and insecticides.—Madras is mostly an agricultural Province and its prosperity depends largely upon its agricultural production. The two essentials for intensive cultivation are water and fertilizers. A great deal has been done in Madras to extend the benefits of irrigation, but as regards the production of fertilizers very little has been attempted with the result that the Province has to rely upon foreign imports. This is not a satisfactory position from an economic point of view, and further, in the event of international complications arising, there is always the possibility of an interruption in the supply of fertilizers which have become essential to the agricultural population and in such an eventuality the yield of crops and the return to the cultivator would fall off. It is very desirable, therefore, that a real effort should be made to establish the fertilizer industry in India and since Madras accounts for about half the imports of ammonium sulphate, it would only be in the fitness of things for the industry to be developed in this Province. The total value of manures imported into Madras during the year 1938-39 amounted to Rs. 51.65 lakhs. The present annual consumption of ammonium sulphate itself in the Madras Province, Mysore, Travancore and Cochin, may be taken at about 35,000 tons, of which 32,000 tons went into consumption as ammonium sulphate and the remaining 3,000 tons were used for mixed fertilizers. India imports about 60,000 tons of ammonium sulphate worth about Rs. 60 lakhs per year and about half this quantity appears to be consumed in South India. Imports into India have increased by nearly 36,000 tons during the last five years. The manufacture of ammonia either from by-product hydrogen or from hydrogen derived from the electrolysis of water seems destined to become a very important industry in India as once the industry is started it should expand considerably as the demand for the fertilizer increases. The chief raw materials required for the manufacture of synthetic ammonia are nitrogen and hydrogen which are combined under certain conditions to give rise to ammonia. As far as nitrogen is concerned, there is no difficulty in its manufacture as it can readily be obtained by the liquefaction of air. All that is required for manufacturing nitrogen is power which is utilized to liquefy the air from which pure nitrogen is derived by fractional distillation. The other raw material, namely, hydrogen, is more difficult and costlier to obtain than nitrogen. In fact, the cost at which hydrogen can be manufactured determines the cost of manufacture of ammonium sulphate. The only method by which hydrogen could be prepared at Mettur would be by the electrolysis of water, though if a steel industry is developed in the Salem district an appreciable quantity of hydrogen will be produced from the furnace gases. The possibilities of establishing a plant at Mettur for the manufacture of ammonium sulphate have been examined on the assumption that at least 12,500 K.W. of electric energy will be available at Rs. 40 per K.W. of demand for a year of eight

benefit to the cottage industrialists. It may be necessary later on in the light of the experience gained in the running of the museum, to consider the establishment of an emporium and show room for the products of cottage industries in which not only would samples be displayed, but retail sales effected and possibly wholesale orders executed. As a result of the initiative of the Hon. Minister for Industries and Labour, district museums for the products of cottage industries have already been established at Tinnevely, Vellore and Mangalore and it is probably only a question of time for each district to have a museum of this description. In many cottage industries there is great scope for the introduction of improved apparatus and appliances, and the question of providing facilities for the conduct of experiments in connexion with the devising of such appliances is engaging attention.

Handloom weaving.—The handloom weaving industry of the Province and the ancillary operations connected with it, in India as a whole, ranks in importance and magnitude next only to agriculture. From the standpoint of the well being of the rural population, the industry plays a conspicuous part as there is no other occupation so remunerative as weaving to absorb the population not engaged in agriculture, or to keep the agriculturists occupied when there is no work for them in the fields. It serves also as a suitable part-time occupation for the families of the agriculturists. The question of affording adequate protection to the handloom weavers is beset with many difficulties and it is indeed a complex problem to reconcile the different interests of the large mass of cottage workers, the Indian mills, and the consuming public with their desire for cheap cloth, even though it may be conceded that the interests of the cottage workers should be paramount. In recent years, handloom weavers have had to face increasing competition from Indian mill-made fabrics, and disquieting reports and a number of representations have been received from handloom weaving centres in regard to the state of unemployment which prevails in them. Nevertheless up to last year the handloom weaving industry of the Province appears to have held its own fairly well judged from the statistics of the quantity of cotton yarn left over for consumption by handloom weavers, the figures being 78.8 million pounds in 1934-35, 83.4 million pounds in 1935-36, 86.8 million pounds in 1936-37 and 75.7 million pounds in 1937-38 as compared with an average annual consumption of 59 million pounds in the decade ending with the year 1920-21. No entirely satisfactory explanation of the apparent paradox of increased yarn consumption and growing unemployment is forthcoming, although it is possible that owing to the depression in agriculture, more people have taken to handloom weaving and that there are now more handloom weavers than there is work for. There is the possibility also that the handloom weavers are now weaving more coarse cloth than

formerly. The consumption of yarn by handloom weavers, however, after rising steadily during the years 1933-34 to 1936-37 showed a decline in the year 1937-38 to 75.7 million pounds, and there is ground for apprehension that from now onwards, the industry may find it increasingly difficult to maintain its position in view of the ever-growing competition of mill cloth. If statistics of the five years ending 1937-38 of the yardage of piece-goods of (i) foreign origin, (ii) Indian mill origin, and (iii) produced by handlooms, are examined, it will be seen that in only one year—1937-38—was the handloom weaving industry in the Province less than four times as important as the power loom industry in respect of production, whilst it is of course many times more important in respect of the employment which it provides. The statistics show that the consumption in the Madras Province of foreign cloth, is steadily decreasing and that the competition which handloom cloth has mostly to fear is that of the Indian mills. In the last few years there has been a growing volume of public opinion in favour of some adjustment of the spheres of production of the power loom and the handloom and regulation of the classes of fabrics to be produced by each. This difficult and complex question is at present under the consideration of Government. Suffice it to say that the adoption of measures to bring about the adjustment of production of the power loom and the handloom or to restrict the production of mill cloth by a quota or otherwise would involve the introduction of legislation by the Government of India and would have to apply to the whole of India including the Indian States, the latter of which might, or might not, be prepared to co-operate. In 1937, the Madras Government enacted a law under which dealers of cloth in this Province are required to obtain a licence and a fee is levied on shops dealing in mill cloth at the rate of Rs. 2 per annum where the monthly turnover does not exceed Rs. 5,000 and Rs. 5 in other cases. As an alternative to the regulation of production between the power mill and the handloom, protection could be afforded to the handloom weaver by increasing the present scale of licence fee imposed on dealers of mill cloth to an extent which would in itself be sufficient to offset the higher cost of handloom cloth in relation to mill cloth and to render it unremunerative for dealers of mill cloth to ply their trade in rural areas.

In 1934, the Government of India announced their decision to assist by the grant of a subsidy, schemes drawn up by Provincial Governments for developing co-operative buying and selling on behalf of the cotton handloom weavers and generally for the better organization and improvement of the handloom weaving industry. The scheme prepared by the Madras Department of Industries and approved by the Government of India provided for the setting up of a central weavers' co-operative society at Madras with a number of district primary production societies

linked to it. The production societies are assisted by the central society in securing supplies of raw materials such as yarn, dye-stuffs, chemicals and also improved appliances and designs, and in the disposal of the surplus stock of goods left over after local sales. In pursuance of the scheme, a Provincial society was formed under the name of the Madras Handloom Weavers Provincial Co-operative Society, Ltd., and it was registered under the Madras Co-operative Societies Act VI of 1932 with an authorized share capital of Rs. 5 lakhs divided into 10,000 shares of Rs. 50 each. The Provincial society is rendering useful service to the handloom weaving industry through the affiliated production societies in the several districts, the central emporium and sales depots which have been established in order to popularize and find an outlet for the cloth produced by the primary weavers societies, and the district staff of supervisors. With the initial facilities afforded by the Provincial society, departmental hand sizing machines have been taken up by two of the affiliated societies. The Provincial society maintains an emporium at Madras and sales depots at Bezwada, Bellary, Calicut, Vellore, Madura, Tinnevely and Coimbatore. If certain classes of handloom cloth are to compete with mill made cloth and sales are to be effected in bulk, the goods will have to be finished and calendered and arrangements are in progress for the setting up of a power driven finishing and calendering plant. A number of new designs for hand-woven cloths have been introduced. On 31st March 1939, there were on the rolls of the Provincial society 131 weavers co-operative societies, 88 individual members, 27 central banks and co-operative societies and nine firms, and the paid-up share capital amounted to Rs. 37,835. During the year, 40 additional societies were given subsidies to meet their establishment charges and for financing the purchase of appliances and the total amount of subsidies so provided was Rs. 25,817. The policy of issuing cash credit loans to supplying yarn, on the guarantee of the Provincial Society and advancing money on goods sent for sale by the primary societies was continued in 1938-39 and the Provincial Society sanctioned cash credit loans to the extent of Rs. 96,350 and yarn guarantees of Rs. 55,463. Yarn to the value of Rs. 30,284 was supplied on the guarantee of the Provincial Society to the primary societies from the approved mills. Sales to the value of Rs. 86,623 were effected by the sales depots. The total sales of the primary societies during the year amounted to Rs. 5,48,683.

Hand spinning.—A provision of Rs. 2,00,000 was made in the budget for 1938-39 for the development of the hand spinning and khadi industry but this was not fully utilized and a similar provision has been made in the budget for the current year for the purpose. The All-India Spinners' Association submitted a scheme for the utilization of the provision of Rs. 2,00,000 in 1938-39 and Government sanctioned an amount of Rs. 90,162 to be utilized by

the branches of the All-India Spinners' Association for the Tamil Nadu (Tiruppur), Kerala (Payanur) and Andhra (Masulipatam), to finance the designing, manufacturing and supply of gins, bows with guts, and spindles with thin pulleys, speed wheels, vertical and horizontal charkas, fly shuttle looms and fittings and also for the conduct of research work in carding, spinning and printing, dyeing and weaving, and for the training of 86 workers and the employment of these workers as instructors in the villages with a view to increasing the efficiency of the artisans and the implements used. The All-India Spinners' Association considered it essential that in addition to this grant, a subsidy should be provided to cover possible losses caused by inexperienced workers in the initial stage and also to enable it to give adequate wages to the spinners and other artisans, and suggested that it should be based on the actual increase in the production effected during the year. Government, therefore, granted a subsidy up to a maximum of Rs. 1,00,257 on the actual increase of production of khadi during the year calculated at the rate of one-anna per square yard of increase. Special provision has been made for the organization of hand-spinning centres in the Bellary and Kurnool districts and in Moplanad.

Woollen cumblly weaving industry.—The spinning of wool and the weaving of blankets and cumblies is an important industry in the districts of Anantapur, Bellary, Kurnool and Kistna where the number of looms engaged in the weaving of cumblies is 1,671, 860, 295, and 189 respectively. The cumblly industry is largely carried on as a part-time occupation mostly by Kurubas who belong to the shepherd class. The industry does not provide continuity of work for the Kurubas owing to the lack of pastures for sheep, and an improvement in the breed of sheep should be aimed at with a view to improving the quantity and quality of wool supply. From the year 1937, the Government of India has provided a subvention for the benefit of the cottage and small scale woollen industries in the several provinces and the assistance to the woollen industries in Madras has taken the form of (i) organization of co-operative societies in the cumblly weaving areas and the establishment of a sales depot at Bellary for marketing their products, (ii) organization of a central co-operative society of weavers engaged in the pile carpet industry at Ellore, and (iii) employment of a designer to assist in the development of both sections of the industry. Four cumblly weaving societies have been started—one at Kudatini, an important cumblly weaving village, and another at Bisalahalli in the Bellary district, and at Kanumolu in Kistna and Dharmajigudem in West Godavari districts. In the depot at Bellary, samples of cumblies are exhibited and sold, and merchants and other buyers are placed in touch with the production societies. Active steps are being taken to extend and develop the market for cumblies to the extent that this is

possible. The object of the formation of the cumbly-weaving societies is to assist the cumbly weavers by arranging for the joint purchase of wool and sale of the cumblies, whilst demonstrations of the use of the fly shuttle loom with a view to increasing the daily output of the cumbly weavers and so reducing to some extent the cost of production and also of the working of the hand-driven warping and sizing machines for preparing long woollen warps are being given in the villages. Demonstrators have been appointed to train the local weavers in the use of the fly shuttle loom. The capital required for the purchase and introduction of improved appliances, working capital and also the recurring expenditure of the societies is provided from the Government of India subvention grant, whilst the pay of the demonstrators is met from Provincial funds. A co-operative inspector has also been appointed to supervise and assist the working of the societies. The cumbly-weaving societies are undoubtedly of considerable assistance to the weavers in arranging for the supply of wool, and the disposal of the finished cumblies, but it is only too apparent that the great need of the cumbly-weaving industry is the provision of additional pastures for sheep in order to improve their breed and to augment the supply of cut wool and the deterioration in the condition of the industry in the Ceded districts may be traced largely to lack of suitable grazing facilities for the sheep. Another adverse factor affecting the industry is the scarcity and high cost of wool, as much of the wool produced locally appears to be bought by agents from Bombay and Bangalore.

Ellore pile carpet industry.—The cost of running the Ellore Pile Carpet Weavers' Society, which was registered in June 1937, is met partly from the Government of India grant and partly from funds made available by the Provincial Government, the Government of India providing the working capital and defraying the rent, pay of the designer and special co-operative inspector and their travelling allowance and the pay of the clerk and peon, and the Provincial Government meeting the cost of the dye-house equipment, rent of the dye-house and the pay of the dyer and the day watchman besides some miscellaneous expenditure. The possibilities of developing the Australian and United Kingdom markets for Ellore carpets is receiving close attention. An overseas order for a thousand square yards was executed by the society. Arrangements for the appointment of sole agents for the sale of the society's carpets in the United Kingdom and Bombay were in progress at the end of 1938-39, whilst a few samples of the carpets produced have been sent to America for exhibition at the World's Fair at New York. The organization that has been set up is capable of supplying carpets of good quality and uniform standard provided a demand can be created for them, and it is hoped that, as a result of the efforts made to extend the demand for these carpets, employment will be found over a period for an increased number of weavers at Ellore.

Sericulture.—The Kollegal taluk of the Coimbatore district is the only centre where the rearing of silk worms and the reeling of cocoons are carried on on an intensive scale under purely cottage conditions, and sericulture forms the main occupation of the people in almost all the villages. In 1937–38, about 7,060 acres were devoted to mulberry cultivation in the Kollegal taluk against 15,387 acres in 1924–25, the reduction in acreage being attributable to the fall in the price of silk and the inadequate rate of protection accorded to the industry. In 1938–39 the area under mulberry declined to 5,735 acres on account of the total failure of rains. In the year 1919, it was found that the rearers of Kollegal were losing two out of every six or seven silk worm crops raised annually by them owing to (i) the prevalence of the disease ‘pebrine’ in the untested silk worm seeds used by the rearers, and (ii) the irrational methods of rearing adopted by the rearers owing to their ignorance of scientific methods resulting in a yield of only 25 lb. of cocoons for every 100 layings. In order to minimize the losses of the rearers, the problem has been tackled in two directions, namely, (i) by the production and distribution of ‘Cellular’ seed so as to eradicate pebrine, and (ii) by improving the methods of rearing. The first Tariff Board, as also the Industries Conference, held at Simla in 1934, considered that the distribution of ‘Cellular’ seed was the first problem which had to be solved if sericulture was to be improved and developed, and as a result, the Government of India decided to distribute annually for five years among the several provinces, grants amounting to rupees one lakh a year. A subvention was granted to Madras for the purpose of increasing the supply of tested seed with a view to rendering Kollegal self-sufficing in the matter of its tested seeds supply within five years, as also for the conduct of such research on pebrine as was possible in connexion therewith. Since then the supply and distribution of cellular seed has been gradually increasing and in 1937–38, as much as 93 per cent of the total seed requirements of the Kollegal taluk were met by ‘Cellular’ seed, thus practically solving the first important problem of controlling the pebrine disease. By successful demonstration and propaganda, the rearer who is the cause of most of the diseases has also been shown how to adopt scientific methods of rearing. In the result, the quality of the cocoons produced to-day is far superior to that of the cocoons produced in 1919, the normal yield now being 50 lb of cocoons with cross-breeds and 35 lb. with pure Mysore variety for every 100 layings as against 25 lb. some years ago. Not satisfied with this achievement, the Department of Industries has been endeavouring to evolve a hardier race of worms that would yield cocoons of a superior quality with richer silk content, and has been conducting a series of experiments and researches with a view to (i) enhancing the rearer’s and reeler’s income, and (ii) bringing down the cost of production of raw silk, to such a level as would enable it to compete with the high quality imported silk. Attention will now be concentrated on the production of

cross-breed seeds which are proving very popular in Kollegal owing to the benefits derived by the rearers in the shape of (i) increased yield of cocoons to the extent of 40 per cent more than that of pure Mysore, (ii) richer silk content enabling an increased output of raw silk to be obtained, (iii) shorter period required for rearing, (iv) higher prices realized than for pure Mysore to the extent of four to eight annas per maund, (v) greater resistance to disease, and (vi) less quantity of leaves required to produce one pound of cocoons. A programme has been drawn up under which, it is hoped, to supply cent per cent of the seed requirements of the Kollegal taluk in the form of cross-breed seeds within a period of five years. If this programme is put into effect and adequate protection is afforded, there seems no reason why the acreage under mulberry cultivation in Kollegal should not gradually increase from the present figure of 7,000 acres to 25,000 acres and the production of silk from its present level of 111,000 lb. to 500,000 lb.

Ericulture.—The Department of Industries has pioneered in recent years a new industry called ericulture which is the culture of silk worms that feed on castor leaves. These worms are bred entirely in cottages. The eri worm is hardier than the mulberry worm and as no life taking is involved as in sericulture which is against Hindu sentiment it is easier to propagate. There are about 250,000 acres under castor cultivation in the Province chiefly in the Northern Circars, Ceded districts and the Central districts, and the cultivation now is for seed purposes only. If the castor leaves now wasted are utilized to rear the eri worms, an important industry can be developed without any detriment to the seed. Ericulture is pre-eminently suitable for development as a cottage industry as the apparatus is inexpensive and the work involved is simple and can be carried on by women and children in their spare time in their own homes. Demonstrations of eri silk worm rearing have been successfully carried out at different centres of the Province, but little progress has been made with the development of the industry as there is little or no demand in South India at present for cloth woven from the yarn spun from eri cocoons. The outlook has altered considerably, consequent on the Mysore Government having set up a waste silk spinning plant in the Mysore State and enquiries are proceeding as to whether the plant will be in a position to absorb the eri cocoons produced in Madras at a price of about As. 8 per pound. If it is not found possible to develop this outlet for eri cocoons, the question of setting up a plant for the manufacture of spun silk from silk waste in Madras will have to be actively investigated, endeavours also being made to spin a better yarn from which a saleable cloth can be woven.

Other small industries.—Apart from textiles, including sericulture, which have already been referred to, the more important

of the non-textile cottage industries in the Province include, basketware, brassware, bronze and bell-metalware, copperware, metalware, cigars and cheroots, coir working, rattan work, slate manufacture and toys. A reference to the village tanning industry has been made earlier in this note and need not be again referred to. Oilseed crushing is practised as a village industry on a considerable scale. During the year 1938-39, eight candidates were deputed to Wardha for training in oil pressing and they completed their course satisfactorily. Their claims for employment as teachers in the Government or aided industrial schools are kept in view and those among them who desire to start the industry in their own places have been encouraged to apply for financial assistance under the Madras State Aid to Industries Act 1922. Soap manufacture and the process of refining vegetable oils on a cottage industry scale, as evolved in the Kerala Soap Institute, Calicut, is a suitable rural industry since most of the raw materials are available in the Province, and the processes involved are fairly simple, whilst plant of the cheapest description may be employed and the demand for soap is decidedly on the increase. Some of the vegetable oils extracted in the villages could be utilized, and if the villagers are properly instructed, cheap washing soaps of good quality could be manufactured and sold at low prices. The Department of Industries has conducted demonstrations of white sugar manufacture from palmyra juice with the aid of centrifugals at Rettakulam in the Tinnevely district and at Navadur in the West Godavari district, and the results of these experiments went to show that it is possible to prepare from palmyra juice, jaggery of a superior quality, which should realize a higher price than the jaggery at present prepared, that it would generally be more profitable to prepare improved jaggery than sugar and that this is likely to remain the case unless a greater yield of sugar is obtained or the price of jaggery declines appreciably. Steps are in progress for organizing co-operative societies for preparing improved jaggery in the West Godavari district. There seems no reason why the preparation of jaggery from sweet toddy should not be extended and developed in the palmyra and date palm tracts. With a view to finding employment for the former fermented toddy tappers, successful demonstrations of the manufacture of improved jaggery from coconut and palmyra sweet toddy were carried out by the Department of Industries in the Salem district, and it was shown that a superior quality of jaggery could be prepared from coconut sweet toddy and that the jaggery is suitable for refining into sugar. Now that prohibition has been extended to other districts, demonstrations of the manufacture of improved jaggery will no doubt be carried on at other centres though it may be necessary to develop an outlet for the jaggery for sugar refining purposes, in view of the fact that the Province is already self-sufficient in regard to jaggery production and that any considerably increased production of jaggery, not intended for refining purposes would tend to create a glut in the market.

On the other hand, the production of sugar is, as stated elsewhere, only about one-third of the consumption in the Province. In areas where paddy is produced rice pounding by hand, either by the old method under which a conical plastered pit in the ground and a wooden pounding bar with an iron shoe at one end are used, or by an improved rice pounder such as the one which the Department of Industries is at present experimenting with, would be preferable to rice milling by machinery not only for the employment which hand pounding would provide, but also in the interests of the health of the people as Vitamin B is practically absent in polished rice. The manufacture of school slates at Markapur in the Kurnool district which appears to have been started in 1921 has since developed considerably, the slates finding a gradually increasing sale owing to their cheapness. The splitting, polishing and mounting of the slates is conducted on a cottage industry basis. A slate manufacturing factory at Kallai, Malabar, has also developed and is manufacturing, on a small scale, good quality slates out of slabs imported from Markapur and the proprietors of the factory have acquired a plot of land at Markapur on a mining lease. The greater portion of the wooden frames required for the Markapur industry is supplied from this factory at Kallai. The slate frame manufacturing company at Kallai manufactured during the year 1937-38, 4,320,000 running feet of frames which provided framing for the manufacture of 96,000 dozen of slates. The question whether the Forest department could arrange for the supply of light wood for slate frames, a good deal of which is at present being imported from Hyderabad, has recently been under examination. The glass bangle industry is still carried on in the districts of Kurnool, Bellary and Anantapur and probably in some other districts also, although it is gradually decaying. There should be scope for resuscitating the manufacture of cheap glass bangles provided that suitable coloured glass blocks could be supplied sufficiently cheaply by the glass factory at Madras or arrangements made by the introduction of suitable furnaces for it to be produced locally. It is unlikely that the problem of cottage industry development would be solved by the revival and resuscitation of the existing cottage industries alone, and it is very necessary that steps should be taken to introduce new ones. There would seem to be scope, for instance, for the development of the fruit preservation and canning industry on a cottage as well as on a factory basis, one or two primary societies of fruit growers and canners being formed in each fruit-growing area, and the members of the societies required to use up-to-date steam pressure cookers such as those used in thousands of American homes for domestic canning. In these cookers, the fruits available could be preserved in tins, the tins being closed with a small hand sealing machine. In the districts where primary societies are started, there should be central societies in charge of persons who

have specialized in fruit preservation and these societies would maintain and operate the can-making equipment, consisting of reforming, flanging and double seaming machinery. A class of paints that could be worked as a minor industry with a small capital and with a not elaborate technical training is the manufacture of mixed paints for household use. The possibilities of developing a hand-made paper industry in some areas of the Province would also appear to be reasonably promising in view of the fact that grasses such as 'Botha' (*Cymbopogon Coloratus*) and leaves of certain plants which are available in plenty and have hitherto been regarded as of little economic value could be employed as raw material for the production of pulp. Ten students were deputed to Wardha to receive instruction in the hand-made paper industry and the first batch of students returned in December 1938. Two training centres in paper making, one each for the Tamil and Telugu areas, were opened in 1938-39 the classes being attached to recognized industrial schools, namely, the Harijan Industrial School, Kodambakkam, near Madras and the Bharadwaj Ashram, Peddakadubur, Bellary district. The classes were placed in charge of men who had undergone training in Wardha. Two other industrial schools, one at Rajahmundry and one in Malabar, have on their own initiative started courses in hand-made paper employing the services of men trained at Wardha. The constitution of a coir-working party in Malabar with a view to introducing the spinning of finer and more evenly twisted yarns for which better prices are forthcoming has already been referred to. It is hoped that as a result of this demonstration it will be possible to develop a coir mat and matting industry in Malabar. The possibilities of developing the coir industry in other areas of the Province is receiving attention. Bee-keeping and poultry-rearing are rural industries which seem to offer scope for further development. Other manufactures which could be carried on on a cottage or small scale industry basis are agricultural implements, finished leather goods, soapstone articles, fireworks and crackers, distillation of essential oils, dry cells, toys and school models, rubber dolls, tents, etc., combs in wood and horn, buttons, earthenware, furniture fittings, such as drawer handles, door knobs, hinges and locks, umbrella fittings, electroplated articles, sheet metalware, wire nails and screws, pins, clips, pen-holders and other stationery sundries and brushes.

PROSPECTS OF DEVELOPMENT.

14. We have recounted, albeit somewhat briefly and with an eye to considerations of space, the economic resources of the Province and discussed the industrial development that has taken place in recent years and trade trends. There remains to be considered the possibilities of further developing the economic

resources of the Province which have been referred to. The possibilities of a few industries including the manufacture of alloy steels, of magnesium metal and of titanium oxide, have already been discussed. The chief products of industrial importance are groundnuts, hides and skins and cotton, the exports of which in 1937-38 amounted in value to Rs. 879.72 lakhs, Rs. 456.00 lakhs and Rs. 107.58 lakhs, respectively.

Oil seeds and similar products.—These are of great economic importance to the Province owing to the variety of the seeds and the extent of their production. Only a very small percentage however, of the annual outturn of oil-seeds is converted into oil, the greater portion being exported to foreign countries as such. It has been pointed out on numerous occasions that it is unsound economically to export the seeds in large quantities instead of manufacturing oil and oil cake in the Province itself, since not only does it take away from the country much useful material in the form of cattle food and manure, but it also gives the manufacture to other countries. The possibility of exporting groundnut oil has been investigated on various occasions, but it has not been found possible up to the present to develop an export trade with Europe in the oil though an export trade in groundnut oil from Madras has been developed with Rangoon, Kuala Lumpur and Singapore. It seems to be the case that no appreciable expansion of Indian groundnut oil exports can take place unless facilities are provided for exporting the oil in bulk from this country, and it would be necessary to provide not only deep tank facilities on ships but also storage tanks of sufficient capacity at the shipping ports. Government have recently sanctioned the carrying out of a survey of the oil-crushing industry in Madras and when it is completed, the question of developing an export trade with Europe in vegetable oils, especially of groundnut oil, will be further investigated. From the information at present available it would appear that the total capacity of the existing oil mills is in excess of the demand with the result that the crushing capacity of the mills is not fully utilized, so that if the industry is to be further developed, it will be necessary to find new outlets for the oil. An industry based on vegetable oils which would seem to offer scope for development is the manufacture of vegetable ghee and refined and deodorized edible oils since hardened fats are used both in the manufacture of toilet soaps and as a substitute for ghee. At present, Indian manufacturers have to depend largely upon tallow in the manufacture of high-class toilet soaps. Local tallow is of a very indifferent quality and is extremely wasteful to refine, while the quantity available is neither steady nor sufficient. Tallow imported from Australia and other countries is expensive and to that extent soap manufacturers in India who have to use an expensive tallow for high-class soaps are at a disadvantage in

competing with soap-makers in Europe. An assured and cheap supply of tallow substitute prepared from vegetable oils in Madras would give an impetus to the development of the toilet soap industry. "Vegetable product" is a term which has been applied to pure vegetable oils hardened and brought to the consistency of genuine ghee or of butter by a special chemical process of manufacture known as hydrogenation. It has a white granular appearance, resembles very closely genuine ghee and is entirely free from rancidity. Vegetable product manufactured by chemical processes is certainly preferable to anything but pure ghee. The refining and deodorizing of vegetable oils is already carried out at the Kerala Soap Institute and it is hoped that it will be possible eventually to refine and prepare a castor oil suitable for medicinal purposes. The preparation on a laboratory scale of toilet creams, brilliantines, hair oils and dentifrices, etc., has been undertaken at the Kerala Soap Institute. The object of these small-scale experiments is to determine whether creams, brilliantines or other cosmetic articles as such will find a ready sale, can be produced at the Institute, and if the results of the experiments are satisfactory, it is intended to take up the commercial manufacture of the products, since this would not only extend the industrial utilization of some of the raw materials available in the Province, but also enable small concerns to be started and additional employment created, whilst the present volume of imports of cosmetic products would be reduced. Further, the commercial manufacture of the products in the Institute would expand the scope of training at present given to the students. In view of the resources of the Province in essential oil-bearing materials and the desirability of exploiting them to the fullest advantage, experiments in the manufacture of essential oils at the Kerala Soap Institute have been initiated. The object of the scheme of experimental work is to develop an essential oil industry and incidentally to provide, at a reasonable cost, some of the essential oils required for the soap manufacturers of the Province. The prospects of developing an essential oil industry on the West Coast appear to be promising owing to its favourable situation in regard to the supply of raw materials. Experiments on the extraction of essential oils from cloves, ginger, cinnamon, ajowan, zedoary, vetivert, worm-wood, linaloe and patcha have so far been conducted. An industry which has made phenomenal progress in recent years is the cashewnut kernel industry, exports having increased from 4,246 tons valued at Rs. 48.82 lakhs in 1933-34 to 13,167 tons valued at Rs. 124.34 lakhs in 1938-39.

Leather.—There has not been any marked improvement in the Province in utilizing the hides and skins locally available so as to work them up into manufactured form, although there has been some development in the chrome-tanning industry to which a

reference has been made elsewhere. There should be some scope for the further development of the leather goods manufacturing industry in the Province.

Textile industries.—In addition to the imports by sea of yarn and cotton piecegoods, there are also considerable coastwise and rail-borne imports. The imports into the Province from Bombay and Ahmedabad consist mainly of the finer varieties of goods, such as coloured shirtings, bleached twills, sarees, dhoties and mulls; suiting cloth and tussures are also imported to some extent. The tendency in India to-day is to spin finer and finer counts of yarn and to weave superior qualities of cloth with the assistance of imported American and Egyptian cotton and there is room in Madras for the spinning of finer counts of yarn for the production of some of the superior classes of bleached fabrics, whilst there can be no question that having regard to the quality of cotton available in the Province and the market for yarn and piecegoods in it, there is still scope for the setting up of additional mills in some areas. Mention has already been made of the establishment at Mettur of a cotton bleaching and finishing mill and it is to be hoped that more mills of this type will be set up during the next few years. The advent of power from the Papanasam hydro-electric project may stimulate the establishment of further cotton mills in the extreme south of the Province, especially as American and Egyptian cotton required for mixing in the production of finer counts of yarn and superior qualities of cloth, could be imported through Tuticorin. It is understood that power will be available for cotton mills in the area served by the Papanasam project from 4 to 6 anna per unit depending on the load and the rates will therefore be on a par with those charged to the cotton mills in the Pykara area. There would seem to be scope for the setting up of more than one spinning mill in the Ceded districts as a considerable quantity of cotton suitable for the spinning of yarn of coarse and medium counts is grown in the area, whilst large quantities of yarn are imported into the Ceded districts from mills in other parts of the Province as well as from outside. It should redound to the benefit of the considerable number of handloom weavers in the Ceded districts if they could be supplied with their requirements of yarn from local mills. The development of the cotton spinning and weaving industry in the Ceded districts would be greatly facilitated if, as a result of the Tungabhadra project, it was found practicable to introduce the cultivation of irrigated Cambodia cotton as in this case it would be possible to spin yarn of higher counts and to weave finer qualities of cloth. It is very desirable that a larger proportion of the cotton grown in the Province should be worked up into manufactured form, since there is a possibility that the overseas demand for raw cotton may diminish during the next few years. It is a question for close examination whether instead of

setting up additional weaving mills in some areas, the installation of individual power looms driven by electric motors in cottages should not be encouraged, and a close examination of the relative economics of weaving the various styles of cloth on single-power looms and the weaving of similar cloths in mills seems to be indicated in view of the spread of electricity in the Province. Power warp preparation units, for the supply of warp to knitting machines and to cottage cotton power looms, tape and ribbon weaving, hosiery manufacture and silk twisting, should all be encouraged. The question of manufacturing absorbent cotton and surgical wadding has been taken up by an enterprising person in the Madura district who has been granted a loan under the State Aid to Industries Act for the purpose of preparing these products from the short staple cotton available in the area. Another textile industry which offers prospects of development, subject to further investigation, is that of staple fibre which is likely to replace cotton to an increasing extent in the future. The question of establishing the industry in Madras is therefore of great importance. Staple fibre consists of rayon filaments supplied in very short lengths, for spinning into twisted yarn, similar in construction to cotton or worsted yarns on cotton or worsted spinning machinery. The question of utilizing the bamboo available in the vicinity of Mettur as a raw material for the production of cellulose required for the manufacture of staple fibre has been under consideration for some time past and arrangements were made for two companies of standing to send separate consignments of bamboo to Europe for test with a view to ascertaining inter alia the yield of alpha cellulose from bamboo and whether it could be extracted at an economic price. Apart from bamboo, a possible basis of cellulose for the manufacture of staple fibre is the eta reed which is available in quantity in the Tinnevely forests. It is understood that cellulose now being made in Manchuria from reeds has a higher content of alpha cellulose than that made from wood pulp and that the Japanese are using this pulp in the manufacture of rayon. There would therefore seem to be considerable possibilities in regard to the utilization of the eta reed available in the Tinnevely forests for the manufacture of staple fibre. The world depends at present almost entirely for raw cellulose material on high-grade wood pulp and chemical cotton produced from cotton waste or linters. There are distinct possibilities in regard to the setting up of a plant for the utilization of silk waste for the manufacture of spun silk. In the production of raw silk, and in the processes connected with the preparation of the silk yarn for the loom, several valuable by-products, which form the raw material for spun silk, are produced. These by-products are generally termed silk waste. The quantity of silk waste produced in the Kollegal area every year is about 55,000 lb. Spun silk yarn is distinguished for its strength, lustre and purity, and in

India its increasing use in many important weaving centres satisfied the Tariff Board in 1934 that there was in this country a market sufficient to justify any steps which might be taken for its production. Italy and France have well-organized factories in which, in addition to waste produced locally, large quantities of imported silk waste are also consumed, and although England is not a silk-producing country, she manufactures spun silk from waste silk imported from China and India. Japan which was formerly exporting silk waste has also set up plants for the utilization of the waste silk. It is very desirable therefore that the silk waste produced in Kollegal, which has up to now been exported, should be retained in the country and converted into spun silk, thus reducing the import of silk yarn. An intimate connexion exists between the price of silk waste and the prosperity of the raw silk industry and if the price of this by-product improves, it must inevitably reduce the cost of production of raw silk. The setting up of a waste silk plant would also give a distinct impetus to the ericulture industry which has been referred to elsewhere as it would provide an assured outlet for the eri cocoons which could also be utilized for the manufacture of spun silk. It is doubtful whether the Mysore waste silk plant will be able to absorb the eri cocoons produced in this Province and if this proves to be the case the question of setting up a plant for the manufacture of spun silk from silk waste and eri cocoons will have to be actively investigated.

Sugar.—There are 13 cane and palmyra sugar factories in the Province, but the production of sugar is only about one-third of the estimated consumption. There should therefore be scope for the further development of the sugar industry in the Province provided that a reasonable level of prices is maintained. In Madras, the main difficulty attending the further development of the industry is the comparative absence of areas under sugarcane sufficient in extent to support sugar factories of a size generally regarded as representing an economic unit, and this explains why some sugar factories of small capacity have come into existence. These small sugar factories were planned and set up before even the original excise duty was thought of, and they have not yet been established on a profitable basis. In general, the situation of the sugar industry in Madras calls for the better organization of the factories on the agricultural side and the introduction of early and late ripening varieties of cane which would enable the crushing season to be prolonged and permit of the factories obtaining a higher average recovery on the season. As prohibition is extended to more and more districts in the Province, it may be possible to produce on an appreciable scale, palmyra and coconut jaggery for refining into sugar and in that way to lessen the gap between the production and consumption of sugar in the Province.

Fertilizers and insecticides.—Madras is mostly an agricultural Province and its prosperity depends largely upon its agricultural production. The two essentials for intensive cultivation are water and fertilizers. A great deal has been done in Madras to extend the benefits of irrigation, but as regards the production of fertilizers very little has been attempted with the result that the Province has to rely upon foreign imports. This is not a satisfactory position from an economic point of view, and further, in the event of international complications arising, there is always the possibility of an interruption in the supply of fertilizers which have become essential to the agricultural population and in such an eventuality the yield of crops and the return to the cultivator would fall off. It is very desirable, therefore, that a real effort should be made to establish the fertilizer industry in India and since Madras accounts for about half the imports of ammonium sulphate, it would only be in the fitness of things for the industry to be developed in this Province. The total value of manures imported into Madras during the year 1938-39 amounted to Rs. 51.65 lakhs. The present annual consumption of ammonium sulphate itself in the Madras Province, Mysore, Travancore and Cochin, may be taken at about 35,000 tons, of which 32,000 tons went into consumption as ammonium sulphate and the remaining 3,000 tons were used for mixed fertilizers. India imports about 60,000 tons of ammonium sulphate worth about Rs. 60 lakhs per year and about half this quantity appears to be consumed in South India. Imports into India have increased by nearly 36,000 tons during the last five years. The manufacture of ammonia either from by-product hydrogen or from hydrogen derived from the electrolysis of water seems destined to become a very important industry in India as once the industry is started it should expand considerably as the demand for the fertilizer increases. The chief raw materials required for the manufacture of synthetic ammonia are nitrogen and hydrogen which are combined under certain conditions to give rise to ammonia. As far as nitrogen is concerned, there is no difficulty in its manufacture as it can readily be obtained by the liquefaction of air. All that is required for manufacturing nitrogen is power which is utilized to liquefy the air from which pure nitrogen is derived by fractional distillation. The other raw material, namely, hydrogen, is more difficult and costlier to obtain than nitrogen. In fact, the cost at which hydrogen can be manufactured determines the cost of manufacture of ammonium sulphate. The only method by which hydrogen could be prepared at Mettur would be by the electrolysis of water, though if a steel industry is developed in the Salem district an appreciable quantity of hydrogen will be produced from the furnace gases. The possibilities of establishing a plant at Mettur for the manufacture of ammonium sulphate have been examined on the assumption that at least 12,500 K.W. of electric energy will be available at Rs. 40 per K.W. of demand for a year of eight

months. For manufacturing ammonium sulphate, there are two essentials, (i) ammonia and (ii) sulphuric acid or gypsum. For manufacturing synthetic ammonia, power, water and air are required, and these are available, but for supplying the sulphate radical, sulphuric acid is essential and this is at present manufactured out of imported sulphur and is therefore expensive. The alternative is to utilize gypsum which is known to occur along with the sedimentary rocks in the Trichinopoly district. On the basis of a production of 20,000 tons of ammonium sulphate per annum the capital cost of a plant for manufacturing hydrogen by water electrolysis would be about Rs. 42 lakhs. It is estimated that it should be possible to produce ammonium sulphate at Mettur at about Rs. 75 per ton, against a ruling price of imported ammonium sulphate of about Rs. 115 per ton, so that, if the industry could be established under strong technical and financial auspices, it should be a profitable one. There are 11 factories in the Province in which compound manures are mixed with bone manures or other fertilizers prepared, and in addition to these there are some small mixing concerns and bone factories which prepare bone meal, horn meal and other animal products. The Kerala Soap Institute has been manufacturing fish oil and rosin preparations for use as insecticides for some years, but a number of other insecticides and fungicides containing chemical compounds are used extensively in India by cultivators, horticulturists and orchardists for destroying the various insects attacking the vegetable kingdom. Preparations of a purely vegetable nature, derived from plants and roots, also possess considerable insecticidal properties and could advantageously be introduced for destroying various pests. There is also scope for the evolution of suitable special insecticides to meet local needs such as those of the arecanut, coconut and other plants. It was, therefore, considered desirable that the Institute should undertake a systematic study of the whole problem with a view to bringing out new, cheap and efficient insecticides for the agriculturists of the Province, and in 1936, Government sanctioned the conduct of experiments at the Institute in the manufacture of insecticides, fungicides and sprayers. The collection and study of indigenous products available for use as insecticides and fungicides has been carried on since then with a view to determining the active principles and utilizing them as tinctures, extracts, or salts in various insecticidal preparations. A tree banding compound was evolved for the purpose of preventing ants and other creeping insects from mounting the stems of fruit-trees and destroying leaves, flowers, fruits, etc. A leach killer has also been prepared for protecting those working in plantations situated in high elevations where, owing to the dense growth of vegetation and absence of the sun's rays, leaches thrive. An anti-termite compound for use as a protection against white ants has been prepared and is under trial. Insecticides

imported from foreign countries, such as calcium arsenate, arsinatte, crude oil emulsion, flosol, alboleus, buisol, katakiller and sulfnette have been subjected to tests with a view to preparing similar preparations. A crude oil emulsion has been prepared and found satisfactory for the purpose for which it was intended.

Fruit preservation and canning.—An industry which would appear to offer considerable scope for development is the fruit preservation and canning industry, including jams and jellies and the extraction of fruit juices for the preparation of syrups, cordials, squashes, crushes and carbonated beverages from limes, oranges and other citrus fruits. A large expansion of fruit growth in the Province is a diatetic desideratum, and the general economic value of fruit cultivation should be considerable if the industry is developed on sound lines. The view has been expressed, however, that fruit cultivation on any extensive scale is impracticable unless a fruit preservation and canning industry is developed contemporaneously with it, or in other words, experimental work on fruit preservation and canning should be considered as complementary to the conduct of research on fruit cultivation. The fruit preservation and canning industry could be developed both on factory and cottage industry lines. As already stated, a factory for the canning of mangoes, and pine-apples has already been established at Bezwada. Panyam in Kurnool district is an important centre for fruits such as mangoes, oranges, guava, wood-apple, etc., and in order to provide an outlet for some of these fruits at certain seasons of the year when there is a glut, there is a proposal to establish a fruit preservation and canning factory at Panyam with the aid of financial assistance under the State Aid to Industries Act.

Industrial alcohol.—The question of the possibilities of producing industrial alcohol have received attention during the past year. The two questions which require careful consideration are (i) the quantity of molasses that could be made available for the manufacture of power alcohol and (ii) the cost at which absolute alcohol could be produced. The optimum production of molasses of the existing factories in Madras is about 19,000 tons per annum and a little over 1,000,000 gallons of power or absolute alcohol could be produced if all the available molasses were worked up in the factories operating under optimum conditions. The consumption of petrol within the Madras Province itself may be estimated at about 15,000,000 gallons. The Government appointed a committee to study the material already collected and make definite recommendations for the consideration of Government. The committee were requested to investigate fully the question of production of power alcohol from molasses and report on the best method of manufacture and the best method of preparing petrol-alcohol mixture. The committee considered that the mixture of alcohol with petrol for use in motor vehicles

would be a practical proposition, that Government should take steps by legislation to render the use of such mixture compulsory, and that a beginning should be made in specified areas.

Paper.—The difficulty in regard to paper manufacture is that the market for protected papers is limited and that the paper imports include many varieties and descriptions of paper, whilst any one factory could only manufacture a limited range of qualities. When the new paper mills which are under construction in different parts of the country reach the production stage, there may be over production of paper and it is doubtful whether there is scope at present for more than one new mill in the Madras Province, now that the Andhra Paper Mills, Ltd., at Rajahmundry, has been remodelled and commenced manufacturing operations on the basis of an output of 10 tons of paper per day. The development of the Mettur hydro-electric project has opened up the possibility of establishing a paper mill at Mettur, and it would appear that a secure supply of bamboo exists in the Mettur area and that the fundamental problem of getting the supply to a mill there would not present insuperable difficulty. A commencement could be made with a paper mill at Mettur with an annual output of 4,000 tons of writing and printing papers. The species of bamboo (*Dendrocalamus strictus*) had been tested at the Dehra Dun Institute and found quite suitable for the manufacture of these qualities of paper and the quantity available is said to be more than ample for the production of 8,000 tons of paper per annum. The question of manufacturing wrapping paper would also seem to be worth investigation. The decision to proceed with the Papanasam hydro-thermal electric project opens up the alternative possibility of establishing a paper industry in the Tinnevely area based on the utilization of the local eta reed. There are about 20,000 acres of pure and mixed reed area in the Tambraparni and Serviar basins which are estimated to yield 20,000 tons of dry reed a year on a three years rotation, whilst other reed areas are estimated to yield more than 4,000 tons a year. It is considered that these areas would be able to supply sufficient material to a mill for the production of 10,000 tons of paper a year. The Tinnevely area, on the completion of the Papanasam project, will offer perhaps the best facilities in the Province for the establishment of a paper industry. The question of establishing a paper mill at Mettur or in the Tinnevely area is under discussion with certain companies. In the Cuddapah district, large quantities of Botha (*Cymbopogon coloratus*) grass are available and the possibilities of this grass as a raw material for manufacturing paper are at present under examination. It would probably be best, however, to utilize this grass for the production of hand-made paper.

Paints and varnishes.—An industry which, having regard to the raw materials available and the growing demand for the finished products in the Province appears to offer distinct possibilities of development, is the paint and varnish industry. The

branch of paint manufacture best represented in India is the manufacture of ordinary oil paints by which the pigment is ground in oil and subsequently thinned with further oil and solvents in order to make mixed paints. Linseed oil, both raw and boiled, is the standard oil for use in the manufacture of paints and this would have to be imported from Hyderabad. Of materials used as pigment, barytes is available in the Ceded Districts as are also various ochres. There is also the possibility of manufacturing lac products including paint. It should be possible for Madras, with its lac forests to play a part in the development of industries for the utilization of lac, for, although the production is at present limited, it could no doubt be increased. The major portion of the lac produced at present is utilized in the manufacture of sealing wax and furniture polish. Lac can be put to a variety of uses including the manufacture of paints and varnishes and the preparation of plastics. Lac paints dry rapidly yielding a glossy weather-resistant film and a process is said to have been developed for preparing lac paints in powder form which easily disperse in alcohol. Lac paints can be used in painting wood, metal or glass, railway carriages and automobiles and can also be used as artists' colours. Articles like buttons, buckles, brush handles, bottle-lids, etc., can be moulded from lac and it can also be used in the manufacture of adhesive tapes. Other raw materials which may be utilized in the manufacture of lac products are alcohol or methylated spirits, cashew shell oil, castor oil, yellow and red ochres, barytes and mica. Lac can also be used in the manufacture of micanite goods and turned lacquer work.

Other industries.—The other industries which offer scope for development in the Province can be referred to only briefly. Calcium carbide is an industry which offers possibilities of development in one of the hydro-electric areas although the markets for the products and the economics of the industry generally would require careful study. The main product produced from calcium carbide is acetylene which is used for welding and cutting and also for flares. Acetylene can be converted into acetic anhydride, acetic acid and acetone and also certain solvents, whilst by treating carbide with nitrogen, a valuable fertilizer cyanamide, is produced. The three main essentials required for the manufacture of calcium carbide are lime, charcoal or other suitable fuel and cheap electricity. The possibility of the manufacture of aluminium which is essentially a large-scale industry requiring a very considerable capital investment turns on (i) the availability of bauxite, and (ii) the rate at which electric energy could be supplied as the industry could not afford to pay more than one-tenth of an anna per unit. Bauxite could probably be supplied to Vizagapatam from the Central Provinces at a rate which would render commercial manufacture feasible provided that the Jeypore electric-project was developed and supply could be obtained from this source at a sufficiently low rate. There

would appear to be possibilities in regard to the development of a sisal fibre industry in the Ceded Districts. There is actually a sisal fibre estate in existence in Penukonda taluk of the Anantapur district. But the plantation has not succeeded owing, firstly, to the fact that the correct variety of agave plant was not introduced and secondly, because replantation was not carried out when the first generation of plants planted in 1912-14 died away. The view has been expressed that in the course of a few years, the sisal industry could be developed into a prosperous industry in the Ceded Districts, profitable to the grower and to the manufacturer, and forming a source of employment in the famine area, and the owner of the estate is contemplating preferring an application under the State Aid to Industries Act for a large acreage of land on the cowle system and for finance to enable him to plant up the land with true *Agave Sisalana* in order to develop the industry on approved modern lines. There are probably other areas in the Ceded Districts where the cultivation of sisal could be introduced or extended by planting it as a hedge crop. It not only supplies valuable fibre in the production of which a certain amount of labour can be absorbed, but also prevents soil erosion. The glass industry would seem to offer some scope for further development as there is a demand for glass bottles, phials and other forms of glassware, whilst two of the essential raw materials, namely, sand or quartz and felspar, and limestone are available. As regards fuel, the cost of coal is of course very high in Madras and the successful development of the industry may turn on the practicability of using oil burning furnaces. Electric bulbs could also be manufactured provided that the white sand found at Ennore near Madras proves to be sufficiently low in iron content as to which enquiries are proceeding. Other industries which might be developed are the manufacture of certain implements and tools, picture frame mouldings, finished rubber goods, including surgical goods, school and college requisites, sports goods and general goods too numerous to mention, disinfectants, surgical gut, tanning materials and extracts, malted foods, and similar products including milk powder, starch from tapioca, potatoes or spoiled rice, camphor, builders hardware and domestic hardware, expanded metal, cement concrete products, such as tiles, slabs, balustrades, pipes, etc., steel furniture, bolts and nuts, wire nails and screws, wire netting and fencing material, wood screws, buckets, crown corks for aerated water bottles, glass paper, radio sets and components, cycle parts, leather pickers, bobbins, electric fittings and appliances and various stationery articles, although it may be mentioned that a factory for the manufacture of envelopes has recently been established in Madras and further developments in regard to this industry are in contemplation.

L. B. GREEN,
Director of Industries and Commerce.

APPENDIX I.

Statement showing the quantity and value of imports and exports of the more important commodities by sea and rail into the Madras Province during the three years ending 1938-39.

Article.	Imports by sea and rail.					
	Quantity.			Value.		
	1936-37.	1937-38.	1938-39.	1936-37.	1937-38.	1938-39.
	TONS.	TONS.	TONS.	RS.	RS.	RS.
Paddy—						
Sea	93,705	86,756	82,676	53,50,263	21,35,829	40,71,534
Rail	41,402	41,517	39,371	23,57,000	24,80,000	21,67,513
Total ..	135,107	78,273	122,047	77,07,263	46,15,829	68,39,047
Rice—						
Sea	696,832	692,634	696,288	5,23,44,212	5,28,76,001	5,12,05,334
Rail	55,721	109,169	105,194	41,77,000	1,08,09,000	1,01,06,971
Total ..	752,553	801,803	801,482	5,65,21,212	6,36,85,001	6,14,02,305
Groundnut seed—						
Sea	208	30	2	31,537	1,940	292
Rail	54,298	44,243	59,511	82,33,000	57,15,000	86,88,606
Total ..	54,506	44,273	59,513	82,64,537	57,16,940	86,88,898
Castor seeds—						
Sea	1	..	1	40	..	130
Rail	23,220	15,125	6,656	30,34,421	24,58,493	8,65,150
Total ..	23,220	15,125	6,656	30,34,461	24,58,493	8,65,280
Copra—						
Sea	14,890	5,781	561	27,57,887	10,47,257	70,150
Rail		(Not available.)				
Total ..	14,890	5,781	561	27,57,887	10,47,257	70,150
Cashew (nuts and kernels)—						
Sea	12,478	14,591	10,942	15,44,479	18,71,312	14,30,580
Rail			(Not available.)			
Total ..	12,478	14,591	10,942	15,44,479	18,71,312	14,30,580
Coconut oil—	GALLONS.	GALLONS.	GALLONS.			
Sea	6,754	7,931	432,860	11,323	13,071	4,05,680
Rail			(Not available.)			
Total ..	6,754	7,931	432,860	11,323	13,071	4,05,680
Coffee—	CWT.	CWT.	CWT.			
Sea	4,471	1,021	120	1,15,584	46,538	5,557
Rail	16,233	16,060	19,209	4,20,000	5,14,000	8,86,544
Total ..	20,704	17,681	19,329	5,35,584	5,60,538	8,92,101
Tea, black—	LB.	LB.	LB.			
Sea	1,491,645	1,042,656	777,243	8,96,450	6,08,337	4,22,487
Rail	1,692,781	2,459,931	2,729,689	10,16,000	14,27,000	14,88,535
Total ..	3,184,426	3,502,587	3,506,932	19,12,450	20,35,337	19,08,022

Article.	Imports by sea and rail.					
	Quantity.			Value.		
	1936-37.	1937-38.	1938-39.	1936-37.	1937-38.	1938-39.
	LB.	LB.	LB.	RS.	RS ₃	RS.
Tobacco, raw—						
Sea	1,314,486	1,201,751	2,423,350	18,90,383	15,50,930	27,19,272
Rail	5,598,225	6,392,035	7,880,202	17,01,000	19,18,000	18,28,732
Total ..	6,912,710	7,593,710	10,303,552	36,91,383	34,68,930	45,48,004
Tobacco, manu- factured—						
Sea	1,331,957	1,770,589	1,790,223	13,55,545	12,99,520	10,71,604
Rail			(Not available.)			
Total ..	1,331,957	1,770,589	1,790,223	13,55,545	12,99,520	10,71,604
Rubber, raw—						
Sea	830,416	698,663	36,610	1,98,067	2,26,178	9,851
Rail			(Not available.)			
Total ..	830,416	698,663	36,610	1,98,067	2,26,178	9,851
Rubber, manu- factured—						
Sea	(Not available.)			40,35,844	38,55,911	23,55,321
Rail			(Not available.)			
Total ..	(Not available.)			40,35,844	38,55,911	23,55,321
	TONS.	TONS.	TONS.			
Cotton, raw—						
Sea	15,673	25,133	16,113	1,04,99,178	1,85,70,439	95,58,194
Rail	11,667	10,523	10,193	70,33,000	69,86,000	56,98,779
Total ..	27,340	35,656	26,306	1,75,32,178	2,55,56,439	1,51,56,973
	IN THOUSAND YARDS.	IN THOUSAND YARDS.	IN THOUSAND YARDS.			
Cotton, piece- goods—						
Sea	113,074	108,428	88,180	3,05,28,756	3,16,46,961	2,43,49,866
Rail	137,690	161,840	182,134	4,68,15,000	5,17,39,000	5,84,98,130
Total ..	250,764	270,268	270,314	7,73,43,756	8,34,85,961	8,28,47,996
	TONS.	TONS.	TONS.			
Hides, raw—						
Sea	4,135	2,834	1,897	27,06,534	18,34,024	9,30,084
Rail	17,128	13,759	16,054	1,17,16,000	1,13,80,000	1,06,48,242
Total ..	21,263	16,593	17,951	1,44,22,534	1,32,14,024	1,15,78,326
Skins, raw—						
Sea	3,329	2,220	1,943	33,11,196	22,19,640	14,55,045
Rail	10,568	9,987	7,751	1,08,54,000	1,27,04,000	72,51,357
Total ..	13,897	12,207	9,694	1,41,65,196	1,49,23,640	87,06,402
Hides, tanned—						
Sea	66	4	12	21,880	10,667	10,396
Rail	2,503	3,972	5,055	22,43,000	1,20,65,000	57,07,938
Total ..	2,569	3,976	5,067	22,69,880	1,20,75,667	57,18,334
Skins, tanned—						
Sea	1	1	9	2,422	8,380	21,248
Rail .. ..	..	..	..	..	..	..
Total ..	1	1	9	2,422	8,380	21,248
	LB.	LB.	LB.			
Wool, raw—						
Sea	594,042	714,518	335,998	3,70,428	6,23,019	2,25,169
Rail	1,314,667	1,039,844	567,650	5,92,000	3,07,000	3,80,411
Total ..	1,908,709	1,754,362	903,648	9,62,428	9,30,019	6,05,580

Exports by sea and rail.

Article.	Exports by sea and rail.					
	Quantity.			Value.		
	1936-37.	1937-38.	1938-39	1936-37.	1937-38.	1938-39.
	TONS.	TONS.	TONS.	RS.	RS.	RS.
Paddy—						
Sea	2,676	1,302	4,285	1,85,575	83,484	2,61,114
Rail	1,806	1,166	3,838	1,33,000	84,000	2,97,025
Total ..	4,482	2,468	8,123	3,18,575	1,67,484	5,58,139
Rice—						
Sea	89,051	92,021	105,228	1,01,67,041	1,06,76,533	1,19,80,860
Rail	105,260	131,891	129,766	1,00,21,000	51,02,000	1,18,78,013
Total ..	194,311	223,912	235,796	2,01,88,041	1,57,78,533	2,60,22,826
Groundnut seed—						
Sea	647,224	579,326	770,292	10,75,47,203	8,25,46,068	8,97,86,364
Rail	46,184	30,483	61,320	79,88,000	52,16,000	87,63,430
Total ..	693,408	609,809	830,776	11,55,35,203	8,77,62,068	9,85,49,770
Castor seeds—						
Sea	23,557	16,993	5,051	33,81,498	25,45,415	6,23,753
Rail	519	612	136	68,000	99,000	16,997
Total ..	24,076	17,605	5,187	34,49,498	26,44,415	6,40,750
Copra—						
Sea	10,417	19,507	20,677	38,41,148	57,62,280	49,39,420
Rail				(Not available.)		
Total ..	10,417	19,507	20,677	38,41,148	57,62,280	49,39,420
Cashew (nuts and kernels)—						
Sea	8,799	11,895	13,167	99,71,567	1,20,64,980	1,24,33,776
Rail				(Not available.)		
Total ..	8,799	11,895	13,167	99,71,567	1,20,64,980	1,24,33,776
	GALLONS.	GALLONS.	GALLONS.			
Coconut oil—						
Sea	1,380,541	2,783,106	2,733,842	23,65,062	38,29,686	25,73,742
Rail				(Not available.)		
Total ..	1,380,541	2,783,106	2,733,842	23,65,062	38,29,686	25,73,742
	CWT.	CWT.	CWT.			
Coffee—						
Sea	224,494	143,225	190,178	87,69,890	58,46,643	1,77,69,648
Rail	9,477	7,609	3,571	2,89,000	3,40,000	1,33,983
Total ..	233,971	150,834	193,749	90,58,896	61,95,643	1,79,03,631
	LB.	LB.	LB.			
Tea, black—						
Sea	47,208,678	52,233,825	57,060,762	4,15,02,405	4,58,85,885	4,06,50,781
Rail	7,231,481	9,899,249	9,141,592	49,17,000	63,91,000	59,08,326
Total ..	54,440,109	61,833,074	66,202,344	4,64,19,495	5,22,76,885	4,65,59,107
Tobacco, raw—						
Sea	21,256,794	28,858,139	45,500,330	69,17,893	93,90,452	1,76,76,778
Rail	33,230,750	39,583,124	36,990,784	73,11,000	91,04,000	79,61,824
Total ..	54,487,544	68,441,263	82,491,114	1,42,28,893	1,84,94,452	2,55,38,602
Tobacco, manu- factured—						
Sea	2,570,038	2,592,157	2,659,192	49,99,143	50,98,521	41,14,308
Rail				(Not available.)		
Total ..	2,570,038	2,592,157	2,659,192	49,99,143	50,98,521	41,14,308

Exports by sea and rail.

Article.	Exports by sea and rail.					
	Quantity.			Value.		
	1936-37.	1937-38.	1938-39.	1936-37.	1937-38.	1938-39.
	LB.	LB.	LB.	RS.	RS.	RS.
Rubber, raw—						
Sea	21,128,778	25,274,377	23,408,412	74,32,757	1,11,72,795	93,39,049
Rail			(Not available.)			
Total ..	21,128,778	25,274,377	23,408,412	74,32,757	1,11,72,795	93,39,049
Rubber, manu- factured—						
Sea .. ..	..	..	..	4,033	10,670	22,037
Rail			(Not available.)			
Total ..	(Not available.)			4,033	10,670	22,037
	TONS.	TONS.	TONS.			
Cotton, raw—						
Sea	50,657	34,777	25,134	3,36,32,302	2,56,23,646	1,89,81,481
Rail	12,712	8,841	8,815	86,57,000	73,53,000	52,21,917
Total ..	63,369	43,618	33,949	4,22,89,302	3,29,76,646	1,92,03,398
	IN THOUSAND YARDS.	IN THOUSAND YARDS.	IN THOUSAND YARDS.			
Cotton, piece- goods—						
Sea	56,022	70,131	62,374	2,22,31,332	2,76,03,854	2,49,84,987
Rail	66,020	70,130	91,816	2,83,89,000	3,01,56,000	59,90,899
Total ..	122,042	140,261	154,190	5,06,70,332	5,77,59,854	3,09,75,886
	TONS.	TONS.	TONS.			
Hides, raw—						
Sea	358	112	138	7,52,088	2,30,569	1,30,304
Rail	1,101	882	735	12,88,000	7,22,000	7,60,420
Total ..	1,459	994	873	20,15,988	9,52,569	8,90,723
Skins, raw—						
Sea	906	1,193	1,006	20,60,137	32,36,704	23,00,956
Rail	744	588	791	7,93,000	18,36,000	17,37,399
Total ..	1,650	1,781	1,857	28,53,137	51,22,704	40,38,355
Hides, tanned—						
Sea	18,269	17,326	15,264	3,22,08,097	3,22,08,154	2,31,02,487
Rail	745	1,701	952	11,71,000	18,74,000	11,47,680
Total ..	19,014	19,027	16,316	3,33,79,097	3,40,82,154	2,42,50,167
Skins, tanned—						
Sea	6,995	6,424	5,220	3,36,06,780	3,11,14,369	2,39,33,559
Rail			(Not available.)			
Total ..	6,995	6,424	5,220	3,36,06,780	3,11,14,369	2,39,33,559
	LB.	LB.	LB.			
Wool, raw—						
Sea	1,825,392	1,827,131	1,781,283	4,17,142	5,15,974	4,53,147
Rail	2,442,137	1,574,125	1,914,244	5,86,000	4,25,000	4,78,561
Total ..	4,267,529	3,401,256	3,695,527	10,03,142	9,40,974	9,31,708

APPENDIX II.

Statement showing the value of the net imports and net exports of the more important commodities during the three years ending 1938-39.

(Value in rupees to the nearest thousand.)

Article.	Years.	Imports.	Exports.	Net imports.	Net exports.
Paddy	1936-37	77,07,000	3,19,000	73,88,000	..
	1937-38	46,16,000	1,67,000	44,49,000	..
	1938-39	68,39,000	5,58,000	62,81,000	..
	Average (to the nearest thousand)	..	..	60,39,000	..
Rice	1936-37	5,65,21,000	2,01,88,000	3,63,33,000	..
	1937-38	6,34,46,000	1,57,79,000	4,76,67,000	..
	1938-39	6,14,02,000	2,60,23,000	3,53,79,000	..
	Average	..	..	3,97,93,000	..
Paddy and rice	1936-37	6,42,28,000	2,05,07,000	4,37,21,000	..
	1937-38	6,80,62,000	1,59,46,000	5,21,16,000	..
	1938-39	6,82,41,000	1,65,04,000	10,16,60,000	..
	Average	..	..	6,58,32,000	..
Groundnut seed	1936-37	82,65,000	11,55,35,000	..	10,72,70,000
	1937-38	57,17,000	8,77,62,000	..	8,20,45,000
	1938-39	86,89,000	9,85,50,000	..	8,98,61,000
	Average	..	..	..	9,30,55,000
Copra	1936-37	27,58,000	38,41,000	..	10,83,000
	1937-38	10,47,000	57,62,000	..	47,15,000
	1938-39	70,000	49,39,000	..	48,69,000
	Average	..	..	..	35,56,000
Cashew (nuts and kernels).	1936-37	15,44,000	99,72,000	..	84,28,000
	1937-38	18,71,000	1,20,65,000	..	1,01,94,000
	1938-39	14,31,000	1,24,34,000	..	1,10,03,000
	Average	..	..	..	98,75,000
Coconut oil	1936-37	11,000	23,65,000	..	23,54,000
	1937-38	13,000	38,30,000	..	38,17,000
	1938-39	40,600	25,74,000	..	21,68,000
	Average	..	..	..	27,76,000
Coffee	1936-37	5,36,000	90,59,000	..	85,23,000
	1937-38	5,61,000	61,96,000	..	56,35,000
	1938-39	8,92,000	1,79,04,000	..	1,70,12,000
	Average	..	..	..	1,03,90,000
Tea—black	1936-37	19,12,000	4,64,10,000	..	4,45,07,000
	1937-38	20,35,000	5,22,77,000	..	5,02,42,000
	1938-39	19,06,000	5,56,49,000	..	5,37,43,000
	Average	..	..	..	4,94,97,000
Tobacco, raw	1936-37	36,81,000	1,42,29,000	..	1,05,48,000
	1937-38	34,69,000	1,84,94,000	..	1,50,25,000
	1938-39	45,48,000	2,55,89,000	..	2,09,91,000
	Average	..	..	..	1,55,21,000
Tobacco, manu- factured.	1936-37	13,56,000	40,99,000	..	38,43,000
	1937-38	13,00,000	50,99,000	..	37,99,000
	1938-39	10,72,000	41,14,000	..	30,42,000
	Average	..	..	..	34,95,000

(Value in rupees to the nearest thousand.)

Article.	Years.	Imports.	Exports.	Net imports.	Net exports.
Rubber, raw	1936-37	1,08,000	74,33,000	..	72,35,000
	1937-38	2,26,000	1,11,73,000	..	1,09,47,000
	1938-39	10,000	98,39,000	..	92,29,000
	Average	..	..	..	91,70,000
Rubber, manu- factured.	1936-37	40,36,000	4,000	40,32,000	..
	1937-38	38,56,000	20,000	38,36,000	..
	1938-39	23,65,321	22,037	23,33,000	..
	Average	..	..	34,00,000	..
Cotton, raw	1936-37	1,75,32,000	4,22,89,000	..	2,47,57,000
	1937-38	2,55,66,000	3,29,77,000	..	74,21,000
	1938-39	1,51,57,000	1,02,03,000	..	40,46,000
	Average	..	..	..	1,20,75,000
Cotton, piecegoods	1936-37	7,25,92,000	5,06,70,000	2,19,22,000	..
	1937-38	8,34,36,000	5,77,60,000	2,56,76,000	..
	1938-39	8,28,48,000	3,09,75,000	5,19,73,000	..
	Average	..	..	3,31,90,000	..
Hides, raw	1936-37	1,44,23,000	20,16,000	1,24,07,000	..
	1937-38	1,32,14,000	9,53,000	1,22,61,000	..
	1938-39	1,15,78,000	8,91,000	1,07,87,000	..
	Average	..	..	1,18,18,000	..
Skins, raw	1936-37	1,41,65,000	28,53,000	1,13,12,000	..
	1937-38	1,49,24,000	51,23,000	98,01,000	..
	1938-39	87,06,000	49,38,000	46,68,000	..
	Average	..	..	85,94,000	..
Hides, tanned	1936-37	22,70,000	3,33,79,000	..	3,11,09,000
	1937-38	1,20,76,000	3,40,82,000	..	2,20,06,000
	1938-39	57,18,000	2,42,50,000	..	1,85,32,000
	Average	..	..	..	2,38,82,000
Skins, tanned	1936-37	2,000	3,36,07,000	..	3,36,05,000
	1937-38	8,000	3,11,14,000	..	3,11,06,000
	1938-39	21,000	2,39,34,000	..	2,39,13,000
	Average	..	..	..	2,95,41,000
Wool, raw	1936-37	9,62,000	10,03,000	..	41,000
	1937-38	9,30,000	9,41,000	..	11,000
	1938-39	6,06,000	9,32,000	..	3,26,000
	Average	..	..	..	1,28,000
Castor seed	1936-37	30,34,000	34,49,000	..	4,15,000
	1937-38	24,58,000	26,44,000	..	1,86,000
	1938-39	8,65,000	6,41,000	2,24,000	..
	Average	1,28,000

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