collections remitted into the treasury. The official Sub-Registrars receive a commission of 20 per cent. as personal remuneration on the fees they remit, and 24 per cent. for their establishments. The special registering officers are required to obtain a practical knowledge of their work in the office of the District Registrar before entering upon their duties.

The annexed abstract statement shows the results of the working of the Department in Madras since the Act was introduced :—

	1864–65. 4 months.	1873–74.	1883–84.	1885–86.
Number of Offices	34	305	312	354
Instruments relating to immovable property ...	8,952	193,790	444,560	541,766
Do. do. to movable do. ...	4,103	12,713	32,774	41,048
Total number of documents	13,055	206,503	477,334	582,814
Receipts	Rs. 5,489	Rs. 331,160	Rs. 624,613	Rs. 839,080
Expenditure	,, 49,259	,, 256,629	,, 593,595	,, 659,859
Average fee per document	,, 0–11–0	,, 1–5–1	,, 1–1–7	,, 1–3–2

The surplus of receipts over expenditure was Rs. 75,531 in 1873-74 ; Rs. 31,108 in 1883-84 ; and Rs. 179,239 in 1885-86. The aggregate value of the transactions was 6$\frac{3}{4}$ crores in 1873-74, 11$\frac{8}{10}$ crores in 1883-84, and 12$\frac{1}{10}$ crores in 1885-86.

It was remarked by the late Governor of Madras, that by means of registration "the comfort of the people is very greatly increased ; a sense of secure possession, which some highly enlightened countries might well envy, is being engendered ; while the income of the community is greatly benefited, and is likely to be more and more benefited for years to come." Any disfavour with which the Registration law might have been viewed upon its first introduction in India, in consequence of the stringent provisions which it contained enforcing a somewhat minute description in instruments relating to immovable property, disappeared upon its attaining its two great objects, viz. discouraging forgery and false evidence, and creating a trustworthy record of title to immovable property. Registration offices have been, and are being, established in centres convenient to the inhabitants of the country to facilitate recourse to registration ; notices have been, and are being, freely circulated among them, pointing out the advantages of registered over non-registered documents ; and the special registration officers, who devote their whole time and attention to expanding the business of the Department, strive to make registration everywhere popular, by preventing unnecessary delays and obstructions, and by rendering the procedure as simple as possible. The instruments that are now most commonly registered are wills, gifts, deeds of adoption, authorities to adopt, settlements, partition and maintenance deeds, sales, mortgages, perpetual leases, agricultural and non-agricultural leases, awards of arbitration, agreements, bonds, &c.

The Supreme Government, in its review of the Administration Reports of Registration of the several provinces for the year 1880-81, remarked :—"The steady progress which takes place in the development of registration in the Madras Presidency appears to the Government of India to be decidedly satisfactory, and the Governor-General in Council concurs with the Madras Government in the view that every such extension is a matter for congratulation, as implying greater security of title and diminished litigation, accompanied by reduced State expenditure on law and justice." Again, on the Reports for 1884-85, the Supreme Government said :—"To begin with the Madras Presidency, the progress which has been so marked during the past few years has been fully maintained. The financial results are also very satisfactory, the income of the year having risen to nearly 7½ lakhs, showing an increase of 19 per cent. above the highest revenue obtained in any year since the organisation of the Department."

POST OFFICE.

"*It is hereby enacted that the exclusive right of conveying letters by post from place to place* within the territories of the East India Company shall be in the Governor-General of India in Council." So ran the provisions of the Act of 1837; and, to quote the words of a well-known authority on the administration of the Post Office, "Until 1837 it was a positive privilege to be allowed to send private letters by the Government Dak." Three schedules were annexed to this Act showing the rates of inland postage, and it was enacted "that the full postage shall be paid either on receipt, or on delivery, at the option of the sender, and that, if the thing conveyed be transferred from a Post Office in one Presidency to a Post Office in another Presidency, no additional charge shall be made on account of such transfers." Postage was collected in cash, and the fee was regulated according to the distance to which the article had to be carried. The lowest fee was one anna; and this was charged for carrying a letter not exceeding one tola in weight, or a newspaper not exceeding three and a half tolas in weight, a distance not exceeding 20 miles. For carrying the same letter 500 miles the charge was nine annas, and for 1,400 miles one rupee. The highest charge on a newspaper not exceeding three and a half tolas in weight was three annas, and this was imposed when the distance exceeded 400 miles.

Thus, while that schedule of rates was in force, the postage duty on a letter sent from the City of Madras to the head-quarters of the Ganjam District, a distance of over 700 miles, was no less than eleven annas, and that too although the letter might not weigh more than half a tola; and on a letter from Madras to Tinnevelly, a distance of over 400 miles, the charge would be eight annas. Subscribers to a Madras newspaper residing in Calicut would be required to pay three annas postage on each copy they received, and six annas if it exceeded three and a half tolas in weight. In the case of letters, when the weight exceeded one tola, but did not exceed two tolas, the charge was doubled; and for each additional tola, or fraction of a tola, single postage was added. The postage fees on parcels were proportionately heavy, and the schedule to this Act makes no reference at all to parcels exceeding 600 tolas, or 15lbs. in weight. The duty on a parcel of that weight if carried 500 miles was Rs. 20¼, and if carried 1,000 miles Rs. 31¼. Postal communications even under these conditions were not very widely extended, as only main lines connecting places of importance in the interior with the seat of Government were kept open. Post Offices in the interior of the Presidency of Madras were with a few exceptions under the charge of the Collectors of Districts; and the management of the whole was in the hands of a local Postmaster-General who acted under the control of the Local Government.

In the year 1850 a Postal Commission was appointed in India, and its report, which was published in the following year, led to the passing of the Act of 1854, whereby the Act of 1837 was repealed. Provision was for the first time made for the use of postage stamps; rates of postage were fixed without reference to the distance to which an article was to be carried, except in the case of parcels, and the whole of the postal arrangements in India were placed under the control of a Director-General. The rates of letter postage then introduced were, roughly speaking, double those now in force; and the postage on newspapers was peculiarly high, the charge being two annas for three and a half tolas, four annas for six tolas, and when the weight exceeded six tolas, two annas for every additional three tolas. The duty on the *Madras Mail* in its present form according to the table then in force would be six annas. The charge on newspapers was rapidly reduced, a rate of one anna for ten tolas having been introduced in 1866, which was further reduced to only half an anna in the years 1871-72. Letter postage was reduced to the rate of half an anna for half a tola from April 1869; and in the meantime the additional charge of postage whenever an article

was redirected, had been abolished. The Act of 1854 authorised the imposition of this additional charge

The duty on parcels was not fixed at a uniform rate irrespective of distance until the year 1870-71 After several modifications had been made from time to time, the rates now in force were finally adopted in 1880. According to the table in the Act of 1854 the charge for conveying a parcel weighing two hundred tolas a distance of 500 miles was three Rupees The same parcel can now be sent any distance within British India, or from any place in British India to any place in British Burmah, for a fee of only two Annas On the introduction of official postage stamps, the rates of postage for official correspondence were at first the same as for ordinary correspondence, but remarkable reductions have since been made, and at the present time a weight not exceeding ten tolas can be sent by post for one anna, and only one anna extra is charged for every additional ten tolas up to forty tolas.

Since the year 1854 the development of the Post Office in the Madras Presidency has proceeded with great rapidity. In the year 1856 57 the mails were being carried over a distance of 7,8784 miles, in the year 1885 86, the distance over which they were carried by the several modes of conveyance was 10,239 miles In the former year they were carried only 65 miles by rail, while in the latter year they travelled over 2,154 miles by that means, and from this it may be understood how much the time in transit must have been reduced throughout the greater part of the Presidency

In the year 1854 only 130 Post Offices had been established in the Presidency, in 1860 the number had risen to 163, at the close of 1871 72 there were 360, at the close of 1880-81 there were 717, and on the 1st April, 1886, no less than 1,065 offices were open In spite of this rapid increase, however, it is still only in towns and very large villages that offices have been established; but, in order to provide greater facilities elsewhere, 614 letter boxes had been placed in outlying villages before the close of 1885 86, and 476 village postmen had been appointed whose duty it is to clear these letter boxes and deliver articles in rural tracts Since the 1st April, 1886, there has been a further increase in the number of Post Offices in the Presidency, and there is now an office for every 121 square miles of country, and for every 26,725 of population

By converting square miles into square kilometres, the postal system of the Presidency in respect to area and population may be compared with those of countries in the western world. Roughly speaking then there is found to be one office to every 300 square kilometres. In Great Britain there is one office to every 18 square kilometres, and every 2,162 of population, in Germany one office to every 30 square kilometres and every 2,684 of population, and in Sweden one office to every 213 square kilometres, and every 2,311 of population. The country where the development of the Post Office most closely resembles that which has been reached in Madras is Greece, which has one office to every 295 square kilometres, and every 9,205 of population In Egypt there are 3,522 square kilometres, and 42, 807 of population for each office.

The number of officers, clerks, and others employed in the Department in the Presidency has not increased in the same ratio as the number of offices; and, as will presently appear, the increase in this respect is insignificant in comparison with the vast expansion in the work of the Post Office that has taken place. The number employed on the 31st March, 1870 was 5,134; on the 31st March, 1881, it had risen to 5,289, and on the corresponding date in 1886 it was 6,495. The number of articles, including letters, newspapers, parcels, and book and pattern packets given out for delivery in 1856 57 was 5,828,220; in 1871 72 it was 13,922,227, in 1880 81 it was 26,451,680, and in 1885 86 the number had increased to 38,603,264 During this period the number of letters rose from 5,000,000 to 33,000,000, and of newspapers from 601,000 to nearly 3,000,000.

The use of Inland and Foreign Post Cards was introduced in July, 1879; and it may be interesting to mention that the numbers given out for delivery during 1885-86 was no less than 8,523,219. These are included in the 33,000,000 of letters.

In the rules for the management of the Post Office which were first issued in 1854 it was directed that "in order to protect as far as possible the public mails from the chance of robbery, officers in charge of Post Offices shall not knowingly receive coin, bullion, precious stones, or jewels for despatch either by letter or banghy," but from the 1st January, 1878, the insurance of registered letters or parcels, the contents of which were valuable, was introduced. The insurance fee was at first 8 annas per cent., but it was subsequently reduced to 4 annas only. In the year 1884-85 there were 24,169 registered letters received in the Madras Presidency, the insured value of which was Rs. 6,103,623; and 23,072 parcels, the insured value of which was Rs. 5,879,521. The insurance fees realised amounted to Rs. 31,427, and thus, although the fee is so small, a considerable revenue has been derived from this business. What is most satisfactory of all in connection with the working of this system is to find that, in spite of the temptation that it may seem to offer, it has led to so few frauds on the part of postal *employés*. Judging, however, from what is stated in paragraph 57 of the Director-General's report on the operations of the Post Office for the year 1885-86, there would appear to be some danger of the system being occasionally abused by senders of insured articles who desire to cheat the addressees, and hold the Post Office responsible. This they can at least endeavour to do by enclosing contents other than those which they declare

The value payable business was introduced from December 1st, 1877, and has, like the other principal branches of Post Office work, passed through a rapid development. During the year 1878-79 there were 101 articles received in the Presidency for despatch, the declared value of which was Rs. 2,595. In 1881-82 the number of articles had risen to 14,192, the value of which was Rs. 146,508; and in 1884-85 there were 40,281 articles sent, the amount specified for recovery by the Post Office being Rs. 410,983.

On the 1st January, 1880, the Money Order Department was transferred to the Post Office, and has since shown remarkable powers of expansion. In 1880 81 the number of money orders issued in the Presidency was 218,597, and their value Rs. 5,542,507. The orders issued in 1882 83 were 363,361 in number, and their value Rs. 81,34,427; while in 1885 86 the number had risen to 511,814, and the value to Rs. 11,168,396. The number and value of paid orders increased at the same rate, the figures for 1885-86 being 533,052 orders, and the amount paid on them Rs. 11,630,927. This rapid growth is no doubt due to the greater facilities which the Post Office affords in comparison with the Treasury Department, with which the management formerly rested. Post Offices are much more numerous than Treasuries, and much more easy of access, and arrangements have been made whereby the Post Office transmits the money order from the office of issue to the office of payment, delivers the amount through a postman to the payee, and obtains an acknowledgment of payment from the latter for the satisfaction of the remitter. The practice of delivering the amount of the order to the payee at his residence has not yet been widely introduced in outlying villages; but the number received for payment in such places is not considerable.

The Post Office Savings Bank was established from the 1st April, 1882; and at the close of the year 1882-83 there were 4,416 accounts open with a balance to the credit of depositors of Rs. 2,60,741. On the 1st April, 1885, there were 16,119 accounts open, the balance of deposits being Rs. 13,46,871; and on the 1st April, 1886, the accounts had increased in number to 20,609, and the balance at credit of the depositors to Rs. 19,23,012. Since the date last mentioned all accounts in the District Savings Bank have been transferred to the Post Office, and the number of accounts and the balance of deposits have in consequence increased enormously In Rule 318 of the *Indian Postal Guide* it is intimated that "the object of Government in establishing Post Office Savings Banks is to provide a ready means for the deposit of savings, and so to encourage thrift;" and from the foregoing

particulars it would appear that a considerable degree of success has been attained towards the fulfilment of this object.

In the year 1856-57 the total receipts of the Post Office in the Madras Presidency were Rs 6,70,072, and the disbursements Rs. 6,33,201, leaving a profit of Rs. 36,871; in the year 1871-72 the receipts were Rs. 12,28,263, the disbursements Rs. 7,28,980, and the profit Rs. 4,99,282; while in 1885 86 the receipts had risen to Rs. 17,69,594, and, as the disbursements were only Rs. 10,06,548, there was a profit of Rs. 7,63,046. The expenses in connection with the operations of the Railway Mail Service in the Presidency are excluded from these disbursements.

In October, 1883, the system of Combined Post and Telegraph Offices was introduced, and on the 31st March, 1886, there were 66 offices of that description open. As 37 telegraph offices remained under the direct management of the Government Telegraph Department, there were in all 103 offices for the receipt and despatch of messages on the above date. Previous to the introduction of this system there were only 61 Government Telegraph Offices at work; and it is thus manifest that the measure has been attended with greatly increased facilities in regard to telegraphic communication The total charge to the Telegraph Department for working these combined offices during 1885 86 was Rs 25,592, and the revenue realised was Rs 84,395 There was thus a substantial profit, and this is due to the fact that the management is marked by that economy which is so carefully observed in all the branches of business now under the conduct and control of the Post Office

TELEGRAPHS

In August, 1853, the Telegraph stores lying in the Madras Arsenal were inspected, and, with the aid of the various Collectors and Engineers of the districts between Madras and Humpasagar, on the Bombay frontier, they were distributed, and arrangements were made for the erection of flying lines By the end of July, 1854, 28 miles of local lines were erected in the vicinity of Madras, with a double wire from Madras to St. Thomas's Mount. Offices at Black Town, Madras, at Fort Saint George, Guindy, St Thomas's Mount, and Poonamallee were opened to the public. 401 miles of line from Poonamallee to Bellary were erected, with offices at Vellore, Bangalore, Tumkur, and Bellary By the end of 1854, 91 miles of line from Bellary to Humpasagar were completed, with offices at Herriur, Humpasagar, and Dharwar Preparations were made for the erection of a flying line from Bangalore to Mysore, a distance of 84 miles of line, which was completed in March, 1855, and an office was opened at the latter station. This line was extended from Mysore to Ootacamund, a distance of 80 miles, and an office at Ootacamund was opened on the 26th April, 1855 In September, 1856, 203 miles of flying line from Mysore to Calicut were completed, and offices were opened at Mercara, Cannanore, and Calicut. In January, 1857, arrangements were made to construct a flying line from St. Thomas's Mount to Ceylon, through the French Settlements at Pondicherry and Karikal, but the work was greatly delayed by the detention of the wire expected from England. In August, 1857, 99 miles of line from Madras to Pondicherry through St Thomas's Mount had been completed, and an office at Pondicherry was opened. On the 24th November, 1857, 271 miles of line from Madras to Bezwada, *viâ* Nellore and Ongole, were completed, and an office at Nellore was opened, and another at Bezwada By August of the following year, 280 miles of line south of Madras, from Pondicherry to Chetty Chuttrum were completed up to Negapatam, and to Ramaisweram in October following. A submarine cable, consisting of a 7-strand copper wire protected by an outer coating of tarred yarn and large iron wire, was successfully laid across the Gulf of Mannar from Thonicodi Point and Tallamanaar

In May, 1858, orders were received to construct a line from Calicut to Cochin, a distance of 103 miles, and upon its completion an office at Cochin was opened on the 18th December following.

Preliminary operations were commenced to extend the line from Cochin to Ramnad *vid* Alleppy, Quilon, Trivandrum, and Tuticorin, and from Cannanore to Dharwar, traversing Mangalore and Honore, but proceedings were postponed. In 1862-63, some portions of the following sections, from Madras to Bangalore, Bangalore to Bellary, Bangalore to Mysore, Mercara to Calicut, and Calicut to Cochin, were reconstructed, and the alignments of the above sections were slightly modified to avoid several large river-crossings, paddy fields, &c The Government again sanctioned the extension of the line from Bombay to Tuticorin, *vid* Cannanore, Cochin, and Palamcottah on the Western Coast That portion of the route within the limits of the circle was surveyed, and estimates and indents were submitted. An office at Tellicherry and three temporary ones on the banks of the Vypeen and Beypore rivers, and in Seerah were opened respectively The estimates, &c, referred to having been sanctioned, the construction of the line was commenced in 1863-64 from Tuticorin, *viâ* Tinnevelly, Trivandrum, Quilon, Alleppy, and Cochin, and from Mercara to Mangalore and Condapore The direction of the line formerly contemplated to run on from Cannanore to Bombay was changed in view to avoid the numerous water crossings to the north of Cannanore on the Western Coast Offices at Cuddaloie and Beypore were opened In 1864-65, the lines from Tuticorin to Cochin, and from Mercara to Mangalore and Condapore towards Bombay, measuring 365½ miles were completed, and offices at Palamcottah, Alleppy, Nagercoil, Trivandrum, and Mangaloie were opened, as also an Office of Observation at Kotaperamba

Various extensions were made in subsequent years, and the extent of the line advanced from 892 miles in 1867-68 to 2,102 miles (with 13 Departmental, 46 Combined, 19 Mysore State Railway, 11 Canal, and 35 Private Line offices), on 31st December, 1886 The Departmental Offices of the Madras Division—which forms about one third of the whole Presidency—are situated at Madras, Fort St George, Negapatam, Vellore, Pondicherry, Trichinopoly, Madura, Tuticorin, Pamban, Bangalore, Wellington, Ootacamund, and Lovedale Combined offices have been established at Adoni, Arcot, Chittoor, Coimbatore, Coonoor, Cuddalore, Cuddapah, Dindigul, Erode, Gudiyatum, Hosur, Kankal Karur, Kotagiri, Kumbakonam, Kurnool Mount Road, Mannargudi, Mylapore, Mysore, Nagore, Nungumbaukam, Palghat, Paramakudi, Poonamallee Pudukotah Ramnad, Salem, Saidapet, Sowcarpett, St Thomas's Mount, Tanjore, Tirupati, Tranquebar, Trichinopoly Fort, Triplicane, Vaniyambadi, Vepery, Virudupati, Walajanagar, and Worur The number of messages of all classes transmitted from the different offices in the Madras Division advanced from 23,394 in the year 1858-59 to 267,929 in the year 1885-86, and the value from Rs 46,465 in the former to Rs 6,20,151 in the latter year

When the telegraph was first introduced into India the signals were composed and read off by the right and left deflections of a magnet placed within several convolutions of copper wire Shortly before 1857 the Morse system was introduced, and reading by sound from the taps of an electro magnet is now universal in India Formerly there was but one system of working, that is by the ordinary open current, now in the Central Telegraph office at Madras circuits are worked by ordinary open circuit, by through circuit, by closed circuit, by double current single working, by double current duplex working, and by quadruplex working Formerly all interruptions were repaired by line runners A fault occurred between two stations, say 100 miles apart, and a man was started from each end, and had to examine every inch of the line until the fault was reached The two men having met, repaired the fault, and returned to their respective stations Now all the lines are tested twice a month to see that they are in good electrical order, and whenever a fault occurs it is easily localised within a few yards of the place, a runner is ordered out to the spot, and the accident is usually repaired in a few hours All the signallers have to pass an entrance examination in general elementary education, and, after nine months to a year of technical education, they have to pass a final examination.

PUBLIC WORKS.

In the year 1837 the state of Public Works in the Presidency of Madras was thus described by Captain (now Sir Arthur) Cotton, of the Madras Engineers :—

"That the nature and importance of the subjects of the Irrigation and Communications has been hitherto altogether misapprehended leading to a loss of Revenue and a retardation of the progress of improvement in the state of the community which is quite beyond calculation

"That, as respects Communications, no country whatever can prosper if they are not made the very first objects of attention, and that in respect to Irrigation it is in this country owing to the peculiar character of the climate, undoubtedly the very first subject to be attended to inasmuch as we cannot naturally expect that there will not be famine and want of every kind, just in proportion as the cultivation is more or less dependent upon local rains, without the help of artificial works

"But the expenditure upon the Irrigation has certainly not exceeded one third of what, upon the strictest principles of economy, it ought to have been and that from the little consideration that the subject of Communications has been thought worthy of, there has been in most cases nothing at all expended and in others the most expensive and unaccountable expenditure totally disproportioned to the advantages to be obtained, and to the real necessities of the case

"Though the country cannot advance without good Judicial and Revenue management, yet it is indisputably certain that nothing will avail unless the Irrigation and Communications are attended to While the population are mainly dependent upon the local rains of so precarious a climate for their cultivation, that four fifths of them must be employed in merely raising food every five or six years we must witness the deaths of tens of thousands by famine and the great body of the people must be without clothing or anything but a bare subsistence, even in fruitful seasons And without Communications nine tenths of the natural treasures of the country must continue to be useless Above all the want of Communications is almost a total bar to the progress of knowledge, and improvement generally"

The system under which this lamentable condition of affairs continued had been gradually evolved from that by which, in the early days of British rule, every Collector was his own Engineer, and in addition to collecting the revenue, expended annually, without professional assistance, considerable sums on the upkeep and improvement of the works from which the revenue was derived Though logically it must be admitted that the Collectors who were responsible for the revenue should also have much to say to the works upon which the revenue depended, yet, as no amount of zeal will make up for want of professional training, it followed that the waste of money attracted attention, and from time to time efforts were made to aid the Collectors by appointing "Superintendents of Tank Repairs" But for many years the number of the latter officers was too limited to be of any practical benefit, and it was not until 1825 that the whole Presidency was divided into three divisions, each under the charge of a "Civil Engineer," with a suitable establishment, and the whole placed under the control of an Engineer officer at the Presidency town, styled the "Inspector General of Civil Estimates" In 1836 it was decided that the Board of Revenue should have the benefit of the experience of the Inspector-General, and that officer was given a seat at the Board, under the title of Chief Engineer, an Engineer Secretary to the Board being at the same time appointed, upon whom devolved the administrative duties previously performed by the Inspector General

Such, then, in the first year of the reign of Her Majesty was the "Maramut" or "Repairs" Department, which had the control of all irrigation works and navigable canals, and all roads and bridges not situated in Military cantonments. Side by side with the "Maramut" Department was the Engineering Department of the Military Board, an institution dating as far back as 1785, and which was responsible for the superintendence of the fortifications generally; of the roads, bridges, and public buildings, both Civil and Military, at the Presidency town; together with all Military (and Civil up to 1838) buildings in the provinces; and roads and bridges in cantonments. The engineering works under the Board were distributed in ten divisions, corresponding with the divisions of the Army Five of these divisions were controlled by Superintending Engineers, with executive officers, a suitable establishment of overseer Serjeants, &c ; and in the remaining five, the execution of works was undertaken by the Commanding, or Staff Officer. Thus it will be seen that fifty years

ago the conduct of Public Works in the Presidency of Madras was divided between a Military Works Branch and the Public Works proper. This arrangement did not work well; and in 1838 the importance of the "Maramut" Department to the revenue of the country, and the necessity of strengthening it so as to enable it to cope effectually with the vast amount of work devolving upon it, became more apparent.

It was therefore resolved that the whole Presidency should be rearranged to form eight "Maramut" divisions, each under a "Civil Engineer," to whom were, at the same time, transferred the construction and repair of all Civil buildings in the provinces, formerly under the Military Board; while the other works, under the control of that body, were placed in charge of the Staff Officers at Stations, and at Division Head-quarters, under the Quarter-Master-General of the Division Staff. By this reorganisation, whatever efficiency the Engineering Branch of the Military Board had possessed, was gradually destroyed, but it was not until twenty years later that the Board was abolished. In 1850, the importance of the systematic management and execution of Public Works throughout the Presidency engaged the attention of the Court of Directors in England, and a Public Works Commission was appointed in the following year. In 1852 the Commission issued a very full account of the existing system of Public Works Administration, and reviewed at length the working of the "Maramut" Department, the Trunk Road Department, and the Engineer Department of the Military Board. It pointed out the generally neglected state of public works of the country, except in a few favoured districts; it dwelt on the insufficiency of the annual grants allotted for public works, and on the inadequate establishments appointed to look after them; and it brought to notice the benefits to be derived by the State from the systematic and judicious expenditure of public money in the promotion of public works. The Commission also recommended the establishment of one Department for the management of all Public Works, Civil or Military. At this date the entire cost of the Public Works Establishment was 5¾ lakhs per annum, and the expenditure on works 24½ lakhs. The proposals of the Commission involved an annual charge of nearly 14¾ lakhs for establishment, and an annual expenditure of 48 lakhs. After much discussion, the new establishment was sanctioned for the year 1858, and thus, for the first time in its history the Department, as a whole became an executive Department. In consequence of the Mutiny in Bengal, the expenditure on Public Works was much restricted, and a considerable part of the Public Works establishment sanctioned in 1858 was discharged in the year 1859. In 1860 doubts arose as to whether the organisation was not too elaborate, and in 1863 the question was referred to a Committee upon whose recommendations some radical changes in the executive were made. In 1870, in consequence of the difficulty of maintaining the minor irrigation works, a Commission was assembled to consider the expediency of further reorganisation, but it was not until 1872 that practical effect was given to its recommendations. The principal changes were the appointment of twenty-one District Engineers in direct communication with the Chief Engineer. The cost of the new establishment was set down at 21½ lakhs. This organisation was succeeded in 1878 by the Superintending Engineer system; the Presidency being divided into five circles, each under a Superintending Engineer, and 39 Executive divisions. In 1879 considerable reductions were made in the Executive Staff, in consequence of financial pressure caused by the famine; and the number of executive divisions was reduced to 29. It being found that with the increased areas thus given to each division, the staff of the Department was no longer equal to the work expected from it, the greater part of the Public Works in the Local Fund Circles were handed over to the Local Fund Boards for execution by their own agency. The consequent reduction in the contribution of the Local Funds to the cost of the Public Works establishment, amounting to about 5½ lakhs, together with the financial pressure then existing, involved a still further reduction in 1880-81 when 15 officers of the Engineer Establishment, and 79 upper subordinates were retired. But in the year 1881 brighter times dawned upon the Department, which admitted of a large increase

in the establishment, and the Presidency was re-arranged into six Superintending Engineers' circles, subdivided into 30 executive divisions; which, with the exception of alterations made from time to time in the number of divisions, is the organisation now in force.

Having thus outlined the rise and formation of the Public Works Department, and briefly sketched its organisation, it only remains to mention a few types of its work. The most important of the Public Works of the Madras Presidency—other than those of Irrigation—may be divided into three classes, viz.: Communications, Harbours, and Buildings. With a few exceptions no works of the first class remain under the Department, and the exceptions referred to will, as soon as they are completed, be handed over to the Local Fund Boards concerned Up to a very recent date all the bridges in the Presidency town were maintained by the Department; but they have now been handed over to the Municipality; and in future years it is not probable that any roads or bridges will be constructed by the Department, except in cases where the Local Fund Boards are unable on account of the expense to undertake the work. With regard to Harbours, the works at Madras are described on another page The pier at Gopalpore is also alluded to, and it is merely necessary to add that it will be completed during the present year. The improvement of the Cocanada harbour by means of lengthening the groynes at the mouth of the Cocanada river) has lately engaged the attention of the Department, but it is probable that the idea of extending them will be abandoned in favour of dredging on the bar The works at the Paumben Pass have, since 1879, been carried on by the Marine Department, but prior to that date they were under the Department, and consisted chiefly of blasting and dredging to make a passage for coasting vessels The harbours of Mangalore and Negapatam have also been considered, but they present exceedingly difficult problems, and their improvement is not likely to be attempted for some time. The Cruz Milagre dam at Cochin gave rise to some uneasiness two years ago, but the remedial measures taken had the desired effect

To turn now to the class of "Buildings," it must be admitted that in proportion to its size and importance the Madras Presidency has few modern buildings of architectural importance, but within the last ten years much has been done at the Presidency town and at Ootacamund to improve matters Among the largest and most important Military buildings constructed by the Department may be mentioned the Military Convalescent Depot at Wellington costing 17½ lakhs; the Lawrence Asylum at Ootacamund, 8¾ lakhs; Family quarters in Fort St. George and Cannanore; Barracks at Fort St George, Cannanore, St Thomas's Mount, Bangalore, and Bellary, and many other Military buildings of various descriptions. It may be added that most of the buildings named above were completed with little deviation in cost from the estimated amount. Among the Civil buildings, the most important that have been constructed of late years are Government House, Ootacamund, the Postal and Telegraph Offices, Madras, the Senate House of the Madras University, the Presidency College, the Lying-in Hospital, and the Ophthalmic Hospital. With these, and many other buildings, the name of Mr R. F. Chisholm, late Consulting Architect to the Government of Madras, will be honourably handed down to posterity.

From this brief sketch of the Department, it will be seen that since 1837, when the reproachful words of Sir Arthur Cotton were written, much has been done to ensure the public works of the Presidency being carried on in a systematic manner. The result has been most satisfactory. The main lines of road, and thousands of miles of cross roads have been metalled and bridged, and (since 1879) handed over to the Local Fund Boards, who year by year are improving the "Communications" by making new roads and repairing existing ones; thus leaving the Public Works Department free to devote more attention to the subject of "irrigation." The difficulty, however, of the up-keep of the minor irrigation works still continues, and in 1883 it was found necessary to entrust the work of obtaining hydraulic information and preparing estimates for these works to a separate

branch of the Department known as the "Tank Maintenance" scheme. Unfortunately, owing to financial pressure, nearly the whole of the establishment for this work had to be abolished at the commencement of this year, and for some time it was feared that the scheme would have to be held in abeyance for an indefinite period. It is now, however, contemplated to recommence operations upon a modified scale, for there can be no question of the great importance of carrying out the repairs to these minor works (which include 31,648 tanks) in a systematic manner and upon scientific principles. This retrospect should not be closed without mention of the Corps of Madras Engineers, the officers of which have from the earliest days taken a prominent part in the public works of the Presidency; so much so that a Civil history of the corps (the Military history has already been written) would be almost a complete history of the Public Works Department.

RAILWAYS.

Although some progress had been made with the construction of Railways in England at the time of Her Majesty's accession, it was not until several years after that event that practical steps were taken for their introduction into India. Some of the earliest Indian Railway Companies were formed in London in 1845, but the projectors found it impossible to raise the necessary funds without the assistance of Government. This led to the adoption of what is known as the "guarantee" system, under which lines are made through the instrumentality of Companies who receive from Government a guarantee of a certain rate of interest upon the capital expended, the rate being at first 5 per cent., with half the surplus profits beyond that figure. The direct pecuniary interest which, under this arrangement, the Government has in the success of railways, involved the necessity for some supervision and control, which is provided for in the contracts, and is exercised in England through a Government Director, and in India through the Consulting Engineers for Railways.

The Madras Railway Company was originally formed on the 8th July, 1845, its object being the construction of a line from Madras to Arcot. The Company was dissolved in the following year, and it was not until the East Indian and Great Indian Peninsula Railway Companies had obtained a guarantee of interest that the subject of a railway in the Madras Presidency was revived. In 1849 the Madras Company endeavoured to obtain terms similar to those in other Presidencies, but was unsuccessful. A report on railways was then made by Major (now Sir Thomas) Pears, of the Madras Engineers, who recommended that a trunk line should run from Madras to the Malabar Coast, *viâ* Vaniembady, Salem, and Palghat; and that another should diverge from it, at about seventy miles from Madras, and climbing the Eastern Ghauts near Palmanér, be carried *viâ* Bangalore to Bellary, and thence to Poona and Bombay. In the selection of his lines Major Pears seems to have been guided entirely by facilities of construction, and subsequent economy in working. The Supreme Government did not approve of the line *viâ* Bangalore to Bellary, but decided upon a main line from Madras to the West Coast, with a branch from Vaniembady to Bangalore, and another from Coimbatore towards the Nilgiris; and a line also from Madras to Cuddapah and Bellary.

The present Madras Railway Company was formed in 1852, and its first contract was for the construction of an experimental line from Madras towards the West Coast. The question of the general system of lines was still unsettled, but the arrival of an Agent in January 1853 rendering a commencement necessary, the Government of India shortly afterwards directed that a line from Madras as far as Munnal be at once constructed, as the best line for an extension of the railway in any direction that further surveys might show to be desirable. The first sod was turned on the 9th June, but before much progress had been made it was agreed that the line should be extended to the West Coast. A contract for this purpose was executed in 1855. A further contract for the

construction of the North-West Line was entered into in August, 1858 The first section, from Madras to Arcot, was opened for traffic on the 1st July, 1856; and the South-West Line, from Madras to Beypore, was opened throughout on the 12th May, 1862 The Bangalore branch was opened on the 1st August, 1864, and that to Mettupalaiyam on the 31st August, 1873 On the North West Line commencing at Arkonam, the first section to Nagari was opened on the 4th March, 1861, and the line was completed to Raichur on the 15th March, 1871, the Bellary branch being also opened in the same month The doubling of the line from Madras to Perambore was completed on the 7th February, 1874, and from thence to Arkonam on the 28th August, 1877 The short branch to Bangalore city, which was originally undertaken as a portion of the Mysore Railway, was handed over to the Madras Railway for construction as a broad gauge line, and opened for traffic on the 1st July, 1882 These lines are all on the 5′ 6′, or Indian gauge, selected by Lord Dalhousie, and their total length is 861 miles, but on the 1st February, 1887, the Bellary Branch, 30 miles in length, was transferred to the Southern Mahratta Company, so that the total length of the Madras Railway is at present 831 miles Calicut is now being substituted for Beypore as the western terminus and this extension, 9 miles in length, will be opened towards the end of this year A branch, 2½ miles long, from Palghat Station to the town is also under construction.

The South Indian Railway, which is also "guaranteed," consists of a main line from Madras to Tuticorin with branches from Chingleput to Arkonam, from Villupuram to Gingi river, where it joins the Pondicherry Railway, from Tanjore to Negapatam, from Trichinopoly to Erode, and from Manyachi to Tinnevelly The first portion of the undertaking was on the 5 6′ gauge from Negapatam to Erode, but when the extensions to Madras and Tuticorin were sanctioned, it was determined that the entire system should be on the metre gauge The line from Negapatam to Erode was commenced in May, 1859, by the Great Southern of India Railway Company, and completed in December, 1861 The line from Arkonam to Conjeeveram was commenced in March, 1864, by the Indian Tramway Company, and was completed on the 3 6′ gauge in May, 1865 The Carnatic Railway Company took over the latter, and entered into a contract in 1870 for its extension to Cuddalore but in July, 1874, the two undertakings were amalgamated, under the title of the South Indian Railway, and the whole system is now on the metre gauge, the conversion of the Negapatam to Erode section having been completed in December, 1879, and that of the Arkonam to Conjeeveram section in July 1878 The line from Trichinopoly to Tuticorin was completed in January, 1876, and that from Tanjore to Madras in July, 1879 The Pondicherry branch was opened in December, 1879, and the Chingleput to Conjeeveram section on the 1st January, 1881.

These being until quite recently the only open lines in the Madras Presidency a few remarks may now be made as to their financial results Unlike most of the guaranteed lines in other parts of India the Madras and South Indian Railways, though comparatively cheaply constructed, have never paid the guaranteed interest, a result due to the comparatively small traffic which they command The chief causes assigned for this are —The geographical character of the country served, lying as it does within the narrowest part of the peninsula, the absence of leading staples of traffic, and of any great trade centre on which they might concentrate from a long distance, and the poverty and simple habits of the southern people The same will probably be true of any future extensions

The capital of the Madras Railway is $10\frac{7}{10}$ millions sterling, of which 8¾ millions bear interest at 5 per cent The line has cost £12,250 per mile. The capital of the South Indian Railway is 4½ millions, and the line has cost £6,800 per mile Up to the end of 1885 the guaranteed interest of the Madras Railway amounted to 12½ millions, while the net profits reached only 5½ millions, leaving a balance of 6⅞ millions to be met from the revenues of India, in addition to the expenditure on land which was given free

The interest and profits of the South Indian Railway are $3\frac{4}{10}$ millions and $1\frac{8}{10}$ millions respectively, leaving a balance of $1\frac{8}{10}$ millions against the State. Much has been urged against the fact of the Madras

Railway passing at a distance from the large towns of Arcot, Vellore, Salem, and Palghat, but the short-distance traffic thus lost could have no appreciable effect on the general results, and it is questionable if 1,500 miles of railway could have been laid in the Madras Presidency which would have yielded traffic exceeding in any degree that earned by the existing lines. The Madras Railway now pays nearly 3 per cent., and the South Indian, excluding abnormal outlay which is now being incurred, may be expected to pay 4 per cent.

The work done by these lines has increased largely of late years. In 1885 the Madras Railway carried 5½ millions of passengers an average distance of 45 miles, and 646,000 tons of goods a distance of 153 miles; and the South Indian Railway carried 6½ millions of passengers an average distance of 36 miles, and 584,000 tons of goods a distance of 72 miles. The gross earnings of the two lines during the same years were 76½ lakhs and 45½ lakhs respectively, and the net profits amounted to 32¾ lakhs, and 15¾ lakhs. About 99 per cent. of the passengers travel third class. Rates have been greatly reduced, and the lines are performing their proper function in developing the resources of the Presidency. Although the Government has every year to make up a large deficit (in 1885 this was £275,000) there can be no doubt that the advantages in improved and cheapened administration, and in the development of the country, far outweigh the charges thus incurred. A notable instance of the use of railways was furnished during the famine of 1876-78, when, as stated by the Viceroy, the railways saved Southern India.

As to other lines in the Madras Presidency, it may be mentioned that the only open length is a portion of the Southern Mahratta Railway from Bellary to Hospet, 40 miles. As already stated this Company now owns the branch of the Madras line, which will be converted to the metre gauge to afford connection with the railway under construction by the State from Guntakal to Bezvada. The latter has a length of 279 miles, and is designed to convey the surplus produce of the Kistna Delta to the unproductive portions of Bellary, Anantapur, and Cuddapah. A similar line, 86 miles long, on the metre gauge, is being made from Tirupati to Nellore to connect the above-named districts with the Pennair Delta. This line and a portion of the former, known as the Bellary-Kistna, will be opened during the present year. In order that they may fulfil their object extensions are required from Guntakal to Hindupur and Bangalore, and from Tirupati to Dharmavaram. A line is also projected from Villupuram to Pakal (near Damalcheru) crossing the Madras Railway at Vellore, to convey the produce of the Tanjore Delta, and, together with the extensions described above, to connect the metre gauge systems of the South Indian and Southern Mahratta Railways. A line on the broad gauge, 21½ miles long, is now under construction from Bezvada to the Hyderabad Frontier, to join that being made by the Nizam's State Railway Company to the Singareni coal fields. The coal is of good quality and inexhaustible in quantity; and its use on the railways of Southern India will lead to considerable economy in working. At present the Madras Railway works one-fourth of its trains with patent fuel, and three-fourths with wood; the South Indian Railway uses coal almost entirely. Several surveys for minor lines have been carried out from provincial revenues.

THE MADRAS HARBOUR.

The construction of a Harbour at Madras has been the greatest engineering work of the kind undertaken in India during the reign of Her Majesty, and, perhaps, as a purely marine work, in no way connected with quays, locks, or canals, it is one of the largest works ever attempted out of Europe. To Lord Hobart is chiefly due the origin of the Harbour, for to him, in 1873, Mr. William Parkes submitted his plan, of which that Governor highly approved, and which he warmly recommended for the sanction of the Secretary of State. The idea was not to form a Harbour of Refuge, but to overcome the drawbacks of the surf, and by this means to make such a saving on boat hire as would pay 5 per cent. interest on the capital to be laid out in constructing the Harbour, the estimated cost of which was Rs. 56,45,165. In March, 1875, the scheme was sanctioned by the

Secretary of State, and preparations were immediately made for commencing work at Madras. Engines, cranes, and machinery, with cement, and various stores, were sent out from England; while, in Madras, arrangements were made by Mr. James May, the Superintendent, for quarrying stone and laterite in the neighbourhood of Madras for the work, and organising establishments. Very little progress, however, was made in 1875, as the commencement of forming the north pier, or surf bank, was a mistake, and the work had afterwards to be relinquished. In December 1875, it was resolved to connect the name of the Prince of Wales (who was then in India) with the undertaking. Accordingly, on the 20th of that month, with all due ceremony, and in the presence of a very large number of the inhabitants of Madras, His Royal Highness laid a Memorial Stone in commemoration of the commencement of the undertaking.

In January 1876 work was begun in earnest, Mr. May being ably assisted by Mr. Beardmore, who had arrived in the previous November from England. The north surf bank was pushed out rapidly into the surf. In May, Mr. May died in the fifty-eighth year of his age. This threw the responsibility of a great amount of work upon Mr. Beardmore, who did excellent service. In the following August, Mr. F. N. Thorowgood arrived, and took command of the works, which had by this time been brought into a good state of efficiency for a proper start at construction. But the advance of sand to seaward with the progress of the piers caused much apprehension, and the Government telegraphed to Mr. Parkes to visit Madras to report what was going on. This he did in October 1876, when he allayed many of the fears in the public mind by showing that the sand accumulation was only temporary. From December 1876 until April 1877 the progress at the north pier was regular, but in April the stone foundation was found to be buried with sand in one night. This hindered progress to such an extent that, from March 1877 to January 1878, an advance of only 58 feet was made. This slow rate of progress revived so much alarm, and the need for economy in public expenditure was so pressing, that had it not been for the Duke of Buckingham and Chandos, who was then Governor, the works would probably have been discontinued by the Government of India. Soon afterwards, however, the work at both piers went on briskly, and in 1880 a rate of advance was attained which is not known to have been equalled before in any deep sea work in the world. In the working months of that year a length of 1,235 feet of the north pier, and 1,420 feet of the south pier was built. In October 1881 the Harbour was nearly an accomplished fact. The water that it enclosed was smooth; and sailing ships of large size, and numbers of smaller native craft anchored inside with comfort. All seemed well. The pier heads were reached, and were half completed. Moorings on a comprehensive scale were being put down, and were paid for out of the savings gained in the construction of the Harbour, so cheaply had it been built. Mr. (now Sir Mountstuart) Grant Duff, the new Governor, inspected the works on November 7th, and was led to hope that one of his first acts in Madras would be to open the cheapest harbour that ever was made. But five days after this inspection the two piers of the Harbour, which had taken nearly six years of hard work to build, and had cost the health and the lives of many men, were destroyed during a storm, from the curved work of each arm outwards, thus leaving the space between the two piers nearly open to the sea.

This caused a complete stoppage to the works, which had, up to this date, cost Rs. 58,06,414, and had swallowed up in construction 13,304 concrete blocks of about 27 tons each, besides 1,201,486 tons of rubble stone. From this date almost up to April 1885, or for nearly three and a half years, no real action was taken to restore the dilapidated harbour, but the time was chiefly employed in discussing how a proper harbour ought to be built. Mr. Parkes did not admit that there was any fault in his section of wall, but he proposed to add another row of blocks, and so make the work wider. In 1882 this proposal was sanctioned by the Madras Government, and many blocks were made for this new design. But it was decided by the Secretary of State that the whole matter should be thoroughly re-investigated; and consequently Sir John Hawkshaw, Sir John Coode, and

Professor Stokes were appointed to consider the best means of reconstructing the harbour. In January 1883 these experts published their report Briefly, they recommended a different style of building with concrete blocks, but retained Mr Parkes's width The side of each pier was to be protected by a "wave breaker" composed of random blocks of 30 tons weight each, piled up against the wall, and finally, each pier was to receive a solid capping of concrete about six feet deep The entrance also was to be reduced to 450 feet, instead of 550 feet as in the original design But this design did not meet with approval at Madras, where a strong desire was expressed for an entrance at the north-east corner instead of opposite the centre of the harbour area A Committee was formed in Madras, of which Captain Taylor, R N R, Master Attendant, Colonel Sankey, C B, Secretary to Government Public Works Department Mr Thorowgood, Captain Marshall, Assistant Master Attendant, and Mr Beardmore were members, and they drew up a scheme for closing the eastern entrance, and forming one to the north east The matter was again referred to London, but the Home Committee declined to alter its opinion While this volume was passing through the press, Captain Taylor was engaged in London in endeavouring to induce that Committee to modify its views in deference to Madras opinion

In August 1884 the new design was submitted to Mr Parkes for approval, and he prepared a detailed estimate for it amounting to Rs 45,90,051 This estimate came into operation on January 1st, 1885, since which date the expenditure has been about 19 lakhs of rupees The work of restoration is now going on with fair rapidity, considering the amount of material that has to be used up for every yard of advance, as not only has the regular pier to be built, but each season's work has afterwards to be protected by a screen of 30 ton blocks in the wave breaker At this date there have been about 300 feet of the new south pier built, and 464 feet of the north pier A storm of considerable violence in November 1886 did no damage to the works, so it may be hoped that the present design will prove sufficiently strong to resist a first class cyclone On June 1st, 1886, the works were transferred to the control of the Harbour Trust Board, which has just been constituted

The Harbour covers an area of about 210 acres, of which 170 acres contain a depth of water from three to eight fathoms, and 40 acres of a less depth than three fathoms Silting up had been prophesied from before the commencement as a sure thing, but periodical surveys, carried out with great accuracy of detail, distinctly show that no alarm need be felt on this head The depth at the eastern entrance is the same as it was at that spot eleven years ago But sand has entered the Harbour to some extent at the south west corner although here the depths are variable, as, for instance, shallower in 1886 than in 1882, but deeper than in 1879 as in this last named year sand was driven in from the wide eastern gap, and was afterwards washed out again The periodical surveys show beyond question that no serious silting has occurred in the Harbour as a whole. To the south the sand has steadily advanced, but corresponding almost exactly in area to the land gained to the south there has been an encroachment to the north, showing that the Harbour, viewed as one huge groyne, has brought about the results always observable with groynes where sand travels parallel to the line of coast The total expenditure on the work, including the first construction, the pause between destruction and reconstruction, and the reconstruction to date, has been Rs 84,93,117, and to complete the design as now contemplated will take about Rs 26,51,000 more, so that nearly one million sterling will have been spent before all is completed

The construction of the Harbour has been an arduous undertaking, calling for much physical endurance, and since the first block was set in December 1876, of the whole of the executive staff, including locomotive engine drivers, the principal contractors, foremen, and others in responsible posts, there only remains one—namely, the present Superintendent, Mr Thorowgood, who was present at the setting of the first block The rest have either died, or left the work on account of ill health

IRRIGATION.

The net result during the last fifty years of the work of the Public Works Department in the matter of ordinary irrigation works, that is, old native works, such as tanks and channels, may be summarised as follows A great number of works have been kept in good repair, and others greatly improved ; but the condition of the bulk of them is in the year 1887 much what it was in 1837. On the other hand, much valuable information has been collected at the cost of much time and trouble, and is recorded in a convenient shape, and matters have generally been put in train for the steady and continuous repair and up-keep of this important class of works on scientific principles It may reasonably be hoped therefore that the reviewer of fifty years hence will be able to record great and uniform progress If, in the matter of ordinary irrigation works, the progress may not be considered altogether satisfactory, in the conception and execution of works that are great in an Engineering point of view, and successful beyond measure as pecuniary investments, and as a source of wealth and prosperity to the country, the fifty years since the Accession of Her Majesty have been most fruitful

Among the most successful and important may be mentioned the Coleroon, Godavery, and Kistna Anicuts, which, constructed across the rivers of the same names, ensure the irrigation of the three great deltas of the Presidency ; the Nellore, Streevaikuntham, Palar, and Pelandoral Anicuts, built respectively across the Pennair in Nellore District, the Tambraparni in Tinnevelly, and the Palar and Vellaur in the North and South Arcot Districts The channels taking off from these latter anicuts feed series of tanks, all old native works, the supply to which, now fairly certain and sufficient was in days previous to the anicuts most precarious and variable. These works therefore may be considered productive, that is they give in some cases a very large, and in every case some percentage of return on the outlay incurred Among later works the Sangam and Barur Projects may be mentioned. Neither of these is yet fully completed The former consists of an anicut across the Pennair river in Nellore District, below the existing Nellore anicut, and is intended to render certain the irrigation under existing tanks, and also to greatly extend it ; while the latter is a scheme for the improvement of the supply of water to a number of existing tanks by constructing an anicut across the Pennair river, in Salem District. The Sangam Project, which should be completed in 1889 90, is calculated to give a return of 5 per cent on the total capital outlay , while the Barur, which is now nearly complete, will, it is expected, pay 6 per cent

Of the works mentioned, the most famous are the great delta works of Tanjore, Godavery, and Kistna, and some description of these may not be out of place. The Cauvery delta system is virtually of native origin. The delta differs in one most important and essential particular from the deltas of the Godavery and Kistna While in the two latter the irrigation and drainage channels have to a great extent to be artificially constructed, in the Cauvery delta, on the contrary, the numerous deltaic branches of the river form in themselves the natural sources of irrigation and drainage This essential difference may explain why even under the native *régime* the delta of the Cauvery was a thriving district, while the districts of the Godavery and Kistna were miserably poor

Tanjore came into the possession of the English about the year 1800, and at that time the irrigation was carried on by cuts in the banks of the various rivers of the delta This system, defective in itself, was rendered still more so by the precarious nature of the supply available. The full of the Coleroon, which branches from the Cauvery, is far greater than that of the latter river, and consequently there was always a tendency for the Coleroon to draw off too much water, and for the Cauvery to silt up at its head. The prevention of this was a source of constant trouble and anxiety to the officers of the district. It was not till 1836, when, at the instigation of Captain (now Sir Arthur) Cotton, the Upper Coleroon Anicut was built, that all fears on this head were set at

rest. Since that time improvements in the shape of regulating works, sluices, and embankments have been steadily carried out; and quite lately the construction of the Cauvery and Vennar regulators may be said to have practically ensured the safety of the delta against future floods. These regulators built across the Cauvery, and its main branch the Vennar, in connection with the Grand Anicut,—an old native surplus work, which has been much improved,—allow of the supply during floods being so distributed between the Coleroon, the Cauvery, and its several branches, that the delta need never receive more water than it can with safety dispose of, a danger to which it had always been exposed since the construction of the anicut, which, while it effectually prevented the possibility of a too scanty supply created the opposite evil of a too excessive one Some idea of the success of the Cauvery delta as a financial investment may be gathered from the returns of 1885-86, which give the total outlay on new works and improvements as Rs 16,59,254, the area irrigated as 905,284 acres, and the percentage of net revenue on outlay as 38 98

Next in order of age came the Godavery Delta Works, which were commenced early in 1847. The desirability of throwing an anicut across the river had first been brought to the notice of Government towards the close of the last century by Mr Topping, a Civil Engineer, but no steps were taken in the matter till 1844, when the rapidly decreasing revenue of the district, and the poverty of the ryots, led to the project being again taken up In this year Sir Arthur Cotton submitted a general report, followed in 1845 by a more complete one, together with detailed estimates for the anicut, and approximate estimates for the system of channels in connection with it. The project received the approval of the Court of Directors, and the construction of the work was commenced early in 1847 The total outlay incurred to the end of 1885 86 was Rs 1,21,67,097, the area irrigated 555,908 acres, and the percentage of net revenue on outlay was 10 29, the project will, it is expected, be fully completed in 1889 90 at a cost of Rs 1,30,32,653, when the area under irrigation will be 612,000 acres, and the percentage of net revenue on outlay 12 7

The Kistna Delta Works, which come next in order to the Godavery, were commenced in 1852, when the construction of the anicut was put in hand The outlay incurred to the end of 1885 86 was Rs 75,55 996, the area irrigated 330,159 acres, and the percentage of net revenue on outlay 11 01 On the completion of this project, which it is hoped will take place in 1901 2, the figures are expected to stand as follows total expenditure Rs 1 49,00,944, area irrigated 475,000 acres, and percentage of net revenue 8 22 The decrease in this last figure is due to the fact that a considerable expenditure has to be incurred in increasing the efficiency of existing works, without extending irrigation, and on this expenditure there will be no return

How greatly these works have benefited the country may be gathered from the fact that in the famine of 1877 78, when every unirrigated district was importing grain in enormous quantities, the grain exported from the Godavery was valued at £1,740,000, and yet, in the year 1844, the district was described as being in a poverty stricken state, with a steadily declining revenue Similarly with the Kistna This district, now one of the richest and most thriving, was, previous to the construction of the anicut, one of the very poorest in the Presidency, and suffered very severely in the famine of 1833 34 A noticeable feature of the works described is their construction solely at the cost of Government This system, with its concomitant evils of grants varying in accordance with the state of the Exchequer, explains why many of the works were so long in hand, and why the actual outlay in many cases was much in excess of the original estimated cost It appears to justify the view that a more liberal policy on the part of Government in encouraging their execution by private enterprise would have given better results The Kurnool Canal, however, the one solitary example in this Presidency of a large irrigation work carried out by a Company under Government guarantee, by no means supports this idea The Company, known as the Madras Irrigation and Canal Company, for the execution of the Tungabudra Project, as the scheme was then called, was incorporated in 1858, and the regular contract deed was signed in 1863 In 1866 the Company

was already involved in monetary troubles, and from that period to 1882, the year of the transfer of the Canal to the Secretary of State for India, its history was one long record of financial difficulties ending in eventual failure. Since its transfer, the work has been a losing speculation to the Government, and when the large capital already sunk is considered it is to be doubted whether the works can ever be remunerative.

The works above alluded to may be generally classed as productive; that is, works the outlay on which was in the first instance justified by the more or less large percentage of returns expected. The occurrence of the famine of 1876-78 first compelled the acceptance of the necessity of protective works, that is, works which, though not sufficiently remunerative to justify their being classed as productive, are still calculated to be a preventive of famine, and to guard against a future heavy expenditure in relief to the people. Of this class of work, only one, the Rushkhulya Project in the Ganjam District, has as yet been commenced. Sanctioned in 1883, the preliminaries for commencing work were undertaken towards the end of 1883-84, and it is expected that the year 1894-95 will see it completed. The scheme is to utilise the waters of the Mahanuddy and Rushkhulya rivers for the purposes of irrigation and navigation. The net revenue anticipated on the completion of the works is 5 per cent. on the total capital outlay. Among the schemes not yet put in hand may be instanced the Peryar Project, which has received the sanction of the Secretary of State; it is a scheme for diverting, by the construction of a dam across the Peryar, the waters of that river into the Madura District, a district which at present receives but a scanty supply from either monsoon, and in the last famine was among the localities which suffered most severely. The Project is to take six years to complete, and on completion is calculated to pay 7·8 per cent. net revenue on total outlay. It may therefore be fairly classed as productive; but in addition to this, its importance as a protective work cannot be over-estimated, as its successful execution would convert the barren district of Madura into a veritable garden. The Tungabudra Project is a scheme for giving the cantonment of Bellary a good supply of water, and at the same time extending irrigation in the district. The Maraudahully Project is designed to improve the supply to certain tanks in the Salem District. The last two Projects, though fully worked out as regards investigation, have not yet been sanctioned. Other important Projects have been suggested and investigated, but the want of funds has indefinitely postponed their execution.

Turning from irrigation works proper, some mention should be made of the lines of water communication in the Presidency. In the two northern deltas the main lines of Canal are utilised both for navigation and irrigation, but until the last few years, these deltas, though connected with each other, had no connection with the south of the Presidency, and it was not till the Famine of 1876-78 that the importance of water communication between the north and south was fully realised, and that an attempt was made to improve and extend the East Coast Canal, to meet the fresh-water high-level Canals of the Kistna Delta. The East Coast Canal, or, as it is now called, the Buckingham Canal, in honour of the Duke of Buckingham and Chandos, Governor of Madras, 1875 to 1880, is a salt-water Canal, and to some extent tidal. It was begun so long ago as 1801, but up to the years 1876-78, the total expenditure upon it was only about 5½ lakhs of rupees. In the years mentioned, the Canal was taken up at the instance of the Duke as a famine relief work, and an expenditure of 29 lakhs was incurred. Since that date improvements have been carried out steadily and continuously, and at the present time there is very fair through communication between Madras and Pedda Ganjam in the Kistna District. At this point the Buckingham Canal meets the Kistna high-level fresh-water Canals, and is, through them, connected with the Godavery system, thus opening up traffic with the sea-port of Coconada. The completion estimates lately sanctioned amount to nearly 100 lakhs, and it is expected that the works will be completed in 1893-94. Until this is the case, and the Canal has been fully protected from river-floods, it cannot be considered an altogether safe means of communication. Its value, as a cheap means of transport, is already

recognised; its prospects in the future are very favourable; and by connecting the City of Madras, or the head-quarters of the trade and railway system of the Presidency, with the deltas of the Godavery, Kistna, and Nellore, it will be simply invaluable in times of famine.

On the West Coast also the subject of water communication is receiving much attention. The benefits to be derived from expenditure on a large scale are, however, not so obvious as in the case of the Buckingham Canal; for already Cochin has very good water communication with Trichoor, a town situated twenty miles from the Madras Railway station of Shoranoor. From Tirur, another station on the same line, there is also a continuous line of canal to Cochin. Portions, however, are not excavated to full depth, and in consequence the traffic is diverted to Trichoor. Estimates for improving this latter line have been prepared, and the work will no doubt be put in hand when funds can be spared. From the above brief sketch, it will readily be admitted that whatever may be the shortcomings in regard to ordinary irrigation works, the fifty years since Her Majesty's accession have been marked by progress that has materially improved the condition of a very large number of Her Majesty's subjects in Madras.

COMMERCE.

The growth of trade during the past fifty years would, having regard to the vast natural wealth of the Presidency of Madras at the commencement of that period, and to the fact that such wealth had been but very partially developed, necessarily have been considerable; but a retrospective glance discloses a rate of progress far greater than these considerations alone would suggest. This remarkable progress may be attributed to a stable and good Government, under which that confidence, so necessary to the employment of capital and the encouragement of enterprise, has been preserved; to the opening up of the country by railways, roads, and canals, by means of which districts, even the most remote, have found an outlet for their products, the demand for which was previously limited by local requirements; to more extensive and more rapid means of communication by telegraph and post, whereby the inland trader obtains information in a few hours which previously occupied as many days, or weeks, in transmission; to the introduction of, and improvements in, machinery, the effect of which on production has been the more marked, seeing that what little was previously in use was cumbrous and defective; to the stimulus given to coffee and tea planting by European enterprise; and to such stimulating influences as cheap freights, brisk competition, marine telegraphing, &c.

The export trade of the Presidency fifty years ago was valued at two crores of rupees (two millions sterling), and the import trade at one crore and thirteen lakhs of rupees; now, the figures are eleven and seven crores respectively, thus showing that the import trade is about six times, and the export trade five and a half times as much as it was. It is patent that this great expansion of trade means a corresponding increase in the wealth of the country, in the material prosperity of its inhabitants, in the field for the employment of the labour, and in the ability of the producer to employ it. Not only has there been a remarkable increase in the productions of the Presidency, and consequently of its power to import foreign commodities, but new industries have come into existence, and trade has been more distributed throughout the interior. Thus, whereas, fifty years ago, the great centres of commerce were confined to sea-ports, where almost exclusively the European merchants were established, now the agents, and sometimes the chief offices of those merchants, are to be found scattered over the Presidency, including remote country districts, which, if previously heard of at all, were only known by report. The natural results of this have been the clearing away of the many obstacles to trade involved in slow and uncertain correspondence, and the employment in other fields of industry of numerous middle-men who formerly stood between the producer and the consumer, or exporter. This development of commercial enterprise, has

stimulated the spread of Banking, the introduction of foreign capital, and the multiplication of European traders and producers. Another feature of the age is the substitution for the manual labour that was solely available fifty years ago, of machinery which is now largely employed in spinning, weaving, the preparation and packing of raw cotton, the cleaning of coffee, &c. In the same connection may be mentioned the complete revolution of the shipping trade.

The traffic by sea of the Presidency, which was carried in 1840 by sailing ships, aggregating about 40,000 tons burden, is now almost entirely conveyed by steamers, annually aggregating 1,700,000 tons, since vessels carrying 500 or 1000 tons cargo, and occupying four months or more in the passage to or from England, have been replaced by steamers carrying from 2,000 to 3,000 tons, covering the same distance in five weeks. Taking some of the leading products of the Presidency as illustrating the growth of trade during the half century, it is found that the export of raw cotton has increased from 12,000 tons, valued at Rs. 40,00,000, to 25,000 tons, valued at Rs. 1,00,00,000. The cultivation of coffee is comparatively a modern industry, the opening up of the important districts of the Wynaad, Neilgheries, Coorg, Mysore, Travancore, &c., having been accomplished during the fifty years. The present production is about 17,000 tons, of the value of Rs. 1,25,00,000, whilst the export in 1840 was only 150 tons of the value of Rs. 70,000. Cinchona was unknown commercially as an article of production twenty years ago, and may even now be said to be in its infancy. But the export already reaches the value of Rs. 12,00,000. The manufacture of indigo remains now, as hitherto, exclusively in the hands of natives, but it has increased from 400 tons, valued at Rs. 17,00,000, to over 2,000 tons, valued at Rs. 1,00,00,000. The foreign trade in rice shows no gain, the increased production being necessary for the increase in population. Madras has always taken the lead in India in the tanning industry, and the trade throughout the past fifty years has steadily grown, the skins prepared being much sought after, on account of their excellence, not only in England and on the Continent of Europe, but also in America. The value exported in the earlier years of the period under review amounted to only a little over Rs. 2,00,000, whilst the export last year was valued at about Rs. 1,85,00,000, equal to about 12 millions sterling. The export of oil seeds has been comparatively of modern growth, the annual value of castor and gingelly seeds being each about Rs. 20,00,000. The value of sugar, and other saccharine matters produced, has increased fifty-fold, viz. from Rs. 1,00,000 to Rs. 50,00,000. Tea planting was commenced within the last twenty years, but as yet the total value produced has not exceeded Rs. 3,50,000.

Turning to imports, it is remarkable that notwithstanding the development of the mill industry, the quantity of manufactured cotton annually brought into the Presidency from Europe is maintained, whilst the total import of 1837 is insignificant compared with that of modern years; thus the buying power of the population must have increased, a fact which testifies to their prosperity. The value of yarn now imported is from Rs. 80,00,000 to Rs. 90,00,000 against about Rs. 9,00,000 in 1841. But it is curious to find that at that time the importation of what are known as Manchester goods, such as cotton cloths, &c., amounted to only Rs. 5,00,000; whereas now the value reaches from Rs. 1,50,00,000 to Rs. 2,00,00,000. In bygone years the annual value of machinery imported did not exceed Rs. 2,000 or Rs. 3,000 a year against Rs. 5,00,000 to Rs. 20,00,000. The use of wrought iron has increased from Rs. 2,00,000 to Rs. 20,00,000. The establishment of large manufacturing industries, which form so important a feature in the progress of the Presidency, comprises coffee works, cotton presses, cotton and woollen mills, sugar factories, and iron foundries. There are in the Presidency, at the present time, upwards of twenty large coffee works employing about 7,000 hands; thirty large steam factories for pressing and ginning cotton, employing about 2,000 hands; and ten spinning and weaving mills employing about 4,000 hands, besides others projected, or in course of construction. The local manufacturing industries here enumerated are only the largest concerns, and to them must be added an enormous number of native establishments, including tanneries, oil mills, rice mills, &c., which have come into existence during the half century;

these give employment to many thousands of hands, and largely contribute to the volume of trade the increase of which is so marked a characteristic of the age.

The interests of Madras trade have been sedulously guarded and promoted by the Chamber o Commerce,—an association of merchants at the Presidency capital, which was incorporated on th 29th September, 1836, and celebrated the completion of its Jubilee year by a banquet on the 18t December last, which was honoured by the presence of the Governor, the Commander-in-Chief, th Members of Council, the Bishop, the Secretaries to Government, Heads of Departments, and othe public functionaries. The vitality of the Chamber was in abeyance from the year 1841, when it first Secretary left for Europe, until 1855, when his successor was appointed, but it made up durin the latter moiety of the period under review for any want of activity that may have characterised i in the first decade of the half century. Its practical experience of matters intimately connected wit the conservation and development of the material resources of the country has been largely utilise by the Government of Madras, and its opinion has been frequently invited by the Government o India. Imperial legislation connected with such subjects as Customs, Stamps, Contracts, Bank ruptcy, Partnership, Administration of Estates, Probate Jurisdiction, Regulation of Factory Labour Coolie Emigration, Merchant Shipping, Master and Servant, Municipal Taxation, Currency, Govern ment Securities, Presidency Banks, Adulteration of Raw Products, &c., has received materia assistance from the Chamber, which has also bestowed much attention on such technical subjects a boat notes, tonnage schedules, port rules, port clearances, fees to port officers, Marine Courts landing charges, railway freights, train service, negotiable instruments, weights and measures, trad marks, value payable parcels, bills of lading, general average, rates of interest, notarial fees, usanc of bills, commercial statistics, detention of mails, telegraph codes, &c.

Shortly after its formation, the Chamber evinced much interest in the establishment of steam communication with Europe; and, in 1846, it contributed £100 to the London fund for presenting a testimonial to Lieutenant Waghorn, the pioneer of the Overland Mail Route. It was keenly alive to the importance of opening steam communication between Indian ports. The improvemen of the navigation of rivers, and the extension of irrigation also engaged its attention from time t time. The Chamber has interested itself greatly in the improvement of the port of Madras. On the 17th September, 1859, its Chairman assisted the Governor and the Commander-in Chief in screwing down the first pile of the Screw Pile Pier. Between 1869 and 1872 projects for mitigating the natural disadvantages of the port by means of a breakwater, or of a boat harbour, were exhaustively discussed by the Chamber; and in 1873 the Chamber gave its general support to the scheme of Mr. W. Parkes, C E., for the construction of the harbour (referred to elsewhere) at an estimate cost of a little more than half a million sterling.

The development of the railway system in Southern India was watched by the Chamber with much sympathy, and the importance of encouraging traffic by low charges and reasonable conveniences was on many occasions advocated. The improvement of anchorages was a subject that the Chamber considered from time to time, as well as the desirability of reducing port charges to the lowest practicable scale. The Chamber has always advocated judicious thrift in the expenditure of the Government, and advised more free recourse by the State to the labour markets of India and England; but it has not sympathised with the policy that would illiberally remunerate good work in India. It disapproved of the relinquishment of the import duties on Manchester goods on the grounds that India was not in a position to make the sacrifice of revenue, and that as revenue must be had, the duties afford not only Her Majesty's subjects in India, but also the subjects o Native States that are protected by Her Majesty, the opportunity of contributing insensibly to the cost of the administration. It has been opposed to the interference of the Government with the ordinary operations of trade; and, as soon as that industry had largely engaged private enterprise, it deprecated the continuance of the connection of the State with cinchona cultivation.

The Chamber has steadily maintained that, in a country densely populated by relatively poor people, the Postal and Telegraph charges should be low in comparison with the charges obtaining in the United Kingdom, and it has had the satisfaction of seeing this principle recognised in regard to Postal rates. The Chamber identified itself with the Madras Exhibition of 1854, and took an active interest in the scheme for Provincial Exhibitions, as well as in the success of periodical Exhibitions in Europe. It acted in 1863 as the recipient for public subscriptions for the Lancashire Cotton Weavers' Relief Fund, and collected Rs. 75,500; in 1870 it similarly collected Rs. 12,775 for the Sick and Wounded in War Fund; and in 1873 it received Rs. 12,473 for the relief of sailors shipwrecked, and of families bereaved by the Madras cyclone.

The Chamber had the honour, in 1859, of communicating its loyal congratulations to Her Majesty on her assumption of the direct sovereignty of India. It informed Her Majesty that it hailed "this auspicious event as the promise to this country of an era of enlightenment and prosperity," and it prayed that her Government of her "Indian Empire may be distinguished by the blessings of peace, and by the advance of civilisation." The Chamber submitted an Address to the Earl of Mayo, the Viceroy Designate, on his arrival in Madras in 1869; to the Marquis of Ripon, Viceroy of India, on his arrival in 1884; and to the Earl of Dufferin, Viceroy of India, on his arrival in 1886. It offered its respectful condolence to the Countess of Mayo, on the assassination of Lord Mayo in 1872; and to Lady Hobart on the death of Lord Hobart in 1865. The Chamber has had the honour of being represented in the Legislative Council of Madras since 1862.

MARINE.

The sea-board of this Presidency extends about 1,500 miles, from the district of Ganjam, on the East Coast, round Cape Comorin to the district of South Canara, on the West Coast. At the beginning of Her Majesty's reign the Marine Department was presided over by a Marine Board, composed of a Member of Council as Chairman, and the Commissary-General, Quarter-Master-General, and the Master Attendant, Madras, as members, with a Secretary. This body was maintained till the year 1858, when it was abolished, and an officer, called the Superintendent of Marine, was appointed to perform its duties. This designation was changed in 1868, when the offices of Superintendent of Marine and Master Attendant were amalgamated, and placed under one head, called the Master Attendant. This title was further altered in 1886 to Port Officer, but the administrative duties and control over all the ports of the Presidency has remained all along vested in the same officer.

With regard to the outports, there were in 1837 nine ports in charge of Masters Attendant, viz., Calingapatam, Vizagapatam, Coringa, Masulipatam, Tuticorin, Quilon, Cochin, Calicut, and Tellicherry, which formed the principal outlets of commerce. The sea-borne trade in those days belonged to a class of sailing ships called Indiamen, and the coasting trade was conducted by country craft, but later on the advent of steamers caused a complete revolution in the means of sea transport. Steam liners have been established between India and Europe extending to China, Japan, Australia and New Zealand; and coasting steamers have been started between ports in India, and Ceylon, Burmah, the Straits of Singapore, and Malacca, thus taking away the occupation of the old Indiamen, and diverting a large share of the former employment of coasting craft. With the facilities afforded by steamers, the construction of trunk roads, and the opening of railway communication with the large districts supplying produce for export were carried out. Additional outlets for trade thus came into existence, and largely increased the number of ports. There are now twenty-one principal ports, viz., Gopaulpore, Calingapatam, Bimlipatam, Vizagapatam, Cocanada and Coringa, Masulipatam, Madras, Porto Novo, Cuddalore, Tranquebar, Negapatam and Nagore, Paumben, Tuticorin, Cochin, Calicut and Beypore, Tellicherry, Cannanore, and

Mangalore. There are also one hundred and forty-eight minor ports. Of the former, twelve are in charge of Port Officers, and seven in charge of Sub-Conservators; while the latter are in charge of Superintendents, or Assistant Superintendents of Sea Customs, or heads of villages acting in the capacity of Port Conservators.

There were only three lights in 1837—one at Madras, which was an ordinary light exhibited on the top of a house in Fort St. George; the second at Coringa, or Hope Island, which was an ordinary country lantern; and the third at Tellicherry. The one at Madras was substituted, in January 1844, for a first-class revolving catadioptric light, exhibited on a fine granite column, 125 feet high, erected on the Esplanade near the beach, north of the Fort. The light is visible for twenty miles. The Coringa or Hope Island light has been improved to a 4th order dioptric fixed white light, visible fourteen miles; and at Tellicherry there is now a 6th order dioptric fixed white light, visible eight miles, exhibited on a small tower on the Fort wall, instead of from the flagstaff as formerly. Besides these improvements, seventeen additional lights have been established, so that both the East and West Coasts are now lighted throughout. In 1839 a light was established at Cochin, the lighthouse being built on the bastion of the old Fort to the south of the harbour. It was improved in 1868 to a 4th order white fixed catadioptric light, visible for fifteen miles. In 1842 a lighthouse was built at Mangalore, on a hill above the town; and in 1870 this light was changed to a 4th order dioptric white fixed light, visible for fourteen miles. In 1843 a light was exhibited at Cannanore from the flagstaff, and in 1850 it was improved to a 6th order dioptric fixed red light, and transferred to a small column erected on the Fort rampart, visible for from six to eight miles. In 1845 the lighthouse at Tuticorin was built, and in 1874 a 4th dioptric fixed white light, visible for fourteen miles, was exhibited. In 1846 a light was exhibited at Negapatam, and in 1870 it was improved to a 4th order dioptric white fixed light, visible for fourteen miles. In the same year (1846) a lighthouse was built at Paumben on a sand-hill about one mile east of the northern channel, and the light was changed to a catadioptric, with fixed light of the 4th order, in 1860; it is visible for fourteen miles. In the year 1847 a light was exhibited at Calicut, which was converted in 1870 to a 4th order dioptric fixed white light, visible for fourteen miles. In 1849 a light was exhibited on the top of a house built on Santopilly Hill, three quarters of a mile inland, to warn vessels off the dangerous reef known as the Santopilly Rocks. The light was changed to a 4th order dioptric fixed white light in 1871, visible for fourteen miles, and it was substituted in 1886 by a 2nd order dioptric fixed white light. In the year 1857 a light was erected at Point Divi, two miles north-west of the Point, and it was improved in 1870 to a 4th order dioptric fixed white light. In 1853 a lighthouse was constructed at Monapolliem, in the Nellore district, to warn vessels off the Armeghon Shoal. The light was changed to a 4th order dioptric white fixed light in 1870, visible for fourteen miles. It was again converted to a flashing light in 1881. In the year 1859 a red light was exhibited at Pulicat. The lighthouse is built near the beach, the column having white and black bands. The light is intended to warn vessels off the Pulicat Shoal. It was improved in 1870 to a 4th order dioptric fixed light, and in 1880 the colour of the light was changed from red to white. In 1871 a 3rd class light, visible ten miles, was exhibited at Gopaulpore from the white flagstaff, as a guide to vessels making the anchorage at night. In the year 1875 a light was temporarily exhibited at Muttum to warn vessels off the Crocodile Rock, and in 1883 a 1st class dioptric fixed white light was exhibited on a dark grey granite column, visible for twenty miles. In the year 1875 a 3rd class white fixed light was exhibited on the obelisk at Calingapatam, to warn vessels off a small reef which projects from the Point. A lighthouse is now being built on a rock at the Seven Pagodas to warn vessels off the Tripaloor Reef. It is to be a red light visible for about ten miles.

Other improvements have also been carried out, such as the erection of jetties, wharves, quays, and piers at Gopaulpore, Coconada, Masulipatam, Porto Novo, Negapatam, Tuticorin, Cochin, Calicut, Cannanore, Barkur, Kumbla, Kasaragod, and Mangalore. Madras, in addition to a screw

pile pier, is being provided with an artificial harbour at a cost exceeding one million sterling. Buoys have been laid down at Coconada, Madras, Paumben, Cochin, and Calicut. A semaphore has been erected at Madras for notifying the time to the shipping by an electric current from the Observatory. Tide gauges have been established at Coconada, Madras, Negapatam, and Cochin. Arrangements have been made for recording meteorological observations at the ports of Gopaulpore, Coconada, and Calicut, in connection with the Meteorological Department of the Government of India. Pilots have been appointed at Madras, Paumben, Keelakarai, and Cochin. Steamers have been subsidised for running between ports on the Coromandel Coast and Rangoon. A cyclone code has been established, and also a system of telegraphing bad weather warnings to the different outports for the information of shipping. Coconada and Negapatam have been supplied with Priestman and Bruce dredgers. Legislative enactments have been passed relating to Indian Merchant Shipping, for the registration of vessels, for the protection of native passengers by sea, for the management of boats and catamarams, for the conservancy of ports and collection of port dues, for enforcing quarantine, &c. In short, every year has witnessed some improvement in the direction of affording facilities for the advancement of trade and navigation in the Presidency.

FORESTRY.

Fifty years ago "Forestry" was unknown in the Madras Presidency, nor was it until twenty years later that a recognised "Forest Department" was instituted. It is true that, in 1807 Government made an attempt at conservancy by establishing a royalty over teak, and other timber in the Districts of Malabar and Canara, but this speedily developed into a monopoly throughout the Coast Districts, failed in its object, and led to such hardship that it was abolished by Sir Thomas Munro in 1822. For the next thirty years or so the forests were left entirely in the hands of Collectors, without any systematic control. In Combatore District things were latterly somewhat different; for, in 1847, Captain F. C Cotton (now Major-General, C S.I.), the Executive Engineer of Malabar, in an interesting account of a journey into Cochin territory through the Anamalai forests, brought their value to the notice of Government, and Lieutenant J. Michael (now Colonel, C S I), was appointed to explore, conserve, and work them in connection with the Public Works Department,—an arrangement which lasted seven years. An extensive teak tract was leased from the Zemindar of Colangody, a forest establishment was organised, roads and timber slips were opened out, and a system of strict conservancy was initiated On the whole, however, it was usual in those days to regard a forest as an enemy to be extirpated; and, considering the prevalence of fever, and of dangerous animals, it is scarcely surprising that a Collector who encouraged cultivation to its utmost limits was esteemed a public benefactor. In the words of the late Governor of Madras "we did not step in to conserve the Indian Forests an hour too soon, and large parts of the country would, if we had not done so, have soon become uninhabitable deserts."

Meanwhile, the importance of tropical forests began to attract attention at home. It was known that large and valuable forests in India were being cleared, regardless of ultimate consequences; and, as the results of this wholesale denudation became more apparent, the necessity for organizing a Forest administration, which would enable the authorities to economise public property for the public good asserted itself with increasing force. The subject came before the British Association for the Advancement of Science at Edinburgh in 1850, and a Committee was appointed to consider the question, consisting of Dr. Forbes Royle, King's College, London; Colonels R. Baird Smith and R. Strachey of the Bengal Engineers; and Dr. Hugh Cleghorn. The results of the Committee's deliberations were laid before the Association at the Ipswich meeting in 1851, whence it appeared that neither Government, nor the community at large was deriving from the Indian Forests those advantages which they were well calculated to afford. Apart from the

wasteful destruction of useful material, numerous products, valuable to science, and otherwise profitable, lay neglected in the forests. These and other representations were not without effect, and, as regards Madras, were instrumental in preparing the way for the Forest Department, which was organised in 1856—under the Governorship of Lord Harris—with Dr. Cleghorn, one of the Committee above mentioned, as Conservator.

To Dr. Cleghorn must, in all fairness, be conceded the title of Pioneer of Forestry in Madras, but it is due to Mr. Conolly, C.S., Collector of Malabar, whose efforts preceded his by many years, to allude to the magnificent teak plantations at Nilambur. They are probably not approached, and are certainly unsurpassed by anything of their kind in India, and, as a unique, interesting, and valuable State property, they form an enduring memorial to their author's sagacity. The plantations were first suggested by Mr. Conolly, in 1840, their object being, in his own words, "to replace those forests which have vanished from private carelessness, and rapacity, a work too new, too extensive, and too barren of early return to be ever undertaken by the native proprietor." It happened at the time that one of the many religious bodies holding lands in the Nilambur valley was in want of funds, and owned some of the best sites for planting that could have been selected had the whole area been available to choose from; and in this accident, probably, originated the idea of Mr. Conolly's enterprise. For the first year or two, there was much difficulty in getting seed to germinate, and various experiments were tried; but in 1843 Dr. Roxburgh discovered the true method, which with some slight modification is still followed; and, in 1844, Mr. Conolly having raised 50,000 healthy plants, was able to report that his experiments were successfully concluded, and to add 61 acres to the 31 which had been planted up to date. It is melancholy to have to add that Mr. Conolly was assassinated at Calicut by Moplah fanatics in 1855, a few days after he had received intimation of his well-deserved promotion to the Council of Fort St. George.

In 1862 the Nilambur Plantations, by this time covering an area of 1,623 acres, valued at 20 lakhs, were transferred to the regular Forest Department, and, in the five-and-twenty years which have since elapsed, have been enlarged by about 1,900 acres, and may now be set down in round numbers at 3,600 acres. They have cost from first to last (*i.e.*, up to the beginning of the official year 1886-7) including outlay in acquiring fresh sites, about Rs. 7,28,199, and have yielded a revenue of Rs. 7,31,222 derived from saplings thinned out, and from the better classes of timber felled for clearances. Assuming that regular felling operations may begin in 1904, when the first planting will be about sixty years old, it has been calculated, after allowing compound interest at 4 per cent. for unproductive periods, that a clear profit of Rs. 4,23,11,820 will eventually be realised.

Returning to the Forest Department at the opening of its career in 1856, we find it began with the forests of Anamalai in the Coimbatore District; with Sigur and Mudumalai in Malabar; and with those of Salem and North and South Canara. By 1862 it had taken in hand the Wynaad and Chenat Nair forests in Malabar, the Madura, North Arcot and Cuddapah forests, and included the Australian Plantations and Cinchona experiments on the Nilgiris, as well as the Teak Plantations at Nilambur. In the following year the forests of North Canara were transferred to Bombay; whilst those of Bolampatti, Bhavani and Collegal in the Coimbatore District, Gumsur and Surada in Ganjam, and the Kurnool forests were under conservancy. At Dr. Cleghorn's retirement in 1867, the forests of South Arcot and Tinnevelly had been added to the list; and the Golcondah Hill tracts, which had been for a short time under the Department, were handed over to the Collector. When reviewing Dr. Cleghorn's administration of the Department during its first eleven years of existence the Government, in October 1867, particularly noticed "the attention paid to the vastly important subject of fuel reserves with reference to the present and prospective needs of the Railways, to the propagation of the more valuable kinds of timber, as teak, red sanders, and sal, in suitable localities, and the assistance rendered to District officers towards the most advantageous employment of the local planting funds." Of the financial position the Government remarked that "the ultimate gain to the

State by the labours of the Department amounts to Rs. 18,58,038, while a most valuable public property has been brought under conservancy; the vast timber resources of the country have been carefully developed; and the future interests of the Government and of the public have been protected from risks which are daily assuming greater magnitude, but which, until comparatively recent years, had scarcely attracted attention." Referring to the inroads of cattle and herdsmen complained of in several Districts, the Government observed that "the subject is one that will be duly weighed in connection with the proposed introduction of the Forest Law, which is under consideration;" defined the primary object of conservancy as "the development of the sources of supply, and the careful protection of those sources from waste;" and remarked that "a large revenue, although it may be, and doubtless often is, a satisfactory indication of the advantages of economical administration is a comparatively secondary consideration." Having regard to all that has since transpired words such as these are very significant.

Colonel, then Captain, Beddome, succeeded Dr. Cleghorn as Conservator, and held that appointment until 1872, when a "re-organisation" took place, by which Forest administration was committed to the Board of Revenue, and Collectors were invested with the responsibilities and authority of District Conservators. Local Forest officers thus became the Collector's Assistants, while the Conservator became "Inspector of Forests," and was constituted a general adviser on Forest affairs to Government, the Board, and Collectors. When this occurred forest operations had everywhere developed, and divisional charges had to be rearranged Plantations and fuel reserves had progressed, and the Department was strengthened by the addition of several new officers. In 1876 control was once more placed in the hands of the Conservator as head of the Department; officers were put in charge of Trichinopoly and the Upper Godavery, whilst others submitted special reports on the Bellary, Kistna, and Nellore jungles. A Deputy Conservator was also detailed on special duty for the selection of reserved forests, and by this means preliminary proposals were framed for the Coimbatore, Tinnevelly, and Madura Districts, and a beginning was effected in Salem. Efforts meanwhile continued to be directed towards the development of revenue, and a more efficient control generally, but the absence of a forest law, the paucity of officers, and other difficulties proved serious impediments Colonel Beddome retired in December, 1881, after a Departmental service of twenty four years, fourteen of which were passed as chief. During his tenure of office the forests of the Presidency were thoroughly explored and reported on, and valuable contributions were made to the public knowledge of their economic value and botanical interest He was the author of the well-known *Flora Sylvatica*, as well as of a standard work on the ferns of Southern India, besides being a naturalist of no mean reputation. The financial results of his term of office amounted to a net profit in favour of Government of 9¾ lakhs, which was less by 8¾ lakhs than that which distinguished the administration of Dr. Cleghorn. This is easily explained. The Department at first confined itself to the chief timber-yielding forests of the Presidency, and in those days the receipts from North Canara and the Anamalais were very considerable. The extension of operations to less remunerative tracts; the heavy outlay on plantations, and fuel reserves, amounting to nearly 6½ lakhs; the transfer of North Canara to Bombay; and the abolition of the Indian Navy, which had been a large purchaser of Anamalai timber, all conspired to reduce the annual surplus. The price of labour had also risen, whilst the necessity for capital outlay producing no direct or immediate return grew with the development of the Department.

Lieutenant-Colonel Campbell Walker now became Conservator, and the year which followed his assumption of charge was remarkable for a series of events which heralded the approach of a new era in the history of the Department. It witnessed the advent of Sir Mountstuart Grant Duff, a Governor keenly interested in the progress of Forestry, and the arrival of Sir D. Brandis, Inspector-General of Forests to the Government of India, who was directed to discuss and arrange the

introduction of long-needed reforms. After several months occupied by the Inspector-General in visiting some of the more important Forest Districts, Committees were appointed to discuss legal, and other measures of reform. A draft Act, with a comprehensive report on Forest legislation in the Madras Presidency, was submitted in May; and another report as to the future relations of Civil and Forest Officers was submitted in June. In September the Inspector General laid his proposals for reorganisation before Government, together with a financial forecast for the next five years; and before the end of the year the Act had become law, and the reorganisation an accomplished fact.

At the beginning of the official year just concluded, 1,628 square miles of "Reserved Forests" had been constituted under the Act, which with those already "reserved" under previous orders gives a total of 2,737 square miles. "Reserved lands" had also been notified under the Act to the extent of 7,060 square miles, while leased and other forests covered 1,311 square miles. The total area placed under the legal control of the Department was thus 11,108 square miles, which Government appears to consider about as much as the requirements of the country are likely to demand. Much of course remains to be done in the way of transfers from reserved lands to reserved forests, but in both circles and in most Districts this is being steadily accomplished. Demarcation naturally follows reservation, and this too has annually progressed, the length of boundaries laid down during 1886 being upwards of 1,400 miles. The subject of forest surveys has not been overlooked, though, as yet, most of the work done in this direction has been performed by the Madras Survey Department, but proposals are now under consideration for the formation of a Special Forest Survey Party. As regards the all-important work of fire protection, it appears that at the end of the fire season of 1886, an area of 1,483 square miles had been attempted, and 1,445 square miles successfully maintained. In this connection, however, Government justly remarked, that until reserved forests are settled, demarcated, and finally set apart, progress must necessarily be comparatively limited. Grazing should be capable of producing considerable revenue without oppressive taxation, but it is at present something of a vexed question, the solution of which, as the Board of Revenue says, "lies at the bottom of all forest conservancy in this Presidency."

Under the head of "Police" the percentage of convictions obtained seems to warrant the belief that complaints are not generally laid except on good grounds. Roads are being extended in all directions; tramways laid down; and numerous buildings for the accommodation of all ranks erected, a work without which no adequate supervision is possible. As regards natural reproduction the effect of protection on the forests has been most favourably apparent; and under the head of artificial reproduction it may be noted that no less than 18,657 acres are classed as plantations, 30,760 acres as topes, and 1,043 acres as cultural operations, which means the re-stocking of blank areas in forests as distinguished from regular plantations. Financial results have more than justified the forecast framed in 1882. Receipts have risen from about 9 lakhs in 1882-83 to nearly 12 lakhs in 1885-86, the annual surplus averaging about 2½ lakhs. Expenditure for the same period has been at the rate of about 8 lakhs per annum.

Much, too, has been done of late years in the way of experiments with various exotics. The most marked success has occurred in the case of the mahogany tree, which is doing well in both circles, and particularly at Nelambur, where the ceara rubber tree has also been thoroughly established, and where the ipecacuanha plant and giant bamboo are also thriving. *Eucalyptus citriodora* is said to be fairly satisfactory at moderate heights, but no variety has yet been discovered suitable for growth on the plains. Conifers and maples from Northern India are coming up on the Nilgiris, and manilla hemp and the edible date (*Phœnix dactylifera*) both promise well in the Southern Circle. Amongst other duties Forest Officers have found time to assist at ensilage experiments, and in making the representative collections which have enabled the Department to compete with honour at the various Exhibitions held on the Continent, in the Colonies, and at

Calcutta, Edinburgh and London. Much useful information has also been contributed on such subjects as apiculture and sericulture, and a complete collection is about to be undertaken for the Central Museum at Madras illustrating the sericulture of the Presidency by specimens of eggs, cocoons, larvæ and the leaves on which the insect feeds. A Departmental Museum has been started in Madras, which already contains an interesting and valuable collection of timber specimens and samples of forest produce—such as gums, resins, seeds, oils, and fibres, as well as a herbarium. If forestry since its initiation in 1856 has not advanced "by leaps and bounds," if for years subsequently its progress was fitful and fluctuating, the fault—if fault there be—does not all, or nearly all, rest with the Department. Recalling the promising beginning indicated by the review of operations up to the date of Dr. Cleghorn's retirement in 1867, already quoted, when Government and the Conservator were apparently in perfect accord as to the essential lines and chief objects of a forest policy, it may well be asked why, for the next fifteen years, the Department was left to strive in vain for legislation, urging its paramount importance, and the futility of expecting permanent results without it, and still more, why it is that Madras, practically first in the field of forestry, was the last to pass its own Forest Law. Happily the measures adopted in 1882 are now proved to have been the forerunners of a substantial success.

CINCHONA.

Dr. Royle, who for many years was Botanist to the Government of India, was the first who gave serious attention to the introduction of the cinchona plant from its native country, South America, into India. In June, 1852, in a report on the subject, he wrote:—"Among the vast variety of medical drugs produced in various parts of the world, there is not one, with probably the single exception of opium, which is more valuable to man than the quinine-yielding cinchona. Its utility and employment have been greatly increased since its active principle has been separated in the form of quinine. So greatly indeed has the consumption increased, and so little care has been bestowed upon the preservation of the natural forests, that great fears have been entertained that the supply might altogether cease, or be obtainable only at a price which would place it beyond the reach of the mass of the community." And in the same report he said:—"The probability of entire success in the cultivation of the cinchona tree in India seems to admit of hardly any doubt, if ordinary care is adopted in the selection of suitable localities. I myself recommended this measure, many years ago, when treating of the family of plants to which the cinchona belongs. I inferred from a comparison of soil and climate, with the geographical distribution of cinchonaceous plants, that the quinine-yielding cinchona might be cultivated on the slopes of the Neilgherries and of the Southern Himalayas, in the same way that I had inferred that Chinese tea-plants might be cultivated in the Northern Himalayas."

Dr. Royle's recommendations, although approved of, remained in abeyance until 1859, when the increasing demand for the cinchona drugs, combined with their constantly increasing price, forced the subject again upon public attention. Indeed, things had come to such a pass, that it seemed almost certain that in the course of a very few years the wholesale destruction of trees which was going on in America would reduce the supply of bark to almost nothing.

Under these circumstances it was determined by the Government that steps should be immediately taken to obtain plants and seed of different species of cinchona for transmission to India. Fortunately, the Government was able to secure the active sympathy of a gentleman to whom the cinchona-growing countries were well known, for he had passed much time in travelling through them, studying the language and habits of the natives, and, although not a trained botanist, he had nevertheless made himself acquainted with several of the species in their living state. This gentleman was Mr. Clements Markham, a sailor, a scholar, and archæologist, who, in December, 1859, having been entrusted to carry out the undertaking, proceeded to South America for the

purpose of organising an expedition into the interior. With him were associated the following persons, whose names deserve to be held in much regard by all who have benefited by the cheapening of the fever-allaying alkaloids: Mr John Weir, Dr Richards Spruce—truly described by Mr. Markham as an eminent botanist, and most intrepid explorer—Mr Robert Cross, Mr. Prichett, and Mr Ledger. These gentlemen, with the exception of Mr Ledger, had received instructions to act under the orders which should be given to them by Mr Markham, and that gentleman, in grateful testimony of the value of the assistance which he had received from them, wrote as follows:—"The early success of the enterprise mainly depended upon the selection of qualified agents, and in this respect I was most fortunate No one engaged in important work ever had more able, loyal, and disinterested labourers to assist him" After a series of adventures, often attended with much danger and great discomfort, the first consignment of plants, consisting of *Cinchona Succirubra* was despatched from Goayaquil on the 2nd January, 1861, under the superintendence of Mr Cross, to England, and from thence they were transported, by the Red Sea, to Madras Here 463 of them arrived in good condition These were taken to the Nilgiris Hills, the beautiful district previously selected by Dr Royle, as most probably that in which the different varieties would thrive best in India For the hardier kinds, Mr. Markham selected a site near the top of Dodabetta, the highest rounded knob of which is about 8,700 feet above the level of the sea; while, for the more tender descriptions, he selected a tract of country about Naduvatum—a small Toda village on the edge of the hills facing the west, at an elevation of from 5,500 to 6,000 feet. The plants, on their arrival, were delivered to Mr W. G McIvor, who for some time previously had held the appointment of Superintendent of the Government Gardens at Ootacamund, and it was to his care that the rapid and enormous increase of the plants was chiefly due Easy as it is now found to propagate and raise the different kinds of cinchona, it ought never to be forgotten that this is the result of the intelligence which Mr McIvor brought to bear upon their cultivation, at a time when nothing about the tree was known, and everything had to be discovered by experiments

Shortly after the introduction of these plants into India, plants and seed of other kinds of cinchona were forwarded by those of the collectors who remained behind in America for further exploration, and their labours have resulted in furnishing India with the following species, and an innumerable number of varieties —*Cinchona Officinalis, C Succirubra, C Calisaya, C Ledgeriana, C Javanica, C Santa Fe, C Morada, C Verde, C Zamba Morada, C Carthagena, C Pahudiana, C. Humboldtiana, C Pitayensis*, and *C Micrantha*. Of these the kind which are largely grown in Southern India are *C Officinalis* and *C Succirubra*, and a large number of varieties, which are believed to be hybrids between these two species and *C Ledgeriana* The other kinds are kept only as botanical curiosities, for they are either worthless as quinine yielders, or their properties as such are not yet demonstrated

So soon as the cultivation of cinchona was proved likely to be successful on the Nilgiris, several private gentlemen opened out estates of their own, notably Mr J. W B Money, who is proprietor of estates at Devashola and Wellbeck, besides owning others at Kartairy, and the great Ossington estate. These estates have proved eminently advantageous to those who hold them. Many others have since been opened out, not only on the Nilgiri plateau, but also on the Wynaad and other hill tracts. An idea of the extent to which the production of cinchona bark has been increased during the past quarter of a century may be gathered from the following statement of prices realised for Renewed Crown bark —1877, 13*s.* 5*d*; 1878, 10*s.* 11*d.*, 1879, 10*s*; 1880, 10*s* 3*d*; 1881, 5*s* 11*d*, and 1882, 5*s* 7*d* In the year 1883, the price of all kinds of bark fell rapidly, till at the present time, 2*s* 6*d* per pound may be taken as a good price This rapid decline was largely due to the enormous area of land which had been planted with cinchona in Ceylon during the previous decade Large plantations of coffee had been

destroyed by leaf disease, but, with characteristic energy, the islanders, profiting by experience gained in Madras, replaced coffee with cinchona and tea.

THE MADRAS AGRI-HORTICULTURAL SOCIETY.

Almost coeval with the reign of Her Most Gracious Majesty, and fostered and encouraged by the peace which has shared her throne in the Carnatic, has been the prosperous career of the Madras Agri-Horticultural Society. To the enthusiasm of Dr. Robert Wight,—the eminent botanist, and author of *Icones Plantarum Indiæ Orientalis*, which is to this day the standard work of the kind, and a monument that will endure while libraries exist,—the Society to a great extent owes its being. On the 15th of July, 1835, at a well-attended meeting of Native and European gentlemen held at the College Hall, it was inaugurated. Two days later the first Committee of twelve met, and it was announced that Sir Frederick Adam, the Governor, had accepted the invitation of the Society to become its first patron, the Honourable Mr. John Sullivan, the Junior Member of Council, being its first President, and Mr. Baynes its first Secretary. A little later the Nabob of the Carnatic and Sir R. Palmer, the Chief Justice, were invited to become Vice-Patrons. In 1836 the Society was in occupation of the land which now forms the larger portion of the Ornamental Garden on the Mount Road, Madras. "This was then," we read in Dr. Bidie's Report, "the only spot available; it was very ill-suited for horticultural experiments, and the Society was long embarrassed by expenses connected with its improvement." The Society has once or twice since been embarrassed, notably ten years ago, when the shed in which the Office and Committee business was conducted was turned into what it is now,—a house filled with beautiful and luxuriant ferns; the Office was transferred to what was till then the Superintendent's house; a comfortable house was built for the Superintendent in the Experimental Garden on the other side of the Cathedral Road; and the Red Hills water was carried through the Gardens to the native huts beyond. All pecuniary difficulties were, however, from time to time tided over by a small extra grant from Government; by the liberality of the Society's bankers; or by the zeal of the Secretary for the time being enabling the Society to save the pay of a professional Superintendent, and to let his house at a monthly rent. The finances of the Society are now in a fairly flourishing condition.

In 1837, at the time of Her Majesty's Accession, the work of the Society was in full swing, and very successful efforts were being made to improve by the distribution of better seed the class of cotton grown in the various districts of the Presidency,—efforts which ripened their fruit when the American War closed the ports of the Southern States to the buyers at Liverpool, Manchester, and elsewhere. In the same year some tea plants received from China were forwarded by the Society to Mysore and the Neilgherry Hills, and it is believed that some of these very plants still survive in the neighbourhood of Coonoor, so that Neilgherry tea, one of the most important products of Southern India of the present day, is now also celebrating its Jubilee. The following year a supply of Mauritius sugar-cane was obtained through the Board of Revenue, propagated, and subsequently distributed. Prior to and during the year 1840, when Mr. Glasson opened the first coffee plantation in Wynaad, the Society struggled to grow coffee profitably in Madras, and freely distributed it in plants and seeds to more favourably situated places. During the next few years records are found of the introduction of European and West Indian fruit trees, some of which doubtless still thrive, or have been displaced by their descendants, or by superior varieties. More than one species of mulberry was introduced to feed and improve the silkworms, and wonderful strides were made in the cultivation of indigenous and foreign culinary vegetables now classed generally, and consumed even by the poor, as "country vegetables." In 1844 an attempt was made to introduce the use of guano as manure, and a valuable collection of Australian seeds reached the Society. In 1845 Major Sir Walter Scott, of H.M.'s 15th Hussars (the eldest son of the "Wizard of the North"), then stationed

at Bangalore, was elected a member of the Society. In 1850 the Society successfully sent a case of grafted mango plants to Sir William Hooker at Kew; and seeds of the valuable hurrialee grass, the staple food of Madras horses, was transmitted to Australia and the Cape of Good Hope. In 1853 the Society was largely engaged in raising and distributing vast numbers of the Casuarina for planting on the sand dunes on the coast north and south of Madras, now the source of almost the whole fuel supply of the town—the power which moves the railway engine and the spinning mill, cooks the rich man's banquet, and the poor man's rice.

It is possibly invidious to select a few items of good work such as those mentioned above, but it is necessary, as to do more than mention the Society's experiments with cinchona and spices, fruits and flowers, drugs and tanning materials, fibre plants and dye stuffs, cereals and forage plants, would fill many pages. The Society's nurseries now contain thousands of such plants for distribution The work of the Society is borne in upon the senses from every garden and hedgerow in the area as large as Paris which goes by the name of Madras Town, and many of the commonest plants of the roadside are foreigners that were distributed, if not originally introduced by the Society, within the last fifty years. A stroll round the Society's Gardens, limited in extent though they are, is one of unceasing interest On every side are hundreds of species of the most useful and beautiful of tropical flora, creepers, and herbaceous plants in such rampant growth and luxuriance of leaf and flower as are seen only amidst the warmth of the tropics Indigenous plants, which though doubtless abundant fifty years ago in the immediate neighbourhood, are now, owing to the needs of the wood-cutter, to the scarcity of fuel, to the enormous increase of population, and to the voracity of goats, rarely to be seen within many a mile of the town, are carefully preserved, and propagated Every step in the Ornamental Garden will unfold some new beauty to the tree lover The noble mahogany, from the West Indies, the lichee and the diospyros from China; the Moreton Bay chestnut; the elegant araucaria from Australia, the giant talipot from Ceylon, the graceful date from Arabia; the stately cabbage palm from Brazil, the huge baobab, and endless others are to be seen Shrubs too are not forgotten, such as the handsome South Sea Islands croton, with its quaint forms and variegations, the butter cup like ochna, once common but now rare in the jungles round Madras, jasmines and begonias of many sorts, and the sweet scented gardenias and carissas But space forbids further details.

Of the illustrious names that have been connected with the Society much might be said Since the Society was founded each successive Governor has accepted the position of Patron, and in later years of Patron and President, Commanders-in-Chief, Chief Justices, and Members of Council have often borne office, high officers of State have served on its Committees, and distinguished botanists have worked as its Secretaries Wallich, Royle, Wight, Roxburgh, Lindley, Thwaites, the Hookers, Trimen, Schomburgh, Von Muller, Cleghorn, and many others have been its contributors. Nor should the services of the professional gardeners, who from time to time have been in charge of the Gardens, be forgotten. In 1853 Mr Jaffrey was sent out to the Society from the Caledonian Horticultural Garden, Edinburgh, and did good work for four years, until he obtained a better engagement at Bangalore, after he had contributed to the science of gardening his well-known booklet, *Hints to Amateur Gardeners in Madras.* He was succeeded by Mr. Robert H Brown, the author of the useful *Handbook of the Trees, Shrubs, and Herbaceous Plants growing in the Society's Gardens and the Neighbourhood of Madras.* Mr Denham, Mr Henry, Mr Storey, and some others came out from England in their turn, and after doing faithful work left the service for better paid appointments. The Society has for the last four years had the benefit of the assistance of Mr. J M Gleeson, who was sent out by the Secretary of State in 1869 to work at the Government cotton experiments in Central India, and who, besides the regular duties which he has loyally discharged, has compiled and published an admirable *Catalogue of*

Plants in the Agri-Horticultural Society's Gardens, Madras, and is now engaged on other useful literary work.

NILGIRI HORTICULTURE.

The horticultural establishment in Ootacamund, known as the Government Botanical Garden, was first set on foot in the year 1847, during the Governorship of the Marquis of Tweeddale; and the first gardener—appointed on the recommendation of Sir William Hooker, and Dr. Royle—was Mr. W. G. McIvor, who received his early training at the Royal Gardens, Kew, and eventually obtained much celebrity as Superintendent of the Government Cinchona Plantations on the Nilgiris. Mr. McIvor first opened out the upper part of the present Garden, and planted the space with many indigenous ornamental shrubs and trees, as well as with exotics obtained from China, Australia, the Cape, &c. He also made several ponds and terraces. At the same time he gave a great deal of attention to the introduction and cultivation of apples, pears, figs, grapes, oranges, lemons, plums, citrons, &c. He also cultivated European vegetables, the seed of which appears to have been freely distributed amongst the natives of the surrounding districts; and from this liberality on the part of Government has arisen the present plentiful supply of excellent vegetables with which Ootacamund and its neighbourhood are supplied. The climate and soil of the Nilgiris are so well adapted for the cultivation of the more common European herbs, that were it not for the cost of transporting all produce to the nearest railway station, towns and villages in the low country might have their markets constantly filled with fresh cauliflowers, cabbages, potatoes, celery, artichokes, carrots, turnips, &c. The late Sir Charles Trevelyan, Governor of Madras, visited the Garden for the first time in February, 1860, and recorded in a Minute that "it is both a beautiful pleasure ground, and a valuable public institution for the improvement of indigenous, and the naturalisation of foreign plants; it has been formed by Mr. McIvor with great industry and artistic skill, out of a rude ravine; and he deserves great credit for the manner in which he has laid it out."

In 1868, Mr. A. Jamieson, the present Curator, arrived at Ootacamund from Kew, to assist Mr. McIvor; and in 1871, as the latter gentleman's time was fully occupied in fostering the new Cinchona Plantation, Mr. Jamieson was made Superintendent of the Garden in Mr. McIvor's place. To him the present beautiful state of the Garden is chiefly due. The whole of the lower Garden has been laid out in a very tasteful manner, and has been planted with many rare trees and shrubs. The upper part of the Garden also, which adjoins the new Government House, has been transformed from an unsightly scrub into what will be, in a few years more, when the recently planted trees have grown up, a beautiful park. Many plants of medicinal and economic value have been introduced since the establishment of the Garden, such as ipecacuanha, jalap, digitalis, rhubarb, cinchona, mahogany, various kinds of pines, box, cocoa, mangosteen, litchi, various kinds of trees yielding india rubber, &c. Most of these have been distributed to different parts of the country, and many of them may be now regarded as quite naturalised in India.

Besides the present Garden at Ootacamund there are branch Experimental Gardens at Coonoor, Burliar, and Kulhatti. The one at Coonoor (Sim's Park) rivals in beauty the Garden at Ootacamund; it is situated in a ravine which lies between the upper part of Coonoor and the Wellington Race Course. It is well pathed and roaded, and consists of one portion which is laid out as an ornamental garden, and contains many beautiful trees, especially pines and eucalypti; and of another portion, which consists of sholah trees, that have been left in their natural condition. Nurseries also, for the propagation of the indigenous trees of the neighbourhood, have been recently made. The Park is named after Mr. J. D. Sim, C.S.I., the member of the Council of Fort St. George, at whose instigation it was founded in 1873. The Garden at Burliar is situated almost at the bottom of the Coonoor ghaut, at an elevation of about 1,800 feet above sea level. The temperature is very high. The soil is rich, and the average rainfall considerable, so that many plants

can be grown there, which will not thrive in the higher situations of Ootacamund and Coonoor. It is there that the cocoa, mangosteen, and litchi fruit grows freely; but unfortunately, the climate is most unhealthy, and the inhabitants of the place suffer much from fever of a most virulent description. This Garden was acquired by Government in 1870; but long before that time it had been stocked by Mr. E. B. Thomas, the Collector of Coimbatore, with many rare and exotic trees of ornamental or economic interest. The only other Garden in possession of Government on the Nilgiri Hills is the one at Kalhatti, and this it is proposed to abandon, as the conditions of soil and climate do not differ sufficiently from those which exist at Coonoor to make its retention advisable; but it is intended to open out instead a new garden near Gudalur in South-East Wynaad. All these Gardens have been placed, since the year 1883, under the management of Mr. M. A. Lawson, M.A., late Professor of Botany at the University of Oxford, who is now both Government Botanist and Director of the Government Cinchona Plantations.

In addition to the work carried on by Government, many private individuals have done much to advance horticulture on the Nilgiris. Amongst these may be mentioned General Morgan, who has paid much attention to arboriculture; Mr. Griffith, of Kotagiri, who has introduced many ornamental plants from Europe; and Mr. Misquith whose pears and other fruits are well known to the residents and visitors in Ootacamund. Last year a Society was formed at Ootacamund for the study of the Natural History of the Nilgiris and adjoining districts. The meetings of this Society are held once every fortnight, and excursions are occasionally made by the members in the neighbourhood of Ootacamund. A Museum is also being erected, which is intended to contain specimens of Natural History, and of objects of economic interest.

FISH CURING.

The waters of the tropical seas around the peninsula of Southern India are even more prolific of fish life than the seas of colder climes. Consequently there has always been a large fishing population, and the curing of the surplus "takes" that could not be disposed of fresh has always been an industry. But the stricter administration of the Government salt monopoly proved inimical to this industry. The fishermen could not pay in advance before obtaining the salt for salting their fish. And even if they did, the tax so raised the price of salt that it enhanced the price of salt fish to an extent which drove it out of the market. The fish-curing industry continued to struggle on, however, wherever salt could in any form be surreptitiously obtained free of tax. In the neighbourhood of spontaneous salt swamps that were not sufficiently guarded, or where the ebb and flow of tidal estuaries left on the margin a sun-evaporated line of salt that could be scraped off, or where earth salt could be got, fish-curing still lingered. But such surreptitiously obtained salt was not confined to fish-curing uses, and the maintenance of the salt monopoly made it imperative that salt-smuggling generally should be prevented.

While this struggle between the salt smuggler and the salt tax continued, the quality as well as the quantity of salt-fish naturally deteriorated, the salt being economised to the utmost by merely smearing the fish with a little salt mud, and by the drying powers of a mid-day tropical sun being mainly trusted to in place of salt. Fish thus sun-dried, and but partially cured, would not keep long, could be taken but short distances, and was very offensive in carriage. Nevertheless the demand for it continued great, especially among the poorer classes, with whom it was almost the only animal food they could ever afford to purchase. Where fish curing thus maintained its struggle with the salt monopoly there the fishing classes prospered; where it failed, they were impoverished, and in 1873 Dr. Day, the Inspector-General of Fisheries in India, wrote: "Salt has been subjected to so heavy a duty, that it is virtually unobtainable by the fish-curers at a price which would permit salt-fish being sold to the general public. Ruin to the fish curers' trade has reacted on other fishermen,

due to curtailing their market, and so cutting off the stimulus for labour. It appears evident that to render the sea fisheries useful for providing wholesome salt fish inland, nothing is necessary but cheap salt to the fish-curers." But how to give cheap salt to the fish-curers without imperilling the salt monopoly was the difficulty. To sacrifice the salt monopoly was out of the question, for though it is a tax on a necessary of life, it is in effect an infinitesimal and indirect poll-tax, and as such it contributed in the Presidency of Madras alone 132 lakhs of rupees of revenue in the year 1885-86.

A way out of the dilemma was, however, found in the following compromise. It was suggested that enclosures might be constructed within which monopoly salt might be sold to fish-curers at its actual cost price to Government, and free of the Government monopoly tax, on the one condition that it should be used by them within the enclosure. This proposal was sanctioned in July, 1874, and these enclosures became curing-yards into which Government salt passed under police guard, but out of which no salt passed again except in the form of salted fish. There proposals were sanctioned. In 1876, the year in which the fish-curing yards were first opened, only 324 tons of fish were cured in the whole Presidency, whereas in the twelve months ending with September, 1886, 28,353 tons of fish were cured. Thus already no mean quantity of wholesome animal food is thrown into the market at a rate so cheap as to be within the purchasing power of the poorest. But the rate at which the advance has been made is a matter still more full of hope for the future, the results of each year having nearly doubled the results of the previous year, till, in the last six months of 1886, as compared with the similar season of the previous year, there was an advance of 957 tons of fish cured. And not in quantity alone, but in quality also, is there marked improvement. There is every prospect, therefore, of this industry growing rapidly to dimensions such as to make it worthy of taking high rank among the useful advances that have been made in the Presidency of Madras during Her Majesty's reign. Concurrently with the growth of this industry, the fishing classes are prospering, and their prosperity is calculated to tell again on the harvest of the seas gathered by their increasing capital, improved appliances, and stimulated energies. Great has been the benefit of the increase to the fish-food supply of the millions, of whom over 90 per cent. eat animal food—when they can get it.

PEARL FISHERIES.

Near the southern extremity of the Presidency lies Tuticorin, on the Gulf of Manaar, in which is a Pearl Fishery, worked on the southern shores of the Gulf by the Government of Ceylon, and on the northern shores by the Government of Madras. It enriched the Kings of Ceylon in the days of Marco Polo, who has recorded many quaint legends on the subject. But considerable scientific progress has been made since Marco Polo's time in exact knowledge of the habits of the oyster. The earlier researches of 1857 were made at the instance of the Ceylon Government; and those of 1884 were conducted under the orders of the Madras Government. The nature of these researches is of a scientific character that comes hardly within the scope of these notes. It is enough that they have been endorsed as an advance by leading scientists in England, and that the practical result is that from an improved knowledge of the habits of the fish, it may be hoped that the fishery will be improved. Already is there promise of a most extensive fishery in 1888 or 1889, for the pearl oysters in a healthy state cover an area of coral reef five miles long, and one-and-a-half or two miles wide, and so thick are they that they are clustered together in some places one over another, knee deep, and show, by experiments made, from 600 to 700 oysters a square yard.

Apart from studying the fish, attention has also been given to the mode of fishing. Hitherto pearl oysters have been brought up from the bottom of the sea in exactly the same way as they were in the days of Marco Polo. Descending with the aid of a large stone hitched to one toe, and without any diving dress, it is natural that in 8 or 9 fathoms of water the stay of the diver at the bottom is usually less than a minute; and a few pearl oysters hurriedly picked up are

thrown into a small net attached to him. Less hurried and more thorough picking is to be expected of men who in European diving dress can stay down for hours together; and experiments in this direction are being made, in view to ascertaining the best means of meeting most economically the many practical difficulties with which the position is surrounded, such as the prevention of the theft of pearls, the maintenance of order amongst the large numbers assembled at a fishery, the giving to each diver an individual stimulus to exertion by a system of payment by shares, and the provision of suitable boats and gear in sufficient numbers to complete the fishery within the short time in which the weather allows of its being conducted.

The two last fisheries conducted by the Madras Government yielded in 1860 Rs. 2,50,276, and in 1861 Rs. 1,29,003; while the Ceylon fishery from 1860 to 1884 yielded an aggregate of Rs. 20,75,211. Madras in times past has thus been far behind Ceylon in the profitableness of her Pearl Fisheries. The primary reason for this lies, however, in the natural advantages of the Ceylon position, the pearl oysters preferring the southern side of the Gulf of Manaar on account of the lee side of the Island of Ceylon being sheltered from the strong current which, sweeping down the Bay of Bengal, turns westwards round the south of Ceylon, and then northwards into the Gulf of Manaar, impinging directly on the Madras side of that Gulf, while the Ceylon side is sheltered. But any deficiencies of Madras in pearl fishery revenue have been in a large measure recouped by her uniting with her pearl fisheries a fishery for the holy shell, called the Chank. It is the *Turbinella pyrum* of naturalists. This fishery is not followed in Ceylon though the shell fish are very abundant there, but on the Madras side it has been developed from almost nothing to about Rs. 25,000 a year, and under present management is calculated to yield a steady annual revenue of about the same amount, as well as to be the training ground of the divers on whom the working of the Pearl Fisheries is dependent.

JUSTICE.

In 1837 the scheme of judicial administration in Madras was substantially that which had been founded in 1800 by the Statute 39 and 40 George III. cap. 79. This Statute, besides authorising the establishment of a Supreme Court of Judicature, and a Court of Commissioners for the recovery of Small Debts in Madras, empowered the Governor and Council at Fort St. George to frame regulations for the establishment of Courts in the Mofussil. The Court-making Regulations were passed chiefly in 1802 and 1816; and by 1837, the judicial machinery for the whole Presidency was in regular working order. Each village had then, as now, its Civil and its Criminal Court. The headman was, by virtue of his office, at once the Munsiff and the Magistrate. As Munsiff, he had power to hear and determine, of his own authority and without appeal, suits of money (except for damages) or other personal property, not exceeding Rs. 10 in value. As Magistrate, he had power to try cases of a trivial nature, such as abusive language and petty assaults, and to confine offenders in the village choultry for a time not exceeding 12 hours. He was not liable to be called on to answer for his conduct as Munsiff except on a charge of corruption, or of exceeding his powers, and then only before the Zillah Judge.

Between the Village and the Zillah Courts came those of the District Munsiffs, of whom there were, in 1837, more than 100, each exercising Civil jurisdiction over one or more revenue taluqs. They were empowered to dispose of all kinds of suits against natives, their pecuniary jurisdiction being limited, in the case of suits for land exempt from paying rent to Government, to those of Rs. 100 or less in value, and to those not exceeding Rs. 1,000 in value, in the case of other land or money suits. In petty suits of not over Rs. 20 in value, their decisions were final; and the Munsiffs themselves were graded in three classes, paid Rs. 140, 115, and 100 per mensem respectively. It did not follow, however, that if the subject-matter of a suit exceeded the ordinary jurisdiction of the Village Munsiff, the parties were bound to journey to the District Munsiff's Court. The Regulations

authorised Village Munsiffs as arbitrators to determine suits up to Rs. 100 in value, and to summon Village Panchayets for the disposal, with the consent of the parties, of all suits referred to them, without limitation as to value, and without appeal. Similar principles governed the decision of suits by District Panchayets, summonable, where both parties elected that form of trial, by the District Munsiff. To these Village and District Panchayets, which consisted of not less than five nor more than eleven respectable inhabitants, Collectors also had power to refer for decision of suits between proprietors and their ryots respecting the occupying or irrigating of land, or in cases of disputed boundary, or land-marks. The Assistants to Collectors were Magistrates within their territorial charges, and the Collector himself was the Zillah (or District) Magistrate.

Of the Civil Zillah Courts, there were, in 1837, 22 in number. The powers of the Zillah Judges extended to all suits not exceeding Rs. 5,000 in value, arising within their territorial jurisdiction, subject to a right of appeal in every case to the Provincial Court. In those days codes were not; and where no specific rules existed for their guidance, Zillah Judges were directed to act "according to justice, equity, and good conscience." All manner of assistance was given them, even in 1857, to relieve the overburdened files of their Courts. One Regulation empowered them to refer suits, not exceeding Rs. 200 in value, to their Registrars, or "Registers" as they were then termed. Another Regulation authorised the appointment of Assistant Judges with separate jurisdiction over parts of Zillahs, but with the same powers as the Zillah Courts themselves, including the powers to hear appeals from District Munsiffs. Another Regulation empowered the Zillah Judges to refer suits not exceeding Rs. 2,500 in value to their native law officers, the Sudder Amins, whose decisions in appeal from District Munsiffs were final in many cases. Yet another Regulation authorised the establishment of Native Courts under Principal Sudder Amins with the same powers as Assistant Judges, except that they were barred from hearing appeals from the decrees of their own Sudder Amins, or of any European officer of Government. The Principal Sudder Amins, Assistant Judges, and Zillah Judges, were also Criminal Judges within their Civil jurisdictions. Over all this collection of Zillah Courts and their auxiliaries were placed four Provincial Courts, each manned by three Judges. On the Original Side they disposed of suits exceeding Rs. 5,000, but not exceeding Rs. 10,000 in value, or of any suits transmitted to them by the Sudder Court; and on the Appellate Side their powers extended to special Appeals from the Appellate Decrees of Assistant and Zillah Judges, as well as to regular appeals from the original decisions of those Courts. In Criminal matters the Provincial Courts were constituted Courts of Circuit for the disposal of Sessions cases, but the Senior Judge had always to remain at head quarters, and was competent, under certain restrictions, to exercise all the powers of the full Court. Above the Provincial Courts was placed the Sudder Court, known on its Civil Side as the Sudder, and on its Criminal Side as the Foujdari Adawlut, and consisting of a Chief and three Puisne Judges selected from the Civil Service. Their original business comprised suits of Rs. 10,000 in value and upwards without limit, and they exercised regular and special appellate powers in respect of the original and appellate decrees, respectively, of the Provincial Courts. The Foujdari Adawlut alone had the power of passing capital sentences, and of revising and annulling the sentences of all Lower Criminal Courts.

Such, in outline, from the Village up to the Sudder Court was the scheme of Mofussil justice in 1857. In the Presidency town, the Court of the Commissioners for the Recovery of Small Debts had jurisdiction in money suits up to the value of 120 pagodas; and crowning the whole judicial edifice, both Mofussil and Madras, was the Supreme Court of Judicature, consisting of a Chief Justice and two Barrister Judges with full powers in Civil, Criminal, Admiralty, and Ecclesiastical jurisdiction, subject only to the limitation that in cases where the value exceeded Rs. 10,000 an appeal lay to the Queen in Council.

In the fifty years of Her Majesty's reign the tendency of judicial changes has been towards

simplification, and the reduction of the numerous varieties of intermediate Courts which characterised the scheme of 1837, while the expansion of litigation under the beneficent influence of evenly-administered justice had necessitated a constantly increasing extension of the powers of surviving Courts In 1843 the Provincial Courts were abolished, and the Civil and Sessions Judge replaced both the Zillah and the Provincial Courts By 1845 the exigencies of the wilder tracts of the Northern Circars had called into existence the Special Agency Court. In 1850 the Madras Court of Small Causes was established, and in 1860 similar Courts existed in various Mofussil towns only to disappear again in 1879 By 1857 the Police Magistrates' Courts in the Presidency town had been established. In 1862 the Sudder Amin disappeared, and the present High Court of Judicature replaced both the Sudder and the Supreme Courts. In 1873 the principal Sudder Amin developed into the modern Subordinate Judge, and the Courts of District Munsiffs, Subordinate, and District Judges, were placed pretty nearly on their present footing

The series of Civil and Criminal Procedure Codes which began in 1857 greatly simplified the disposal of business. The existing scheme of judicial administration comprises a chain of Courts scientifically arranged, and highly appreciated, as a whole, by the law-going public At the base of the pyramid, so to speak, there still continue the Village Munsiffs' Courts, but with powers extended, in their ordinary jurisdiction, to suits of Rs 20, and, as abitrators, to suits of Rs 200 in value. The Village and District Panchayets still exist, though not much used The District Munsiffs number 106, classed in four grades, ranging from Rs 400 to Rs 200 per mensem. Their jurisdiction extends to suits of Rs 2,500 in value, and while all of them have the power of Small Cause Courts in money suits up to Rs 50 in value, some have been entrusted with such powers up to Rs 100, and others up to Rs 200 in value The status of the Subordinate Judges, like that of the District Munsiffs, has been raised, and they now number fourteen, graded in three classes, paid Rs 800, 600, and 500 per mensem Their jurisdiction in original suits, like that of the District Judges, is unlimited as to value, and they are empowered to decide such appeals against the decrees of District Munsiffs as may be referred to them by the District Judge An appeal from the original decrees of Subordinate Judges lies in every case, in suits of Rs 5,000 and upwards, direct to the High Court, and in other suits to the District Judge All the Subordinate Judges and some of the District Judges have been invested with the powers of Small Cause Courts in suits not exceeding Rs 500 in value All Collectors and their Assistants constitute Revenue Courts for the trial of rent suits between landlords and tenants, and their decrees are appealable to the District Court In Ganjam, Vizagapatam and Godavery, Special Agency Courts exist for the wilder tracts side by side with the regular Courts, with a similar system of appeal Two separate Small Cause Courts survive at St. Thomas' Mount and Cannanore to meet cantonment exigencies The District Courts, of which there are twenty in the provinces, have unlimited original jurisdiction, subject to regular appeal to the High Court, where also the right of second appeal against the appellate decrees of both District and Subordinate Judges now lies, and is freely exercised In the town of Madras, the Presidency Court of Small Causes, consisting of a chief and two Judges, has jurisdiction in money suits up to Rs 2,000 in value

Turning to the Criminal side, the Village Magistrates continue on the same footing as in 1837. All other Magistrates are classed throughout the Presidency as first, second, or third class Magistrates according to the powers conferred on such classes by the Code of Criminal Procedure The District and Joint Magistrates have also the right of hearing appeals from the Subordinate Magistrates' decisions, and their own decisions are, in turn, appealable to the Sessions Court. These latter Courts have full criminal powers, subject only, in the case of capital sentences, to confirmation by the High Court, and subject to appeal to the same tribunal. In Madras, the Presidency Magistrates take the place of first class Magistrates in the Mofussil, and the High Court, in its criminal jurisdiction, takes that of the Sessions Court. The High Court, which thus constitutes the apex of the existing

judicial system, at present consists of a Chief Justice and four Puisne Judges, of whom two are Barristers, two Civil Servants, and one a Native Judge. It exercises all the powers of the Supreme Court of fifty years ago, Civil, Criminal, Admiralty, Ecclesiastical, and Insolvency; and it is only in cases of the value of Rs. 10,000 and upwards that an appeal is allowed to the Privy Council.

Some idea of the extent to which use is made of the judicial machinery here sketched may be gathered from the fact that in 1885 the Village Munsiffs in the Madras Presidency disposed of 84,500 suits; the Revenue Courts of 4,350; the Agency Courts of 550; the District Munsiffs of 66,500 ordinary suits, and 70,500 small causes; the Subordinate Judges of 740 suits, 13,750 small causes, and 2,500 appeals; the District Courts of 320 suits, and 4,750 appeals; the Presidency Small Cause Court of 27,750 suits; and the High Court of 370 suits, 186 insolvency cases, 140 regular appeals, and 1,050 second appeals, to say nothing of an immense amount of revisional and miscellaneous business. The work of all classes of Courts increases year by year, and it is notorious that no department of the State commands such public confidence among the natives of Southern India as the administration of Justice.

POLICE.

When Her Majesty ascended the throne the only organised Police in Madras was the Presidency town Police, which was then under the able management of Mr. Edward Elliot. This gentleman was also in his time Chief Magistrate, Chief Judge of the Court of Requests (subsequently Court of Small Causes), and Chairman of the Bench of Justices, as well as Superintendent of Police. He came into office on the 14th February, 1834, and held the post till the 15th April, 1856, a term of twenty-two years. His force retained the old names of Jamadar, Darogah, Duffadar, and Peon; and there are many persons still alive who speak with the highest respect and admiration of the good services rendered in those days by the Police under their able chief. In the rural districts Police duties were dependent on such fitful attention as they could receive from the Revenue officers, who were also "Heads of Police." The peons and other subordinates were employed indiscriminately on both revenue and police duties.

In the three Presidency towns the Police, the Justices of the Peace, and the Judges of the Superior Courts were governed by the English practice and procedure in criminal matters. The Police of these towns was administered chiefly by "Regulations." In 1856 an Act was passed for "regulating the Police of the towns of Calcutta, Madras, and Bombay, and the several stations of the Settlement of Prince of Wales' Island, Singapore, and Malacca." This Act consolidated all the Police law; constituted the Police Force on a footing with the Metropolitan Police in England and Ireland; and altered the designation of the Chief of the Police from "Superintendent" to "Commissioner." The City Police of the three Presidency towns were thus placed on the same footing, and governed by the same law. From 1854 the Madras Government had been urging the necessity for a thorough re-organisation of the Provincial (District) Police, and on the 9th June, 1857, the Honourable Court of Directors granted sanction for this reform. Some time was occupied in the preliminary steps that were necessary; and in 1859, an Act was passed "For the better regulation of police within the territories subject to the Presidency of Fort St. George." The duty of reorganising the District Police was entrusted to the able hands of Mr. (afterwards Sir William) Robinson, a member of the Madras Civil Service, who, besides a natural talent for Police administration, had thoroughly studied, when on furlough, Police details in Europe. In 1860 the campaign was opened in the North Arcot District, and at the close of 1862 the Government was advised that the new machinery was in full working order throughout the Presidency. About 13,500 troops were set free from harassing escort and other petty duties not strictly military. Large reductions were thus possible in the military branch of the service, and a considerable saving of expenditure was effected. Regiments, instead of being scattered in detachments over the Presi-

dency, are now concentrated at the principal stations. The Madras police, as organised in 1859, became the model for all India, and on that model was based the General Police Act of 1861, which is applicable by notification of the Governor-General in Council to any presidency, province, or town.

In 1866 the Madras Government decided to incorporate the City Police with the general (District) Police, and for that purpose an Act was passed in the following year. By this Act the police of the town of Madras became part of the general police force of the Madras Presidency, but the Commissioner and his deputies continue to hold office as before, subject to the authority of the Inspector-General of Police. The Madras Police has done excellent work since its birth. The progress made has been steady. Crime will always exist in some shape, but the character of crime in the Madras Presidency has been sensibly affected. The Government in reviewing the last Administration Report of the Madras police, which deals with the twenty-five years' existence of the force as at present organised, states that, "with three exceptions, all disturbances of the public peace have been effectively dealt with by the police without extraneous assistance; dacoities have decreased by 82 per cent.; torchlight dacoity has been nearly stamped out; the yearly average number of robberies has fallen from 977 to 246; and there has also been a considerable decline in the number of cases of house-breaking and burglary. The figures under other heads of crime are said to be equally satisfactory. The great improvement that has taken place is undoubtedly due in a large measure to efficient police administration, and reflects great credit upon the officers and men of the force."

The sovereign power is to the ordinary ryot, living far from camps and military cantonments, represented by the police. It is to the police he looks for protection against lawlessness, and for the continued enjoyment of the tranquillity with which the Empire of India is blessed. The high-handed oppression of former times is now but a tradition, and if the police of the present day is not much noticed it is for reasons creditable to them. They carry on their duties unremittingly, and without ostentation. If occasionally there be hostile criticism actuated by personal interest, or disappointment, the police know that the same critics will, when they are in trouble, largely solicit aid from the guardians of the public peace, and, what is more satisfactory, will feel assured that it will be cheerfully accorded. In the rural districts recruits are, as a rule, obtained without much difficulty, although it is not easy to keep up the necessary strength of the force in some of the more unhealthy parts of the country, where many a humble and faithful servant of the people has died, or become permanently crippled. There is still a dislike on the part of the better educated classes to accept service in the subordinate grades of the force—a prejudice against the strict regulation as to wearing uniform being, it is believed, the principal objection. The pay of the constables is still very low, viz., for the rural force Rs. 6½, 7, and 8, and for the city constables Rs. 7, 8, and 9 per mensem, which compares unfavourably with the present pay of a sepoy who may be quite illiterate. A sepoy also gets an assured increase to his pay according to his service, besides compensation when the market rate of his food exceeds a fixed and liberal standard. Further, the sepoy is not like the constable, on duty every day, and he is spared the harassing escort work of the police officer. Greater difficulty is experienced in obtaining men for the City Police of the stamp required, the duties of the City constable being more severe than those of his rural brother, and the cost of living in the Presidency town being much greater than in the districts. The night duty is specially distasteful to a native. The City officer is also under constant and unremitting supervision, even the citizens constituting themselves into a volunteer supervising staff, and showing a praiseworthy and beneficial interest in the civic force.

The police are subject to the ordinary pension rules of the Uncovenanted Civil Service. Formerly the lower grades of both the City and the Mofussil Police contributed a certain proportion of their pay to superannuation funds. These funds were in a very flourishing condition in 1869,

when Sir Richard Temple proposed, and the Government of India sanctioned, their abolition, the assets being taken over by Government, and the State assuming the responsibility of providing pensions and superannuation allowances. A police officer cannot now claim his pension until he has completed thirty years' service, at which time, and frequently much before, the hard work he has undergone has worn him out During the late Jubilee celebrations the police alone were on duty, while the holiday-makers enjoyed themselves. But at all times and in all weathers the policeman must be afoot While others sleep or feast, the constable labours. At each station where the Jubilee was kept the police cheerfully gave the material assistance without which it would not have been possible to carry out the programmes In the City of Madras, which was *en fête* for two days in February, 15,000 poor people were fed in four different parts of the town, at some places the feeding being continued from 6 A M to dusk 25,000 people attended at the Park at Government House to witness the public presentation to H E the Governor of the Presidencial Address to be submitted to Her Most Gracious Majesty There were illuminations throughout the City, and a display of fireworks on the large place known as "the Island" at night Besides the crowds of foot passengers, all kinds of vehicles thronged the roads and streets Yet neither in the City nor throughout the whole Presidency was an accident or an offence reported as having occurred on that, in every sense, auspicious occasion This was a most gratifying testimony, not only to the discipline and organisation of the Police, but also to the good tempe and docility of the multitudes who went forth to do honour to their Sovereign Lady the Empress of India

JAILS

The first practical measures of Prison Reform in India may be said to have been initiated with the Queen's accession Consequent on a minute written shortly after his arrival in the country by Mr (afterwards Lord) Macaulay, as a Member of the Law Commission, a Committee was appointed, and its Report was submitted in 1838 The state of Prison discipline that then prevailed may be judged from the fact that Lord Macaulay said of the prisoners in the Alipore Jail, near Calcutta :— "It is only a few months since they murdered the Superintending Magistrate At present no visitor can enter the gates without danger" Such being the state of affairs at the seat of the Supreme Government the condition of Mofussil Jails may be imagined The next important step was the appointment of an Inspector General of Jails in each Province In 1855 an Inspector General of Prisons was appointed in Madras to whom was entrusted the introduction of regulations for the better management and discipline of Jails, and the general administration of the Department At that time, Jails were in the immediate charge of the Judges of the District Courts, who had frequently not only to pass a sentence of death upon a fellow creature, but to see it carried out The executive charge of the Jail was, as might be expected, not felt to be a pleasant duty In many instances the real administration was left to the jailers, a class wholly unfitted for the responsibilities thrust on them, and the discipline of the Jails was of the laxest order In 1864 Sir John Lawrence, the then Viceroy—who as an old Bengal Civil Servant was thoroughly acquainted with the subject—pointed out that the full measure of improvement contemplated by the Report of the Committee of 1838 had never been carried out, and that whilst but little progress had been made in the improvement of the prisoners, or prevention of crime, the loss of life amongst prisoners continued year by year to be very great A Committee was then appointed by his Government to report anew, and its recommendations generally endorsed those of the Committee of 1838

In the Madras Presidency the difficulties of Jail administration were probably at their highest during the years 1860 to 1865 The introduction at this period of the Penal Code, simultaneously with the introduction of the new Police on an organised system, so disturbed the criminal classes, that the Jails were filled to overflowing, and the inadequacy of the existing accommodation became

apparent. There were at that time 6,800 prisoners in Jails that were capable of accommodating only 4,490 at the prescribed standard of space; and for years the annual mortality was seldom less, and was often more, than 10 per cent. of the average strength of prisoners, or ten times the mortality in jails in the United Kingdom. This, in effect, meant that imprisonment in India entailed on offenders risks to life which the law never contemplated. The high rate of mortality was attributed to over-crowding, bad ventilation, the want of sanitary arrangements, deficiency of personal cleanliness, imperfectly cooked food, and defective dietaries. In February, 1865, Mr. Rohde, C.S., the first Inspector General of Prisons, and Mr. R. S. Ellis, C.B., C.S., the first President of the recently appointed Sanitary Commission, were directed to consider and report what additional prison accommodation was required, and what measures ought to be taken to improve existing Jails, and the system of Prison management generally. In April, 1865, they submitted their Report, together with a set of Rules for the better superintendence and management of Jails. Their proposals were generally approved. The necessity of Central Jails for prisoners sentenced to a term exceeding one year had already been recognised, and a proposition to build five Central Jails was adopted. Jails of this class had indeed been commenced at Coimbatore and Rajahmundry. These Jails were originally intended to accommodate 640 and 675 convicts respectively; but, owing to the want of Prison accommodation, it was determined to extend them so as to afford room for 1,040 convicts each. The erection of Central Jails at Vellore, Trichinopoly, and Cannanore was also determined upon, and it was arranged that some of the existing District Jails should be improved, and that others should be rebuilt on better principles and more healthy sites, as means became available.

The Sessions Judges were now relieved of the executive charge of District Jails, which were placed under the Civil Surgeons, and special officers were appointed to the charge of the Central Jails. The Penitentiary at Madras, which was under the exclusive management of the Commissioner of Police, was placed under the general supervision of the Inspector General. In July 1872 it was made a Central Jail, and a special officer was appointed to superintend it. In 1866 the new Jail Rules were introduced. Convicts had up to this time been granted a fixed quantity of grain, while as regards their other articles of food and firing they were allowed a small sum daily to provide themselves therewith. The result of this system was that so long as the value of money remained what it was fifty or sixty years previously, the sum allowed sufficed; but afterwards, as the value of money changed, this fixed allowance was barely sufficient to purchase salt, condiments, and wood, and left nothing for vegetable or animal food. Fixed diet scales, drawn up by Dr. Cornish, the then Sanitary Commissioner, were adopted when the new Rules were introduced, and with slight alterations these scales have been in force up to the present time. The chief change effected by the new dietaries was the substitution of cholum and ragi for the more luxurious, but less nutritious, rice hitherto issued, and the fixing of the amount of animal food, vegetables, and condiments. The concurrent measures thus adopted for the improvement of Jail accommodation, the enforcement of cleanliness and sanitary arrangements, combined with the radical change in the system of feeding the convicts, had a material effect upon the sickness in Jails, and the mortality which had in 1865 been 12·70 per cent. of average strength, fell in 1871, or in six years, to 1·84 per cent.

In 1869 an Act for the Regulation of Jails in the Madras Presidency and the Enforcement of Discipline therein was passed. This Act and the Rules based thereon still control the management and discipline of Jails. The next important step for the improvement of Jails in India was the convening of a Prison Conference at Calcutta in 1877. The Conference was almost exclusively composed of experts, as its principal object was to evoke specific recommendations based on actual experience of the working of Jails in each province. It submitted a comprehensive Report with suggestions and recommendations dealing with buildings, inspection and supervision, employment of prisoners, treatment, and marks. Many of the suggestions of this Conference were acted upon by the Government of India.

In 1868 a system of remission was sanctioned for Central Jails in the Madras Presidency, whereby well-behaved and industrious convicts were enabled to diminish the length of their sentences by periods not exceeding a certain fixed limit. Two years ago the system heretofore in force in the Presidency was modified in accordance with Revised Rules on the subject issued by the Government of India for all Jails in India. The new scheme differs in detail, and in the periods of remission obtainable, from that which was before in force in this Presidency, but the objects aimed at are the same. In 1883 a Revised set of Rules for the management and superintendence of Jails in the Madras Presidency were prescribed by His Excellency the Governor in Council. These Rules constitute a carefully prepared Code, in which are embodied all the regulations relating to Jails and Jail management that have from time to time been passed. They are partly based on the recommendations of the Jail Conference. Up to the end of 1871 it was the practice to put all convicts in the Madras Presidency in irons, with the exception of convict servants. It was then determined that convicts employed intra-murally in Central Jails should be relieved from fetters three months after admission, provided they conducted themselves well for that period. Fetters were, by the Jail Code of 1883, discontinued in the case of all convicts in Central Jails sentenced either to rigorous or simple imprisonment, their use being reserved for cases where a prisoner is violent, or where there is reason to believe that he contemplates escape.

With the completion of Central Jails manufactures were introduced, and labour became intra-mural. The whole of the clothing for the convicts themselves is made in the jails, while other public departments also receive large supplies from jails. Carpentery and blacksmith's work, carpet weaving, tent making, and other industries are carried on, a systematic method of working being followed, and tasks rigidly exacted, definite industries being prescribed for given jails. In 1865 the cash receipts on account of manufactures amounted to Rs. 44,706, whereas in 1878 the earnings or profits paid into the Treasury, after adjustment of advances, amounted to Rs. 1,72,225. For the last few years there has been a diminution of receipts, chiefly owing to the restriction placed on manufactures, but this restriction has been withdrawn, and the convict now contributes considerably towards the cost of his keep and custody. The establishment of jails, until a recent date, consisted of the warders, or disciplinary officers, while the safe custody of the convicts was entrusted to the Police. In 1885 the Police were relieved of the duty of guarding certain jails, which duty was undertaken by a warder guard. Last year, a comprehensive scheme for the guarding of all jails was submitted by the Inspector General, in accordance with which the guarding of all jails is performed by warder guards. An important feature connected with the discipline and guarding of Central Jails is the employment of convicts who perform all the duties of free warders, and take their turn of sentry duty by night. Prisoners are thus gradually prepared for liberation, taught self-respect and the value of continuous good conduct. Many other matters in connection with jail administration, such as questions of the system of confinement, employment, punishment, education, and reformation of the convict, have received attention. It may be well to mention that the cellular system has been added to some of the Madras Central Jails, and that convicts are required to pass certain fixed periods in cells before being passed into association, a salutary improvement both on disciplinary and sanitary grounds. In connection with the subject of jail administration is that of reclaiming the juvenile criminal. A Reformatory School has been recently sanctioned by the Madras Government. This School will be shortly opened, and it is hoped that the same beneficial effects which have been found to result from the system in England and France may be experienced in India, or that the juvenile criminal may be rescued before he develops into an irreclaimable "jail bird."

There are now in the Madras Presidency 7 Central and 18 District Jails under the control of the Inspector General of Jails, who also exercises supervision over Subsidiary Jails. Central Jails are in charge of special officers, as also are the District Jails of Tanjore and Tinnevelly, which were built a few years ago on the cellular system. All other District Jails are in charge of Civil Surgeons. In

Central Jails are confined prisoners sentenced to rigorous imprisonment for periods exceeding one year; in District Jails those whose sentences do not exceed one year; in Subsidiary Jails those whose sentences do not exceed thirty days. At the close of the year 1885 there were 7,336 prisoners in the Central, District, and Subsidiary Jails of the Presidency.

Her Majesty's clemency was extended to the convicts on the occasion of the celebration of her Jubilee by the release in the Madras Presidency, on the 16th February, of 2,505 males and 175 females, who were thus able to join in the rejoicings of the period. Of those who still remained in Madras Jails 2,167 males and 52 females received partial remission of their sentences in honour of the event

EDUCATION.

No retrospect of the progress of Madras should fail to record the great achievements in the field of education during Her Majesty's reign. Eleven years before the commencement of that reign Sir Thomas Munro caused an inquiry to be made into the state of education in Southern India, and recorded his views in a minute which gave the first impulse to education in the Presidency. Under his auspices, fourteen Collectorate and eighty-one Taluk Schools were opened in 1826, with a school at Madras for training Teachers. But these schools had to be abolished in 1836, for proved inefficiency. The Madras School for training teachers was converted into the High School, which afterwards developed into the Presidency College. A few Missionary bodies were meanwhile striving against serious difficulties to impart elementary knowledge, chiefly through the medium of the vernacular languages. The only other educational agency in 1837 was the indigenous *Pial* school and *patasala*, in which no attempt was made to train the intellect, but all that was aimed at was to load the memory with a string of words, of which the teacher knew the meaning little better than the pupil.

Between 1837 and 1854, the year of the first great educational despatch, little progress was made. The General Assembly's Institution, started in 1837, gave birth to the present Free Church Institution and Madras Christian College, the Church of Scotland Institution, which only this year has been made a Collegei and the Free Church Mission Schools at Conjeveram, Nellore, and Chingleput. The Church Missionary Society and the Society for the Propagation of the Gospel commenced those labours which have since provided the Districts of Tanjore, Trichinopoly, Madura, and Tinnevelly, with many excellent Schools and Colleges. The London and the Wesleyan Mission Societies and a few Roman Catholic bodies were doing their share of the good work. Pacheappah's Central Institution at Madras was opened in 1842, and the branch schools at Conjeveram and Chidambaram in 1846 and 1850 respectively. The first Director of Public Instruction, Mr. (now Sir Alexander), Arbuthnot, remarked that "at the commencement of the year 1854-55, with the exception of trifling sums expended in the Districts of Chingleput, North Arcot, Nellore, and Tanjore, and on the maintenance of a few elementary schools in the hill tracts of Ganjam, the operations of Government were confined to the Collegiate institution at Madras, and to the two Provincial Schools at Rajahmundry and Cuddalore." The total number of pupils under instruction in 1854 was less than 25,000. The indigenous schools left to shift for themselves diminished in numbers, and, if possible, deteriorated in quality.

The despatch of the Court of Directors of the East India Company of 1854, which is often referred to as the educational charter of India, laid stress, among other things, on the maintenance of the existing Government Colleges and Schools, and, if necessary, the increase of their number; on the establishment of new Middle Schools; on increased attention to Vernacular Schools for elementary education; and on the introduction of a system of grants-in-aid to be administered on the principle of a strict religious neutrality. The first Grant-in-aid Code was issued in 1855. The provisions of this Code being found to be unworkable, a revised Code was issued in 1858, in which the conditions

as regards salary grants were definitely prescribed. As no salary grant according to this Code was to exceed one-third of the salary, and as the allotment for expenditure on grants-in-aid was much too small, the aided system received but little impulse. A fresh Code came into force in 1865, and gave a powerful impetus to the development of aided education mainly by its liberal provisions in regard to salary grants, and by the introduction of the system of payment by results. The amount of salary grants rose from Rs. 1,21,272 in 1866-67 to Rs. 2,47,587 in 1870-71, and the total expenditure on grants-in-aid from Rs. 1,21,272 to Rs. 3,64,491. The results system was, however, only partially successful, as the standards prescribed were unduly high, and failure, even in a single subject, was held to disqualify for a grant. A new scheme for results grants was issued in 1868, and the fact that the rules of 1868 were better suited to the needs of the country than the rules of 1865, is proved by the increase in the amount of results grants from Rs. 24,499 in 1868-69 to Rs. 78,176 in 1870-71. The subjoined table shows the progress in general education during the period under review :—

Year.	Government.		Non-Government.		Fee Income.		Gross Expenditure.	
	Schools.	Pupils.	Schools.	Pupils.	Government.	Non-Government.	Government.	Non-Government.
1858-59 ...	122	4,488	337	10,452	Rs. 10,831	Rs. 17,316	Rs. 1,68,348	Rs. 1,85,829
1870-71 ...	119	9,166	3,360	103,610	,, 75,869	,, 2,51,569	,, 2,65,139	,, 10,39,034

The number of Government Colleges rose from 1 to 5, and the number of private Colleges opened during the period was 7. There were nearly eight times as many schools in 1870-71 as in 1858-59; the fee income in 1870-71 was twelve times as much as in 1858-59; and the gross expenditure on education increased almost sixfold. The number of Girls' Schools rose from 39 in 1858-59 to 138 in 1870-71, with an increase in the pupils from 1,885 to 10,185. These schools were entirely under agencies aided by Government, and all that Government directly did to encourage female education was to open a Female Normal School at Madras in 1870. The most noteworthy features in the history of this period are the cordial co-operation of managers of aided institutions with Government in promoting the growth of education of all grades; the marked rise in the fee income, which is an unerring index of a wide and sound appreciation of the value of education; and the efforts made by private bodies to promote female education, which as yet was in its infancy.

The legislative measures bearing on education during the decade 1870-71 to 1880-81, were the Madras Local Funds Act and the Towns' Improvement Act, which were passed in 1871. The former Act provided for the maintenance of elementary schools, either wholly, or by means of grants-in-aid, for the inspection of schools, for the repair of school-houses, and for the training of teachers. A special tax, known as the House Tax, was levied in the "unions" into which the rural parts of the Presidency were divided, and educational expenditure was the first charge on the proceeds of this tax. The Towns' Improvement Act contained similar provisions in regard to towns, with the essential difference of the absence of a special tax, and the existence only of a permission to apply Municipal funds for educational purposes. The house-tax had to be abandoned at the end of the year 1872-73, as it met with considerable opposition; and the expenditure on education was made a first charge on the one-third land-cess also levied under this Act. It was contemplated by this change to secure for educational purposes about eight lakhs and a half of Local Fund revenue. But different Local Boards manifested different degrees of interest in education, and there were instances in which funds, belonging of right to education, were diverted to other important purposes, such as the maintenance of hospitals. The main feature of this Act, as has been well pointed out, is that "it recognises the all-important principle of working through the people in small areas or districts, and that it constitutes in each a Local Board, composed of official and non-official residents, similar in character to those contemplated in the English Education Act 1870, with somewhat similar powers and responsibilities."

In 1873, Government announced its intention to employ for purposes of elementary education some portion of the funds hitherto devoted to higher education, and called upon the Director of Public Instruction to suggest ways and means. That officer proposed that salary grants should be reduced all round. Revised rules for results grants were issued in 1877, which raised the standards and reduced the grants. The salary grant rules now in force were sanctioned towards the close of 1879-80, but came fully into operation only in 1883. The general tendency of these rules was to make the conditions of grant more stringent than formerly. During the decade under review, the amount spent on salary grants was as much as Rs. 2,34,930 in 1873-74, while in 1880-81 it was only Rs. 1,53,705. But, as a set-off against this reduction, the amount of results grants rose from Rs. 92,207 in 1871-72 to Rs. 2,59,366 in 1880-81. The following table indicates the progress made by the several sections of the community during these ten years :—

	1871-72.	1881-82.
Number of Schools	5,124	12,878
Europeans and Eurasians	5,175	5,730
Native Christians	13,246	29,080
Hindus	111,224	268,139
Mohammedans	5,531	22,075
Others...	16	2,784

The number of schools rose during the ten years by over 150 per cent., and the number of scholars by 142 per cent. The Native Christian and Hindu pupils were more than twice as many at the end of the period as at the beginning of it, and the Mohammedan element had quadrupled. The number of Colleges rose in the period from 12 to 24, and the number of Girls' Schools for primary education from 119 to 500. During these ten years, Government expenditure on its own Colleges rose from Rs. 64,000 to Rs. 1,22,000, and on aided Colleges from Rs. 8,700 to Rs. 23,500. Government expenditure on its own secondary schools rose from Rs. 90,000 to Rs. 1,09,000, while that on aided secondary schools fell from Rs. 1,90,000 to Rs. 92,000. Government primary schools cost Rs. 76,000 in the last year, against Rs. 36,000 in the first, while Government expenditure on aided primary schools rose from Rs. 1,00,000 to Rs. 1,07,000. During the same ten years, the expenditure from Local and Municipal Funds on aided primary schools rose from Rs. 88,000 to Rs. 2,13,000, so that the aid given from "public funds" to primary education amounted in 1880-81 to Rs. 3,20,000. The gross expenditure on education showed a marked increase, rising from Rs 19,06,000 in 1870-71 to Rs. 31,08,000 in 1880-81. The income from fees in all institutions rose from Rs. 3,83,000 to Rs. 8,23,000. In private institutions the fee receipts rose from Rs. 2,83,000 to Rs. 6,40,000, while the total grants-in-aid from all sources rose from Rs. 3,40,000 to Rs. 4,40,700. Thus the percentage of what is paid from "public funds" to what the pupils themselves pay fell from 120 to nearly 69. This development of self-help deserves attention as affording scope for the further extension of educational operations.

At the end of 1884-85 there were 8 Arts Colleges of the first grade and 22 of the second grade, or a total of 30 as against 24 in 1880-81. There were besides three Professional Colleges for Law, Engineering, and Medicine respectively. Of the Arts Colleges, 10 were Government institutions, 18 were aided, and 2 unaided institutions. The number of pupils in the Government institutions was 895, as against 1,620 in the aided and unaided institutions. The total expenditure on Government Colleges was Rs. 1,76,326, as against Rs. 1,95,906 on the non-Government Colleges. Government contributed Rs. 1,25,430 to its own Colleges, and Rs. 39,774 to aided Colleges. The fee income in Government Colleges was about 28 per cent of the gross expenditure on them, while in non-Government Colleges it was 32 per cent. The total number of secondary schools for boys was 596 with 28,724 pupils, and that for girls 166 with 1,648 pupils. The number of primary schools for

boys was 14,139 with 365,081 pupils, and that for girls 579 with 30,293 pupils. There were 48 Normal Schools for Masters, 12 for Mistresses, and 14 special and Technical schools, containing 1,155, 366, and 810 students respectively Of the 15,587 institutions above referred to, 141 were under Departmental management, 1,318 were under Local Boards or Committees, 9,172 were aided institutions, and 4,956 were unaided institutions

Comparing the total number of pupils with the total population of a school going age, it appears that 16 6 per cent of the boys and 2 2 per cent. of the girls were under instruction, or in other words one boy out of every six, and one girl out of every forty five received instruction This result can be properly gauged only when it is remembered that the population of a school going age in the Presidency consists of 2,291,735 boys, and 2,338,541 girls Taking the statistics in regard to the several leading sections of the community, of the boys and girls of a school going age, among Native Christians 51 and 52 per cent respectively were under instruction, among Mahomedans 20 and 1 3 per cent respectively, among Brahmins 74 and 9 per cent respectively, among Vaisya's and Sudras 17 and 2 per cent respectively The total amount of school fees was Rs 12,83,000 in 1884 85, *i e* about 31 per cent of the gross expenditure, as against Rs 8,23,000 in 1880 81 The grants in aid from provincial funds rose from Rs 2,33,000 in 1880-81 to Rs 3,66,000 in 1884 85, and the total amount of grants from "public funds" from Rs. 4,40,700 to Rs. 7,44,000 The whole amount expended on education was about Rs 42,00,000 Of this about 10 per cent was devoted to collegiate education, 66 per cent. to secondary and primary education, 7 per cent to training and technical schools, and 17 per cent to direction, inspection, University, buildings, and other charges Out of the amount spent on education from Provincial funds, 16 per cent. was applied to collegiate education, 39 per cent to secondary and primary education, 12 per cent to training and technical schools, 23 per cent to direction and inspection, and the remaining 10 per cent was spent on buildings, scholarships, and special grants Local Fund expenditure on secondary and primary education was 7 and 62 per cent respectively of the total Local Fund expenditure on public instruction, and 31 and 53 per cent of Municipal expenditure These facts show that the bulk of the expenditure on education from Local Funds goes to support primary education, and that Municipalities in towns encourage both secondary and primary education

It appears from the foregoing summary that the whole educational machinery now at work in the Presidency of Madras came into existence during Her Majesty's reign At the beginning of this period, there was no School or College in the whole Presidency for imparting sound instruction At present there are 30 Colleges and 743 Secondary Schools The Pial schools are making room for Anglo Vernacular and Vernacular Primary Schools, of which 14,299 exist The agency required for promoting the spread of education is secured by means of the Training College established recently, and the Normal Schools for Masters and Mistresses in various parts of the country There has been, year after year, a steady progress in the number of candidates presenting themselves for the several University Examinations Of the graduates in Arts of the Madras University, over 1,500 are living at the present day, and a good many of these are undoubtedly exercising a beneficial influence on all around them. The steady increase in the number of pupils, and in the revenue from school fees, the interest and ardour evinced by Municipal and Local Boards in taking up the management of secondary and primary schools, and in encouraging the growth of education by means of grants in aid, the spirit of self help and self reliance which has led to the establishment of Colleges and High Schools in all parts of the country by local bodies and by enterprising individuals, the efforts made by missionary bodies to combine the most efficient secular instruction possible with the religious instruction which it is their avowed object to impart, the attitude of religious neutrality maintained by Government, and the declared policy of Government to encourage the diffusion and development of education of all grades, are sure pledges of an educational future brighter even than the past.

This sketch cannot be better concluded than by bringing together testimony of high authority in

regard to the value of the education given in the Colleges and Schools of the Presidency. Colonel Macdonald, Director of Public Instruction, wrote in 1873 —"Even hostile criticism can hardly deny that, in this Presidency at least, educated Hindus are filling important offices around us in an honourable and creditable manner, that a higher tone is being diffused by them through the public service, that, in integrity and truthfulness, they stand immeasurably above the men of the past generation, that many of them are striving with success to diffuse the blessings of education among their countrymen; and that the number of educated Hindus who can be pointed to as having brought dishonour on the training which they have received is singularly small"

In an address delivered at the Convocation of the Madras University, Mr Porter, former Principal of the Kumbakonam College, observed that "the earlier pupils of our schools have reached or passed the prime of life, and many of them now hold high posts in all the departments of public life. Among these are men whose names are widely known among their countrymen, and who are honoured where they are known" Of the later pupils he said —"I believe it is generally admitted that, especially in method and regularity, and I believe also in the tone of morality, the public service has vastly improved"

Sir Charles Turner, late Chief Justice of Madras, summed up the results of the higher education in these words —"Modern India has proved by examples that are known to, and honoured by, all in this assembly, that her sons can qualify themselves to hold their own with the best of European talent in the Council Chamber, on the bench, at the bar, and in the mart

His Highness the late Maharajah Rama Varma of Travancore, a highly competent and disinterested judge, stated it as his profound conviction, that "the native portion of the Government service and of the bar has immensely improved during the past forty years" There is no lack of other evidence to the same effect, but this will suffice

No account of the great and good work done in the field of education in the Presidency of Madras can be complete which omits to pay a tribute of admiration and gratitude to Lyle B Powell and John Anderson, to Edmund Thompson and Gopala Rao, to William A Porter and William Miller The labours of these educationists and others have enabled Madras to stand second to no other part of the Empire of India in general intelligence, in the efficiency and integrity of its public servants, and in a loyal appreciation of, and heart felt gratitude for, the benefits of British rule

Mention should also be made of the important assistance rendered to the cause of education by many benevolent ladies who have occupied positions of influence in the Presidency since the educational policy of the Government was formulated The names of Lady Trevelyan, Lady Denison, Lady Napier, Lady Grant, Lady Hobart, Lady Robinson, Lady Chamberlain, Lady Mary Grenville, Lady Grant Duff, Lady Turner, Lady Connemara, Mrs Frere, Mrs Dalrymple, Mrs Sim, Mrs Powell, Mrs Rideout, Mrs Cornish, Mrs Carmichael, Miss Gell, Mrs Firth, Mrs Donald, and others, are held in high honour in Madras, for they are intimately associated with the development of institutions for the promotion of the moral, intellectual, and physical welfare of the women and children of India

THE MADRAS UNIVERSITY

The Madras University dates back only to September 1857, but though not yet thirty years old, it has reached a stage of growth which in many of the older Universities was not reached till they had attained a much greater age It was preceded by what was called the "University Board" in connection with the Government High School which developed into the Presidency College. The institution of this Board was part of a comprehensive scheme proposed by Lord Elphinstone for the development of education—a scheme which involved the formation of a University of Madras. In fact, the Presidency College, or rather the "High School," was often known as the Madras University, and the old "proficients" of that school still rank as graduates The Univer[illegible]s

established, according to the preamble of the Act of Incorporation, "for the better encouragement of Her Majesty's subjects of all classes and denominations within the Presidency of Fort St. George, and other parts of India, in the pursuit of a regular and liberal course of education." This better encouragement was to be given by "ascertaining, by means of examinations, the persons who have acquired proficiency in different branches of Literature, Science, and Art, and of rewarding them by Academical degrees as evidence of their respective attainments, and marks of honour proportioned thereunto." Thus the University was instituted simply as an examining body of the type of the London University, but it differs from the type in one essential feature. The London University concerns itself only with the question "Can the candidates pass this examination?" and asks no questions as to previous education. In Madras, on the other hand, the University demands from all candidates for degrees proof that they have received their education at affiliated institutions. This is a point of great importance, for it not only gives the University a real control of the collegiate education throughout the Presidency, but it also insures that the candidates for degrees are men who have had an opportunity of learning something more than can be picked up from books. Student life has not yet reached a high state of development in India, and perhaps it will be well if some of the sides of student life with which the English student is familiar are never developed; but in the larger colleges there is springing up a feeling of comradeship, and a desire for united action, which is always a hopeful sign.

The first Matriculation Examination was held in September 1857, and the first Degree Examination in the following February. At that time there was no examination between the Matriculation and the B.A. Examinations, the First Arts Examination not having been instituted till 1863-64. For some years after its institution the candidates were sent in for the F.A. Examination one year after they had matriculated, and for the B.A. Examination three years after passing the F.A. Examination, but this was soon found to be an unsatisfactory arrangement, and the F.A. Examination was then made to divide the College course into two equal parts as at present.

At the first examination, in 1858, only two candidates received the B.A. degree, both of them from the American Mission Seminary in Jaffna. In the following year the number increased to eight, of whom seven were from the Presidency College, and the other was a private student. In 1860 a Doveton College student made his appearance on the list, and in the following year Kumbakonam College obtained two passes. For a good many years the Presidency and Kumbakonam Colleges sent up almost the whole of the candidates. It was only in 1869 that graduates began to appear in the lists from the Free Church Mission Institution, which now, as the Madras Christian College, takes a prominent place every year. In that year there were 40 graduates, a great increase on previous years. In 1876 the graduates of the University were 11 Masters of Arts, 428 Bachelors of Arts, 3 Masters of Law, 91 Bachelors of Law, 2 Doctors of Medicine, 4 Bachelors of Medicine and Masters in Surgery, 1 Licentiate of Medicine and Surgery, and 12 Bachelors of Civil Engineering. Ten years later, in 1886, the numbers were as follows:—

Degree.	Passed Examination for Degree.	Graduated.	Graduates Deceased.	Graduates at present on Rolls.
Bachelor of Arts...	1,678	1,584	91	1,493
Master of Arts	49	46	4	42
Bachelor of Laws	267	261	36	225
Master of Laws	9	9	1	8
Licentiate of Medicine and Surgery	36	26	2	24
Bachelor of Medicine and Master in Surgery ...	12	9	1	8
Doctor of Medicine	5	5	1	4
Bachelor of Civil Engineering	41	36	...	36

The rapid spread of University education through the country is well illustrated by comparing the statistics given in the Syndicate's report for 1874-75 with those for 1885-86. In the former year the

number of candidates presenting themselves for the Matriculation, First in Arts, and Bachelor of Arts Examinations were 1,947, 352, and 88 respectively ; in the latter year they were 5,892, 1,380, and 485 respectively.

The Senate House, which forms one of the chief architectural ornaments of Madras, was begun in 1874 and completed in 1879, at a cost of Rs 2,89,729. The Chancellorship of the University is always held by the Governor *ex officio*. The Vice-Chancellor is usually a Judge of the High Court, but there is no absolute rule on this subject The list of Fellows of the University contains the names of a number of distinguished men who have helped to make the history of Madras during the last thirty years Of the Fellows named in the Act of Incorporation only one, Mr J T. Fowler, is now in Madras, of the others some are dead, while others are enjoying a well earned rest after a life of earnest work

The financial condition of the University has greatly improved of late years, for in 1874-75 Government had to pay more than Rs 11,000 towards the expenses, in addition to the amount received from fees, &c, while in 1885 86 the University was not only self supporting, but had a balance of over Rs 19,000 on the year's transactions Though by no means rich in endowments, the University has at present Rs 57,300 funded capital for providing prizes and scholarships, and some additions are made almost every year by persons interested in education, so that there is good reason to hope that in this respect, too, the University will soon be able to make a good appearance With ever increasing educational facilities, and dealing with an ever widening range of subjects, the University of Madras should year by year exercise a more powerful influence for good in the Presidency

TECHNICAL EDUCATION

Three years prior to Her Majesty's accession, a Government Survey School was established at Fort St George, with the object of training men for service in the Revenue Department A quarter of a century later the growing needs of the Public Works Department rendered special training for its subordinates indispensable, and Captain Winscom, of the Madras Engineers, was charged with the task of converting the Survey School into a School of Civil Engineering, the buildings which formed the old Palace of the Carnatic being placed at his disposal for that purpose In 1859 the students under training as Overseers numbered about fifty In 1861 a special class was formed to train Draftsmen and Surveyors for the Public Works Department, and in 1862 classes for Engineers were established, which were open to commissioned officers of the Army, as well as to native and other civilians of liberal education The institution was now known as the Civil Engineering College, and it began to send up candidates for the Examination for the University degree of Bachelor of Civil Engineering as early as 1865. The College, however, conferred its own diplomas and certificates as Assistant Engineer, Supervisor, Overseer, Draftsman, and Surveyor, on the results of the final Examinations which were held by unpaid independent Examiners Under the successive administrations of Colonel Carpendale, Major Edgcome, Colonel Rogers, and Captain Love, all of the Royal Engineers, steady progress was made, the number of pupils under instruction usually averaging 150, while a gradual rise in the standard of education was effected During the last twenty years, the institution has consisted of a Collegiate Branch, educating undergraduates of the Madras, or other Indian Universities, to the standard required for an Assistant Engineer in the Public Works Department, the course being adapted also to meet the demands of the degree of Bachelor of Civil Engineering conferred by the local University, and a School Branch, training students of all classes for the various grades of the Subordinate Establishment of the Public Works Department. The latter comprises an Overseers' class for the education of European non-commissioned officers and soldiers, and civilians of all races, to the standard required for upper subordinates, a Draftsmen's class, and a Surveyors' class. The courses of study, which extended

for each class over a period of two years, were made as practical as possible, and included a considerable amount of work in the field.

In 1880 it was realised that the time had arrived when the Civil Engineering College at Madras should do more than subserve the purposes of a single Government Department, important as that Department undoubtedly is. A Committee was appointed to consider how the institution might be made more generally useful; and it submitted reports in 1881 and 1883, recommending the formation of a class of Mechanical Engineers, and the introduction of a practical training, both in workshops and on works, for students of the Engineers' and Subordinates' classes. It advised also that the period of theoretical study should be increased; that several new subjects should be introduced; and that all examinations should be conducted by a Board of paid Examiners. It was not, however, until 1885 that orders were finally issued reconstituting the College of Engineering on the basis recommended by the Committee. At the present date the remodelling has been only partial. Additional buildings, however, are in progress, and sanction is expected shortly to a substantial increase in the Staff. One appointment to the Engineer establishment of the Public Works Department is now guaranteed annually by Government to the most distinguished student of the Engineer class; and the whole of the subordinate establishment is recruited from the College. The remaining passed men generally find employment as Overseers, Draftsmen, or Surveyors in other Government Departments, in the Railways, and under Local Fund Boards, and Municipalities.

With the view of encouraging advanced instruction in Science and Art in this Presidency, arrangements were made by the Madras Government in 1886 to hold examinations in a great variety of technical subjects. Such of them as are connected with Engineering and with Drawing and Painting may be to some extent taken up by students of the College of Engineering, and of the School of Arts; but, in the absence of a Technical Institute, where instruction can be conveyed, it is unreasonable to expect that the examinations in subjects relating to scientific industries will be largely attended. This want it is now in contemplation to supply by the inauguration in the town of Madras, for the benefit of the whole Presidency, of a Victoria Technical Institute, in commemoration of Her Majesty's Jubilee. Towards this object the public has liberally subscribed.

THE MADRAS OBSERVATORY.

The Madras Observatory, started in 1792, besides being the oldest colonial establishment of the kind, is to this day the only Government astronomical observatory in India. At the commencement of Her Majesty's reign, it was under the charge of Mr. Thomas Glanville Taylor, who had then been engaged for nearly seven years with the necessary observations for a catalogue of 11,015 fixed stars, which was completed in the year 1847. Until very recently this great work remained unsurpassed, as the most extensive of its kind yet accomplished. The observations were taken by native assistants, with a transit instrument and a mural circle, both by Dollond, and the Astronomer's whole time and attention being given to personal superintendence of both observations and calculations, the results, including also numerous positions of the sun, moon, and old planets, were published by Mr. Taylor in seven quarto volumes. A reprint of his *General Catalogue of Fixed Stars* is now called for, as soon as other more pressing duties will permit of its being undertaken.

From 1849 to 1859 the Observatory was under the care of Captain W. S. Jacob, of the Bombay Engineers, who, not contented with mere supervision of ordinary routine work, and finding no instrument in the place adequate for the higher class of research he desired to carry out, privately purchased an excellent 6¼-inch equatorial telescope from Messrs. Lerebours and Secretans of Paris. The numerous measurements of double stars and of the satellites of Saturn made with this instru-

ment would alone have raised Captain Jacob's name to the first rank amongst practical astronomers; but besides making all the observations himself, he subsequently used them for elaborate theoretical investigations, published in the *Memoirs of the Royal Astronomical Society*, after his departure from India. Observations with the old meridian instruments were still carried on by the native assistants, but with less important results than in Mr. Taylor's time, when the Astronomer had little else to attend to. The active superintendence of Major W. K. Worster, Madras Artillery, on repeated occasions between 1853 and 1861, when the permanent Astronomer was absent on leave, or between successive appointments, always gave a fresh impulse to the meridian work, and observations for a catalogue of about 2,200 stars, for the epoch 1855, chiefly due to that able officer, remain on hand, awaiting final reduction and publication. The Observatory was under the direction of Major J. F. Tennant, R.E., during a very troublesome period of instrumental transition, in portions of 1859 and 1860. Hourly magnetical and meteorological observations were recorded at Madras from March 1841 to March 1861, the results of ten years of the former and fifteen years of the latter having been printed, in five quarto volumes, and three more await publication.

The present Astronomer, Mr. N. R. Pogson, took charge in 1861, and speedily initiated a new order of pursuits, till then not attempted at any public Observatory, in England, or any of her colonies. Within three months of his arrival, a minor planet, the 67th of the group revolving in orbits between those of Mars and Jupiter, was found by Mr. Pogson, and being the first discovery of the kind made in this quarter of the globe, was named "Asia." Another planet, found in February 1864, and announced as "Sappho," proved, on calculation of its orbit, to be a re-discovery of 'Freia,' which had been completely lost, owing to insufficient observations on the occasion of its discovery at Copenhagen in 1862. Another planetary candidate for the name of "Sappho" was provided by Mr. Pogson in May 1864, followed by "Sylvia," in May 1866, "Camilla," in November 1868, and 'Vera' in February 1885. A comet, in December 1872, and several new variable or changing stars are also on record as Madras discoveries.

The new line of discovery, commenced in 1861, was not permitted to interfere in any way with the steady routine of stellar observations, ever the first duty at a public Observatory. An excellent meridian circle by Messrs. Troughton and Simms, of London, was supplied early in 1858, but owing to frequent changes of Astronomers it was still unmounted in 1861, and could not be got into efficient working order until May 1862. A carefully selected catalogue of over 5,000 stars was under observation by the native assistants with this instrument up to the end of 1885, the results of which, based upon 52,074 complete observations, are now being published in a series of nine volumes, the first of which is just ready for issue.

A fine new equatorial, with an 8-inch object glass, was sent out by the same makers at the end of 1865, and was mounted and in use by June of the following year. This, and the smaller equatorial, previously mentioned as procured by Captain W. S. Jacob in 1850, have been in constant use throughout for a variety of pursuits. The planet Mars was under observation for about a month at each of eight oppositions between 1862 and 1879, for investigation of the constant of solar parallax, or, in other words, the determination of the true mean distance of the sun from the earth. Celestial distances are measured by astronomers on two scales. The smaller standard is the earth's equatorial diameter, the larger one, the earth's mean distance from the sun. The labours of the various geodetical surveys furnish the value of the smaller standard in miles, but the relations between the two natural standards is only obtainable by the most refined processes of the astronomer, by means of transits of Venus, which recur in pairs more than a century apart; by Mars in opposition, which can be repeated at intervals of twenty-five months, but to the best advantage at only three oppositions in each successive period of seventeen years, and by other methods of less accuracy.