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Report of the Department of Industries, Madras for the year ended 31st March 1920

REPORT

OF THE

DEPARTMENT OF INDUSTRIES, MADRAS

FOR THE YEAR

ENDED 31ST MARCH 1920

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Service. Nevertheless the Secretary of State's despatch marked a revolutionary change in policy, for he definitely accepted the two fundamental principles underlying the recommendations of the Commission; first, that in future the Government should play an active part in the industrial development of the country; and secondly, that the Government could not undertake this work unless provided with adequate administrative equipment and forearmed with reliable scientific and technical advice. He approved in principle the proposal that an Imperial and Provincial Department of Industries should be set up on the general lines laid down by the Commission, and sanctioned the proposal of the Government of India that an interim authority, a Board of Industries and Munitions, should be set up, which would close the war commitments of the Indian Munitions Board, take over from the Commerce and Industries Department certain items of work, undertake the initial work of organization, and in particular frame detailed proposals for the new permanent department. The Secretary of State has therefore reversed the restrictive policy laid down by Lord Morley in 1910, which, though modified by Lord Crewe in 1912 and temporarily in abeyance while the Commission was conducting its inquiry, was still in force, and has recognized that, if the active participation of Government in industrial development of the country is to be accepted as one of its legitimate functions, a new policy is required. The Secretary of State's despatch marks the end of a long period of uncertainty, and the commencement of a new era in respect of industrial development by the Government.

5. *Previous history.*—As the policy outlined in the despatch when translated into effect should mark a great change in the Department of Industries, this appears to be a suitable occasion for a brief review of the history of the department with reference to the efforts made by the Government of Madras to secure the Secretary of State's adherence to the new policy.

6. In 1905 a scheme was submitted to the Government of India for the further advancement of the industrial development of the Presidency, and it was proposed to create a department which should make a survey of existing industries and should investigate the possibility of creating new ones. It was not proposed to work industries experimentally on a commercial scale, but merely to initiate experiments which might assist private enterprise to take up fresh industrial undertakings. Lord Morley, who was then Secretary of State for India, did not view the general principles underlying the scheme with much favour. He regarded with scepticism the prospect of attaining satisfactory results from the direction of State effort towards the creation of industries, and he doubted whether the lack of industrial energy and progress in the Madras Presidency

might not be due to economic causes beyond the reach of State endeavour. Lord Morley, however, sanctioned the creation of the new department, and the appointment of Mr. Chatterton to the charge of it with the title of Director of Industrial and Technical Enquiries. Thus the Department of Industries came into existence in 1906 though not under that name.

7. In 1908 an Industrial Conference was held at Ootacamund, at which representatives of the leading industrial interests attended. The object of the Conference was to consider the best method of developing further the work which had been begun by the Director of Industrial and Technical Enquiries, and also to review the question of the improvement and extension of technical education. The Conference passed a number of resolutions and defined the three functions of the Department of Industries as—

(1) the supply of advice in regard to new industries, and the introduction of new methods and processes,

(2) the carrying out of investigations and experiments, and

(3) the development of selected industries, and added that the department should establish a bureau of information and an industrial museum. In regard to the vexed question of pioneer industries, the Conference passed a resolution to the effect that, subject to certain specified conditions, Government might undertake, as a pioneer, the introduction of new industries for the purpose of training students or apprentices or for demonstrating that such industries will be commercially successful. The resolutions of the Conference, however, were not passed without protest, and three prominent representatives of European business interests in Madras recorded a minute of dissent from the resolutions relating to industrial development, holding that the Government should confine assistance to commerce to matters of research, technical education, industrial instruction, and the dissemination of industrial information. On this point the Government recognized as a general principle that the exploitation of industries should be regarded not as a normal but as an exceptional function of Government, and on the general question of the limitations that should be set to the functions of the State in attempting to promote industrial development, they accepted the conclusions arrived at by the Conference. Accordingly in March 1909 they made the following proposals to the Secretary of State:—

(1) that a permanent department of industries under the control of an officer to be styled the Director of Industries should be created;

(2) that industrial education, as opposed to technical education, should be placed under this department; and

(3) that the department should further be entrusted with the duty of encouraging trade by the introduction of new industries and that it should establish and maintain a bureau of industrial information, and that it should have the charge of the well-boring and pumping operations which were then in progress.

8. Lord Morley, however, in a despatch, dated 29th July 1910, differed fundamentally from the views expressed by the Conference and approved by Government, as to the functions of a department of industries. As before, he condemned a policy of attempting to create new industries by State intervention, and he was sceptical as to the utility of State effort in this direction unless it was strictly limited to industrial instruction and avoided the semblance of a commercial venture. The policy which he sanctioned was that State funds might be expended upon familiarising the people with such improvements in the methods of production as modern science and the practice of European countries could suggest; further than this, the State should not go, and it should be left to private enterprise to demonstrate that these improvements could be adopted with commercial advantage.

9. As the result of these orders the Department of Industries, which, on the recommendation of the Conference, had been created in anticipation of sanction in October 1908, was abolished.

10. Lord Morley's orders however aroused considerable opposition in India. In February 1911 a resolution was passed in the Legislative Council of Madras inviting the Secretary of State for India to reconsider his decision. In pursuance of this resolution, the Government again addressed the Secretary of State for India in May 1911. They referred to the general disappointment which Lord Morley's orders had occasioned and laid stress on the difference between the industrial conditions of India and those prevailing in Europe, pointing out how difficult it was in a country like Southern India 'to bridge the gulf' which exists between mere scholastic instruction and the practical application of an industrial teaching, unless factories under State management were founded; and they asked for authority in special cases, and subject to the safeguard suggested by the Industrial Conference, to undertake the experimental introduction of the industrial processes.

11. These proposals were supported by the Government of India, and Lord Crewe's reply, in a despatch, dated 15th March 1912, was not altogether unfavourable. He reaffirmed Lord Morley's decision against the extension of the activities of a Department of Industries to trading on a commercial scale, but he had no objection to the creation of a separate Department of

Industries, provided that its functions were confined within certain limits. Accordingly the creation of the Department of Industries was sanctioned on the 21st March 1914, and the functions of the Director were thus defined:—

(1) to collect information as to existing industries, their needs and the possibility of improving them or of introducing new industries;

(2) to carry out and direct experiments connected with local inquiries;

(3) to keep in touch with local manufacturers, to bring the results of his experiments to their notice and to obtain their co-operation in the conduct of experiments on a commercial scale;

(4) to supervise the training of students; and

(5) to advise Government with regard to technical matters involving legislation.

12. *Change of policy.*—The despatch of the present Secretary of State on the Report of the Indian Industrial Commission indicates his adherence to the policy, advocated by the Madras Government, of active participation by the State in the industrial development of the country. The policy now approved by the Secretary of State, if and when carried into effect on the basis of the detailed proposals advanced by the Industrial Commission, will result, it is hoped, in considerable industrial development in the near future.

13. *Madras Conference.*—On 13th March 1920, His Excellency the Governor presided over a Conference at Madras, which was largely attended by representatives of commercial and industrial interests as well as by members of the Legislative Council. The business of the Conference was not so wide as that of the Conference held in 1908, but was confined to five specific points which were to be discussed at a Conference of Directors of Industries to be held at Simla in April. The Madras Conference generally approved of—

(1) the creation of a Board of Industries for this Presidency;
(2) the creation of an Indian Industrial Service;
(3) the control of industrial education by the Director of Industries;
(4) the extension of schemes of apprenticeship; and
(5) the establishment of demonstrational factories by the Government.

14. *Committees of experts.*—In his despatch the Secretary of State approved of the appointment of expert committees to consider the recommendation of the Commission regarding the creation of all-India scientific services, and among the notable events of the

year were the visits to Madras in December and January of the Chemical Services and Stores Purchase Committees which were formed for this purpose.

15. The Chemical Services Committee was constituted under the Presidency of Professor J. F. Thorpe, C.B.E., F.R.S., to inquire into the proposals of the Indian Industrial Commission for the constitution of a Chemical Service in India, and also for the creation of central institutes for chemical research. The Committee as a whole did not visit the Presidency, but the President and two members made local inquiries. All arrangements for their visit were made by the Director of Industries. In addition to the Presidency town, they visited Coimbatore and Ootacamund. They did not take oral evidence but had informal discussions with leading industrialists, officials and others at the places which they visited. Thirty-six persons in this Presidency were invited to furnish written evidence on the subject of the Committee's inquiry.

16. The Stores Purchase Committee was appointed by the Government of India to investigate the measures required for the establishment of purchasing agencies of Government stores in India. The Director of Industries was co-opted as a member of the Committee during its stay in Madras at the end of January 1920. Four officials and three non-officials were requested to furnish evidence, most of whom were also examined as witnesses.

17. *Immediate effects of Industrial Commission's Report.*—The publication of the report of the Industrial Commission and of the despatch of the Government of India and the Secretary of State on that report has resulted in a great awakening of interest in industrial development in Southern India. Evidence of this was reflected in the considerable number of new companies that were floated during the year or are in course of formation; the number of industrial and banking companies formed during the year under review was fifty, the capital involved amounting to Rs. 119 lakhs. Further evidence is afforded by the increase in the demand by the public for assistance from the department during the year; the number of inquiries received increased considerably and shows every sign of increasing still further during the ensuing year. In order to cope with the expansion of work in various directions, proposals were submitted to Government for the appointment of one Industrial Engineer and of five Assistant Directors for employment in the districts. The duties of the district Assistant Directors will include the collection and dissemination of commercial and industrial information, the supervision of industrial parties and pioneering or demonstrational factories within their jurisdiction, local investigations and inquiries in connexion with industries of all classes, and the encouragement of persons interested in industries to take advantage of the facilities offered by the department; it is proposed that specialised industrial parties should receive their orders on technical points from the various experts attached to the head office, but that the district Assistant Directors should exercise general administrative control over them.

Bureau of Industrial and Commercial Information.

18. *Organization and objects.*—The Bureau of Industrial Information, which is the intelligence branch of the department, was founded some years ago as a result of the Industrial Conference held at Ootacamund in 1908. The Conference considered that a Bureau of Information and an Industrial Museum should be provided from which information could be obtained on points of commercial importance and interest.

19. The purpose of the bureau, is to provide information on general industrial and commercial subjects in connexion with the existing industries and of projected developments of industries in this Presidency. Enquiries in regard to new processes of manufacture, use of machines, markets for goods and sources of supply of materials and commodities, prices and openings for capital, are received in considerable numbers. These enquiries involve the investigation of such questions as the financial status of the enquirers, the supply of raw materials, the suitability of raw materials available, the supplies and cost of fuel, the nature and cost of suitable machinery, the market for the finished product, and the extent to which the industry is already organized in the district, besides questions of freight and rates of exchange. Before a new industry can be started, the sources of supply of the raw or semi-manufactured material upon which it is based, have to be examined and definite information obtained that they are available in sufficient quantity at reasonable prices and of the requisite quality. It is then necessary to estimate the capital required and ascertain whether there is a market for the finished products. Several of these questions involve careful local enquiries and the development of this branch of the department has undoubtedly been hampered and restricted owing to the lack of an adequate district organization. It is anticipated that the increase in the district staff which will result from the appointment of Assistant Directors of Industries and from the retransfer to this department of the pumping and boring establishment, will to a great extent remedy this defect. It will be part of the duties of these assistant directors and supervisors to act as the representatives of the bureau in the districts, and to organize the collection of information for, and to disseminate the information acquired by, the bureau.

20. *Enquiries.*—Mr. Green was in charge of the bureau throughout the year. A large number of references were received from the Director-General of Commercial Intelligence, Calcutta, in regard to overseas trade; they fell generally under one of the following three classes:—

(*a*) complaints from abroad of the adulteration of Madras goods for export and suggestions for combating this evil;

(*b*) information as to freights, methods of packing and finance;

(*c*) questions as to the standing of firms and their introduction to overseas importers.

21. A large number of enquiries were received from the public for information in regard to prices and suitability of machinery for carrying out various industrial processes. Estimates were furnished to enquirers of the cost of suitable plant for the manufacture and the refining of sugar, cotton-ginning, oil-seed crushing, flour grinding, manufacture of buttons, pencils and oil-casks, extraction of various classes of fibre, canning, cigar manufacture and stone working and polishing. A number of estimates were obtained from manufacturers in England direct and communicated to interested parties. The majority of the other enquiries received in the Bureau related to the hide, skin and leather trade, the industrial exploitation of forest produce, the development of the mineral resources of the Presidency, the interpretation of the mining rules, and the supply and manufacture of oils, fats, paints and varnishes. Samples of clays and lime-stones from different places in the Presidency were analysed with a view to determining their suitability for various manufacturing processes and the results communicated to enquirers.

22. A number of gentlemen called with letters of introduction from the Indian Trade Commissioner, London, and were supplied with information on the subject of their enquiries.

23. *Commercial and Industrial Museum and Library.*—Proposals are under consideration to develop the Bureau of Information in connexion with a Commercial and Industrial Museum and Public Industrial Library. The Industrial Conference held at Ootacamund in 1908 suggested that a Commercial Museum should be established in association with this department. Early in 1919 a resolution was moved in the Legislative Council urging the Government to establish a commercial museum in Madras on similar lines to the one attached to the Commercial Intelligence Department in Calcutta.

The object of such a museum would be to place Indian manufacturers in touch with firms and individuals interested in their products and it would probably include—

(1) an exhibition of samples of imported goods which are manufactured outside India with counter samples of similar articles manufactured in India.

(2) an exhibition of samples of foreign goods which could be manufactured in India.

(3) a display of raw materials exported and re-imported in manufactured form and raw materials which could be worked up to displace imported manufactured articles.

24. Considerable additions were made during the year to the library and arrangements have been made to enable the general public to consult technical books on industries in which they are interested. I am under great obligation to the American Consul for his kindness in transferring to the library a considerable number of American technical and trade journals.

25. *British Industries Fair*, 1920.—The Victoria Technical Institute arranged to send exhibits of Vizagapatam sandalwood and ivory work, Kondapalle toys, Kurnool lacquer work, Madura carved furniture, and Masulipatam printed curtains and cloths to the British Industries Fair which was held in London in February 1920. Unfortunately, however, owing to the difficulty experienced in securing shipping accommodation the articles did not arrive in London in time for the exhibition.

26. *Adulteration of Castor Oil.*—With a view to check the practice of adulterating castor oil before export, Government approved of a scheme under which facilities are provided for the examination of the oil and the issue of official certificates of purity. The Chemical Examiner tests free of fee such oil as is sent to him by firms and individuals approved by the Director of Industries and grants in each case a certificate showing the standard of purity attained. The scheme, which is experimental, came into force on the 15th January 1920.

27. *Coal.*—One of the many difficulties which lie in the way of the development on a large scale of industries in Southern India is the high price and scarcity of fuel owing to the fact that nowhere south of the Hyderabad State has coal been found to exist in workable deposits. Numerous discoveries of coal have been made in the Presidency from time to time, the most promising being those made in the Gōdāvari and Kistna districts. And this is not surprising considering that the Gondwana system of rocks, from which 97 per cent of the coal supplies of India are derived, extends down the Gōdāvari valley as far as Rajahmundry. Coal was actually

found by officers of the Geological Survey in various places in these two districts. In 1917, Mr. Innes suggested that Government should examine the possibility of finding coal in the Gōdāvari valley. An examination of the records appeared to indicate that the Beddadanole area offered the greatest prospect of success, and this view was endorsed by the Director of the Geological Survey of India. Accordingly Mr. Walker of the Geological Survey department was deputed to proceed to the Beddadanole coal field in order to fix suitable sites for boring. Mr. Walker visited the field in November, and his report on the selection of sites for the proposed borings was received towards the end of the year. In view of the impetus which the discovery of coal in paying quantities within reasonable distance of Madras would give to industrial development in this Presidency, endeavours are being made to induce private companies to put down borings at the sites selected by Mr. Walker and to interest firms and syndicates in the exploitation and development of the field.

28. *Salem Iron Ores.*—In April 1918 the Director of the Geological Survey of India deputed Dr. Murray Stuart to investigate the possibility of the electric smelting of the well-known Kanjamalai iron ores in the Salem district as a commercial proposition. Dr. Stuart's report was received during the year. The general sense of the report was that the ore is of rather low grade, and in view of the general inferiority of the ore and of the unfavourable nature of the other conditions, the Director of the Geological Survey of India did not consider it necessary or desirable to send a consignment to England for experimental treatment. Mr. E. Gaudart of Pondicherry, however, considers that a market for the magnetic iron ores of the Salem district can be found in Europe, and he was assisted to obtain from Government the grant of a mining lease and prospecting licence for thirty years for iron ores in the Kanjamalai reserve forest in the Salem district. Mr. Gaudart hopes to commence mining operations within two years. It is proposed by Mr. Gaudart to export the iron ore produce in the Salem district in the form of briquettes.

29. *Gums and Resins.*—A collection of samples of aromatic gums and oleo resins, available in commercial quantities in Madras forests, was made through the medium of the Forest Department for a large London firm of manufacturing chemists who were also supplied with full information as to sources of supply and quantities available. This firm have promised to consider the question of establishing a factory in Southern India for the manufacture of drugs and essential oils.

30. *Cement.*—The question of a possible cement industry at Bezwada has been under investigation for the last three years, and a report on the result of the enquiries undertaken by Mr. Green was submitted to Government in September. The report on the subject has been brought to the notice of various financial and industrial syndicates, and the endeavours made to interest capitalists in the project will result, it is hoped, at no distant date, in the establishment of this important industry. There is a general consensus of opinion among experts to the effect that it would not be a commercial proposition to arrange for an annual production of less than from 25,000 to 30,000 tons and the capital required for the establishment of a cement factory of this magnitude would be from 20 to 30 lakhs of rupees. The imports of cement into Madras in 1911–12 were about 13,000 tons and the average imports for the four years ending 1915–16 rose to 22,000 tons. It seems probable therefore that, had it not been for the intervention of the war, the consumption of cement in this presidency would, by this time, have exceeded the required figure of 30,000 tons, and the demand is likely to increase year by year. A considerable quantity of cement is likely to be required in connexion with the Vizagapatam harbour development scheme, and, if the factory could be started at Bezwada in time to admit of its cement being used in the construction of the harbour, a market for the whole outturn of the factory would probably be found in Southern India.

31. *Cuddapah Stone Industry.*—The subject of the development of the Cuddapah stone industry received attention during the year. There is already a considerable quarrying industry in this district, but its development has, up to the present, been restricted by the high railway freight rates in force. In spite of high railway freights, the scarcity of wagons and the restriction of building construction, the total export of stone from Yerraguntla in 1918 amounted to over 20,000 tons and the question arose whether it would be practicable to develop the industry on a considerable scale by the introduction of quarrying, sawing and polishing machinery. An investigation of the markets for the stone appeared to indicate that little expansion could be expected unless railway freight rates could be reduced to $\frac{1}{10}$ pie per maund per mile, which is the minimum rate fixed by the Railway Board for the transport of stone. If the cost of transport could be reduced to this figure it was thought that within two years a market could be found for 75,000 to 100,000 tons of stone per annum. There is a large demand for this class of stone in Bombay and Calcutta, while the Madras Presidency alone would probably absorb over 50,000 tons annually. The Madras and Southern Mahratta, the South Indian, Great Indian Peninsular and the Bengal-Nagpur Railway authorities were addressed on the

subject. None of the authorities mentioned were however prepared to consider any reduction in the present rate for the transport of Cuddapah stone. Enquiries are being made of English and American manufacturers in regard to the supply of labour-saving quarrying, sawing and polishing machinery, but in view of the fact that the railway authorities are not prepared to consider the introduction of concessional rates for the transport of this material there seems little prospect of any large development of the industry.

32. *Paper.*—With a view to determining whether the jammu grass (Typha angustata), which grows in the Kollair lake in the Kistna district, had any value as a paper making material, samples were collected and forwarded to the Government Agricultural Chemist and to a large firm of paper manufacturers at Home for test. It was apparent from the report of the Agricultural Chemist that the grass was unsuitable for this purpose as the percentage of cellulose is low compared with that usually found in materials used for the manufacture of paper, ranging as it does from 27·35 to 33·47 per cent, whereas the cellulose content of esparto grass is about 48·25 per cent. Also the fibre appears to be short and weak and the grass tends to become more brittle as it dries which is all against its use as a material for the manufacture of paper.

33. *Phosphatic Nodules.*—The subject of the exploitation and development of the deposits of phosphatic nodules in the Trichinopoly district, which are a valuable source of phosphatic manures, with a view to the supply of this manure at cheap rates to the ryots of the Tanjore delta received attention during the year.

Mechanical Engineering Branch.

34. *Objects and organisation.*—The work of this branch of the department may be classified as follows : —

(*a*) Maintenance of power installations and industrial machinery already at work.

(*b*) Investigation of new engineering projects.

(*c*) Erection of new installations.

(*d*) Collection of data regarding the performance of engines and industrial machinery under working conditions.

(*e*) Examination and testing of industrial machinery to determine whether it is suitable or not for the purposes intended.

35. This branch was under the direct charge of Mr. Green throughout the year and for executive purposes the presidency was divided into four circles each under a supervisor with headquarters at Madras, Tanjore, Trichinopoly and Bezwada. Two mechanics were attached to each circle.

36. *Difficulties encountered.*—It was stated in the Administration Report of the preceding year that the continued rise in the price of machinery, the restriction of imports and the scarcity and high cost of liquid fuel, had restricted development and prevented any marked expansion in the work of this section during the year. The conditions prevailing during the period under review did not differ materially from those obtaining in the previous year with the result that there is little progress to report. At the commencement of the year under review the position of the British engineering export trade was overshadowed by labour difficulties and it was evident that the change from war-work to peace-work would take longer than had been anticipated owing to the time required to reorganize the factories and to bring the staffs together again. The result of these conditions was that although the large manufacturing firms at Home were generally well supplied with orders from India, the high cost of production and the conditions of the labour market were such as to preclude the resumption of normal trade conditions. The withdrawal of all subsidies and the control of prices and of supply of iron and steel by the Government at home involved a corresponding increase in the price of manufactured engineering products and this, in conjunction with the coal and moulders' strikes, resulted in still higher prices being demanded by Home manufacturers for the engines and industrial machinery that are in demand in India. The result of the high cost of production and of the uncertain state of labour questions at Home was such as to prevent orders from India for engines and machinery being placed as freely as the requirements warranted. Again, for similar reasons, the manufacturers were not inclined to commit themselves to forward contracts, and buyers in India consequently experienced considerable difficulty in placing orders for material and plant where prompt delivery was required. The inability to obtain machinery at a reasonable price, and for delivery within a reasonable period, undoubtedly affected in a considerable degree the development of industries in Southern India during the period under review. At the same time it is an undoubted fact that, as stated in last year's administration report, it would not be profitable to instal machinery for a comparatively small output at the present inflated cost of engineering plant and material. At the moment, as stated, the cost of engineering plant shows an upward tendency, but it remains to be seen whether the great developments that have taken place in the engineering trade since the war by the introduction of improved and specialised machinery rendering possible the adoption of rapid methods for repetition and mass production on a large scale, taken in conjunction with the rise in exchange, will have some effect in reducing prices during the current year or at any rate in preventing any further increase above the present level of prices. As far as can be seen at the moment it

seems probable that the Indian requirements for engines and industrial machinery will in the coming year be met fully and promptly, and a considerable expansion in the volume of erection work is anticipated during the ensuing year. One good effect of the continued rise in the price of machinery, and difficulty experienced in securing delivery of plant, has been definitely to check the tendency to multiply the installation of some mills and factories beyond the limits set by such economic factors as the supply of raw material and the market for the finished product—a tendency which had been evident for several years and to which reference was made in the administration reports of the two preceding years. In consequence of the shortage and high cost of liquid fuel, which advanced still further in price during the year, and the partial failure of the last monsoon with the resultant shortage of raw material, a number of small rice mills and groundnut mills were closed for a considerable part of the year. The reduced number of mills which continued working experienced considerable difficulty in securing adequate supplies of liquid fuel.

37. *New erections.*—Four industrial plants were in course of erection at the beginning of the year, and 17 new installations were taken in hand during the year. Three of the former and eleven of the latter were completed during the period under review, leaving seven in progress at the end of the year. Of the 17 plants, the erection of which was undertaken during the year, four were new plants, the rest being second-hand plants bought by new owners. They included nine rice hullers, four ginning factories, 2 groundnut decorticators, one deep well pump and a 50 B.H.P. Robey Vertical Oil Engine for the Chrome Leather Company. The small number of new erections compared with the years preceding the war is attributable generally to the factors indicated in paragraph 36 supra and primarily to the prohibitive cost and difficulty of obtaining ready delivery of machinery. It can be stated definitely that the reduction in the number of new erections was not due to any decline in industrial enterprise as the number of inquiries received for general information and advice in regard to installation of machinery showed a considerable increase over the preceding year. General information and advice is given free of charge so far as the information is available and can be given without local inspection, and such inquiries were received in large numbers. In cases where information and advice can be given only after local inspection, such inspection is arranged for on payment of a fee of Rs. 10 for every inspection. The number of parties who paid inspection fees for preliminary investigation of their projects under this system was 58 against 37 during the previous year, an increase of over 50 per cent.

38. *Compounding system.*—Under this system, private installation owners are entitled, for a fixed fee of Rs.15 per annum, to have their installations inspected and overhauled three times a year and also at other times if special requisitions are received. The system has been growing in popularity during the last few years, but during the year under review no further progress could be made owing to the inadequacy of the staff of supervisors and mechanics. The number of factory owners who availed themselves of the advantages offered by the department for the periodical inspection of their plants fell slightly from 158 to 156. In view, however, of the fact that consequent on the failure of the monsoon and the continued difficulty experienced in obtaining supplies of liquid fuel, many mills were closed down or worked short time for several months in the year, the fact that the number of plants under periodical inspection was maintained almost at the same figure as the previous year and considerably above the average of the three preceding years, may be regarded as satisfactory. This branch of work will, it is anticipated, develop considerably when the increase of staff, which will result from the retransfer to this department of the pumping and boring establishment, becomes available.

39. *Cotton Gins.*—Reference has been made in the administration reports of the two preceding years to the desirability of introducing a system of control and licensing of cotton gins and presses, in order to reduce the damage to the lint which results from the bad condition of the small ginneries and to prevent to some extent the mixture of short and long staple cotton. In paragraphs 223 to 229 of their report, which was received during the year, the Indian Cotton Committee recommend that all ginning and pressing factories should be required to take out licences and lay down a series of conditions to which ginning factories should hereafter be required to conform before licences are granted. The Government of India have accepted the conclusions arrived at by the Committee and it is hoped that at no distant date effect may be given to the important recommendations of the Committee which taken in conjunction with their other proposals should do much to enhance the reputation of Indian cotton.

Hides and Skins.

40. *Leather expert.*—The Secretary of State sanctioned the permanent retention of the appointment of Leather Expert. Mr. A. Guthrie, M.B.E., was confirmed in the post with effect from 1st August 1919 on which he was released from military duty, but he proceeded at once to England on combined privilege and study leave for nine months. He was able to do certain work in the leather department

of the Leeds University and visited a large number of tanneries where he saw many interesting processes being carried out, and also was able to examine the latest machinery in actual use.

41. *Leather Trades Institute.*—The Leather Trades Institute, situated at Washermanpet, Madras, was opened in 1915. Its objects are—

(i) to give students a thorough grasp of the principles underlying the various tanning processes;

(ii) to show and instruct them in as many of the commoner processes and methods as they can assimilate in the period spent in the course.

On the completion of the ordinary course students who have had any experience in handling labour and in factory work should be suitable for the following positions:—

(i) in large modern tanneries, assistant departmental foreman;

(ii) in small modern tanneries, departmental foreman; and

(iii) in country tanneries they should be able to feel the way to improvements in methods or to the introduction of new methods.

In the case of students who have no experience in managing labour it may be necessary for them to take a still more subordinate post until they get this necessary experience. Any student with exceptional ability or business capacity will soon prove his value and will rise in position accordingly.

Mr. Gershom, one of the original students of the institute who finished his course in 1918 and has since been working in a tannery in Calcutta, was awarded a Government of India State techn cal scholarship of the value of £150 per annum for further study in England and is now at the Leather Sellers Technical College, London.

42. The institute is run partly as a model tannery and school, and partly as a research institute. Lectures are reduced to a minimum, the greater part of the course being devoted to practical work. The course begins in July each year and extends over three years.

The training of first year students consisted chiefly in general science, both theoretical and practical, and in practical work in the tannery and curriers' shop. Second year students were taught further general science together with some of the simpler tests and methods of analysis used in scientific control in modern tanneries and also received instruction in the principles underlying the varying processes of tanning and finishing leathers. Third year

students were instructed in the more difficult scientific tests and analysis in connexion with the trade and also in the detail of processes used for each class of leather manufactured.

43. Owing to the boom in the leather trade, many applications for admission were received. Sixteen applicants were selected for training and of these four were permitted to join the second year class, as they were found to possess sufficient scientific knowledge. The number of students was 24, of whom 12 took the first year's course, 9 the second and 3 the third. All the three third year students, on the completion of the course, obtained their leaving certificates and are understood to have obtained situations in various parts of the country.

44. The Assistant in charge of the science section, in addition to conducting the regular teaching course of practical work and lectures, carried out several experiments on preservatives for raw hides and skins, the manufacture of sulphorated oils for use in the trade, and also a number of analyses of chrome liquors and other materials used in the tannery. Quite a useful preservative was prepared, but, as certain well known preservatives, which had been unprocurable in 1918–1919, came on to the market again at a lower price than that at which it would be possible to manufacture a similar material here, further work on this problem was abandoned.

45. The lack of a suitable chemical laboratory and gas plant interfered greatly with the work in this section. Proposals to provide these were under consideration.

46. More attention was paid during the year to various chrome tannages than has usually been the case, but other classes were not neglected. A quantity of babool bark was obtained and used for tanning hides, which were afterwards dressed for various purposes. This work was of particular interest to the students from North India, where this bark is the chief tanning material.

47. Some very excellent 'chamois leather' skins were made, but certain difficulties are still to be overcome before the manufacture of this class of leather can be considered successful and further work is still to be carried out. Belting leather manufactured in the institute is now in use on most of the machines and up to the present has proved quite satisfactory.

48. A number of private orders including the curing of shikar trophies were undertaken.

49. The sum of Rs. 6,500 was realized by the sale of leather manufactured for instructional purposes and by the execution of private orders. The Government accounts show that the net expenditure on the institute during the year was Rs. 38,591–5–4.

This figure, however, takes no account of interest on capital, depreciation and the value of stocks.

50. Thanks are due to Messrs. the Chrome Leather Company, Pallavaram, the Mysore Tannery, Bangalore City, and to the owners of several 'Madras tanned leather' tanneries near Bangalore and Madras for granting the students the privilege of visiting their works and of seeing various processes in use on a commercial scale.

51. *Adulteration of leather.*—Members of the Department attended several meetings of the Hide and Skin Committee of the Madras Chamber of Commerce and of the Committee of the South Indian Hides and Skins Merchants' Association to discuss the possibility of legislating in order to prevent the export of adulterated tanned hides and skins from India. The Madras merchants and tanners were generally in favour of such legislation and promised support to a draft Bill prepared by the Director, provided that it applied to the whole of India and not only the Madras Presidency. As various interests in other parts of India objected to this legislation, no Bill was introduced.

52. *Tannage of skins.*—The prohibition of the tannage of sheep and goat skins by the Madras tanners, which had been in force during the greater part of 1917–1918 and 1918–1919 was removed early in 1919 with the result that certain tanners immediately stopped the input of hides and turned their attention to skins, but, owing to the exceedingly high price of raw skins, many continued tanning hides so long as they could dispose of them to Government under the scheme of control.

53. *Finished leather.*—It is probable that the manufacture of finished leather goods, including footwear, will develop considerably in Madras during the next few years, as many as three additional leather manufacturing firms having recently been established. It is hoped that an export trade in footwear may be developed, especially to South Africa, where there is a large market for this class of leather goods.

54. *Export duty.*—An important event during the year in connexion with the trade in hides and skins was the Act passed by the Government of India on the 12th September 1919, which imposed a tax of 15 per cent on all hides and skins exported from India, but provided for a rebate of 10 per cent on such hides and skins as are tanned within the British Empire. Before the war, as is well known, a very high percentage of East India kips were exported to Germany and the result of the efforts which are being made to encourage the conversion of these hides into leather within the Empire will be watched with interest. The rebate in favour of British imports from the duty imposed by the Government of India

on exports of East India hides should prove beneficial to the leather industry of the United Kingdom and help to maintain the demand for East Indian kips as a large quantity of boot upper leather is manufactured from this class of hides. These hides are manufactured in the United Kingdom into various classes of leather for the boot trade, such as box hide and calf, waxed and russett butts, and lining leathers. A considerable quantity is also used for travelling goods and lighter leather articles.

An important proposal has been advanced by the Boot and Shoe Manufacturers' Federation for the establishment of a factory in England for the production of chrome tanned upper leather from East India kips. The factory would, it is contemplated, have a capacity of at least 10,000 and perhaps as many as 20,000 kips weekly, and should have some effect in maintaining the demand for this class of hides.

Textile Industries.

55. *Staff.*—At the beginning of the year the staff consisted of one weaving assistant and two peripatetic weaving parties. Mr. D. M. Amalsad, the Weaving Expert, joined the appointment on the 26th August 1919. A second Weaving Assistant was appointed on 1st October 1919.

56. *Improved Machinery.*—The two peripatetic parties endeavoured to introduce improved methods and machinery amongst handloom weavers. The first party worked in Anantapur district and visited 48 places; the appliances introduced by the party included 5 frame looms, 2 pit looms, 1 tape loom, 3 warping machines, 3 twisting machines, two solid bordered slays, and two jacquard machines, 375 fly shuttle slays, 23 dobbies, 445 shuttles, 19,100 pirns, 38 steel reeds, 135 varnished healds, 16 temples, besides other accessories; the sum realised by the sale of these articles was Rs. 6,224–8–9. The second party worked in the Ganjām district and visited 15 important centres. Its work was more difficult than that of the first party and only 128 slays, 3 dobbies and 3 warping machines were introduced by it during the year. A considerable amount of spade-work was however done in this district and the time of the superintendent of the party was mainly taken up in connexion with the Government yarn depot at Ichchapuram. After allowing for the sale of appliances it has been calculated that the net cost of Party No. I was about Rs. 4,500 and the net cost of Party No. II was about Rs. 2,500.

57. *Co-operative Societies.*—In December 1919 a Weavers' Co-operative Society was started in Somandapalli, Penukonda taluk, with 33 members and a capital of Rs. 7,000. The members are taking a keen interest in its working and management. In November 1918

the Government opened a depot in connexion with the Ichchapuram Weavers' Co-operative Society as an experimental measure of relief for handloom weavers. The experiment was carried on sufficiently long to impart the necessary knowledge of the business to the members of the co-operative society, and on 31st December 1919, the depot was handed over to the society. During the nine months that the depot was run by the Government, 9,837 lb. of yarn were issued to weavers and 8,090 lb. of cloth were received from them, the balance being yarn already issued to weavers to be converted into cloth; the value of this balance was received in the shape of money through the society.

58. *Investigations.*—The Weaving Expert visited important weaving centres throughout almost the whole Presidency with a view to investigate and report on the existing condition of the hand-loom weaving in its technical aspects and on the social and economic condition of the weavers. He has submitted a report, and his proposals which include the following are under consideration:—

(1) the creation of a large number of peripatetic parties to persuade weavers to adopt improved appliances and to instruct them in their use;

(2) the organization of a power-driven central warp and weft preparation demonstration factory in Madras with a view to encourage the opening of such factories in course of time in other weaving centres;

(3) the inclusion of a power-driven silk-throwing plant and a central warping factory in the central demonstration factory at Madras;

(4) the starting of a large number of co-operative societies to undertake the preparation of warps for supply to members;

(5) the import of medium and fine yarns directly from the United Kingdom in suitable form, such yarns not being obtainable from manufacturers in India;

(6) the regular supply to co-operative societies of brass reeds and English healds in place of the bamboo reeds and country healds;

(7) the establishment of weaving sections attached to primary schools in all large weaving centres, with a view to imparting instruction in improved methods of weaving at an early stage in the education of the weavers' children;

(8) the encouragement of wool-spinning by hand.

59. One of the weaving assistants investigated the coir industry on the West Coast and the silk and sericultural industry in Kollegal and Mysore, and carried out a preliminary survey of the hand-loom weaving industry in the Cuddapah district. The other assistant

studied the hand-loom weaving industry in Kistna, Guntūr and the adjoining districts and the pile carpet industry in Ellore and Masulipatam.

60. *Advice.*—The Weaving Expert visited various private weaving concerns, power-driven mills, etc., and gave expert advice in answer to inquiries. He also assisted a private capitalist in starting a hand-loom weaving factory in Madras. He visited various jails where weaving is carried on, in order to advise on the type of machinery suitable for use in jails.

Chemical Industries.

61. *Dyeing.*—Dr. Marsden continued as Dyeing Expert throughout the year, but he was absent on combined leave from 4th August 1919 until the end of the year. His headquarters were at Madura and until his departure on leave he was fully occupied in organizing the control of alizarine dyes in Madura.

62. Towards the end of 1918 the supplies of alizarine were in excess of the demand and it was decided to remove the restrictions regarding the quantity of dye which could be sold to any individual. The lack of demand was however really due to the condition of the yarn and cloth markets. With a change in the conditions of these markets the demand for alizarine went up by leaps and bounds and in two months the stock of alizarine, which had appeared sufficient to last for six months or more, had been absorbed. The control had therefore to be resumed. It was exercised through committees appointed by Collectors. It was the function of these committees to decide who were genuine dyers and what supply each should receive out of the amount of the commodity which was available; the sub-agents of Messrs. Best & Co., who imported the dye, distributed the supply available according to the recommendations of these committees. It is believed nearly 50 per cent of the dyes used in the Presidency are used in Madura, and therefore the work of the committee at Madura was extremely important and difficult. Dyeing is carried on in Madura by large firms employing many hands as well as by weaver-dyers who dye only for their own requirements. Upon Dr. Marsden, with the assistance of the committee, fell the duty of reconciling the claims of these widely different interests and of apportioning the supplies of dyes fairly between them. An attempt was made to fix the comparative requirements of each registered dyer and to apportion to each petty dyer a fixed quantity of dye a month which would be sufficient to assure him a means of living. After supplying these minima requirements for the smaller dyers it was expected that there would be an excess for distribution among the bigger dyers according to a scale which was laid down. Unfortunately supplies from England

have been shorter than was anticipated and in some months even the minima quantities required for the smaller dyers could not be delivered. The distribution made by Dr. Marsden and the committee however appears to have been accepted as reasonable and has continued in force ever since. The department took all measures possible to procure larger supplies of dyes.

63. Some relief was given by the decision to allot to India a considerable share of the German 'reparation' dyes. None of these were however delivered during the year under report. There is every reason to hope that before many months have passed the supply of dyes will be sufficient to meet the requirements of dyers.

64. *Soap.*—The Government Soap Works at Calicut were in charge of Mr. A. K. Menon, Soap Expert and Oil Chemist. The year opened with a stock of 97½ tons of soap; 412 tons of all classes of soap were manufactured during the year, and 390 tons valued at Rs. 2,88,681 were sold, leaving a balance of about 120 tons in stock on 31st March 1920. The demand for soap was well maintained and certain qualities, especially 'Vegetol,' were sold as soon as made. About 11⅓ tons of milled toilet soaps were sold as against 6 tons 6 cwt. in the previous year. There was a good demand for insecticidal soaps made from fish-oil, for use by planters in killing insects such as coffee-bugs, mango-hoppers, etc. During the year 6 tons of saddle soap were supplied to the Police Supplies, Rangoon. Fairly large orders for textile soaps were complied with at the beginning of the year.

65. The system of selling the products of the factory through agents appointed in different areas was adopted at the beginning of the year but was subsequently given up owing to the lack of interest shown by the agents. Government have sanctioned the appointment of three travellers. Two were appointed during the year and one of these was able to bring in a considerable amount of business before the year closed.

66. The accounts of the previous year were audited by Mr. Oakley.

67. The value of soap sold was Rs. 2,75,996 and the net profit on the year's working is estimated at Rs. 6,217 after allowing for stocks in hand, depreciation, interest on capital, supervision charges and fire insurance.

68. The year started under the most unfavourable conditions from the point of view of raw materials, labour and markets for soap, etc. The prices of raw materials of local origin maintained a high level. The rise in the rate of exchange was in favour of imported products. On account of the unsteadiness of the markets, merchants were cautious about placing large orders. In spite of

these disadvantages, the sales exceeded those of the previous year. Although the profits fell, the year need not be regarded as unsuccessful from this point of view, and there is good reason to suppose that conditions may be restored to the normal and that profits would again rise, if the factory were run purely for purposes of making profit; as however this is not the ultimate aim of the factory, now that it has been proved that the manufacture of soap on a small scale is a commercially sound proposition, the use of the institute in future for the purpose of training men in soap manufacture is likely to reduce the profits.

69. The year was not marked by any special progress. The object of the soap factory is to establish soap manufacture, especially by the cold process, as a cottage industry. The work done so far establishes the fact that soap can be made profitably in this Presidency. As Sir Frederick Nicholson remarked in his report on the factory for the year 1917–18 "hereafter or rather from 1919–20, success so far as the building up of a soap-industry is concerned will be gauged not by our own cash profits but by the profits of others, by the number of men whom we can and do train and send out from our factory, and by the number of private factories which we can stimulate into successful and profitable being." The factory has hitherto been carried on in rented premises which are inadequate for the purpose. At the present time it is impracticable to accept students for training. During the year proposals were made to the Government for the construction of a new small factory or rather institute at Calicut and a somewhat larger institute at Madras, the former to deal with the manufacture of soap from west coast oils and the latter to deal more particularly with the manufacture of soap from oils which are commonly obtainable on the east coast.

70. *Tannin.*—Mr. K. C. Srinivasan, the Chemistry Assistant, made an attempt to perfect a simple and rapid method of tannin analysis. The results however were negative in character and were discontinued in favour of a more important and pressing work. Investigation as to the suitability of south Indian wattles (*acacia decurrens*) as a substitute for the bark of the avaram (*cassia auriculata*) were continued. The results obtained showed that the high range wattles are very much superior to the South African wattles and that the tannin contents increase to a maximum in the fifth year of growth. Large quantities of spent avaram bark are available in this Presidency. Investigation was made into the possible uses to which it can be put. Mr. Raitt, the Cellulose Expert, reported on the samples sent to him that they were unsuitable for the manufacture of paper or card board. Experiments on the recovery of tannin led to the recognition of the fact that any such

attempt resulted in the extraction of a high percentage of injurious colouring matter. Further experiments were postponed pending the erection of a small extraction plant.

71. Several samples of half-tanned leather were examined at the request of the leather expert with a view to determine the degree of tannage obtained in the tanneries of South India. It was found that there was a decided tendency towards increased heaviness of tannage.

72. *Glue.*—Research on glue was continued by Mr. Srinivasan who published certain results in a bulletin. The principal investigations which he carried out were as follows :—

(*a*) bio-chemical investigations with respect to the destructive action of liquefying bacteria and the degree of sterility of different media towards these, with connected work on the comparative values of disinfectants ;

(*b*) investigations regarding the relationship between gelatine and glue as indicated by the Lipourit and other methods of glue testing ;

(*c*) investigation of the tensile strengths of various glues involving an examination of the different Air Board Specifications for such tests ;

(*d*) utilization of chrome leather waste ;

(*e*) manurial value of glue refuse ;

(*f*) different types of evaporators and their influence on the qualities of glue produced ;

(*g*) manufacture of roller composition.

73. In the latter part of the year the construction of an experimental glue factory was begun and arrangements were under discussion with Messrs. Beardsell & Co. to run the factory as an experiment.

74. *Miscellaneous.*—Among other investigations made by Mr. Srinivasan are the following :—

(1) suitability of Cannanore and Quilandi waters for dyeing purposes ;

(2) bio-chemical investigation of works water effluents from the Nagpur cotton mills ;

(3) chemical and bio-chemical examination of the Ernakulam water-supply ;

(4) analysis of samples of wattle bark from the Nilgiris ;

(5) the use of the cæsalpinia sappan as a substitute for logwood in dyeing leather ;

(6) manufacture of pectin from the gum cochlosevum gossypium ;

(7) analyses of some samples of sirkar soaps and of their imitations.

75. Many inquiries were dealt with including the manufacture of writing inks and ink-tablets, methods of filtering and refining fish oils and of deodorizing coconut oil, the refining of camphor, the indigenous manufacture of synthetic indigo and of alizarine from imported anthraquinone, manufacture of tannin extracts, the prospects of cement manufacture, suitability of local supplies of graphite for industrial purposes, manufacture of chalk crayons, suitability of clays for ceramic industries, etc.

76. Information was collected on the following subjects with a view to experimental work in the near future :—

(1) the manufacture of starch from the cassava root ;
(2) phosphatic nodules as a potential source of manure ;
(3) the refining of solar salt ;
(4) South Indian gums and resins ;
(5) South Indian tanstuffs.

77. *Minor industries laboratory.*—This laboratory was opened by Sir Frederick Nicholson at Coonoor. It was originally intended to use a room in the Pasteur Institute for this purpose, but this proposal was found impracticable and the laboratory was therefore established in a rented house. The subjects proposed for investigation were inks, adhesives, and vinegar, with, if possible, side experiments. Inks have mainly been dealt with ; adhesives have been only slightly tackled and vinegar not at all for want of time, materials and plant.

78. *Ink.*—In connexion with inks the objects aimed at were as follows :—

(*a*) the preparation of inks and writing fluids of such quality as to compare with and surpass various imported inks ;

(*b*) to do so at a cost which should enable successful competition ;

(*c*) to use indigenous materials.

79. Any one can make ink, but few can make good ink. The characteristics of good ink are permanency, penetrative power, i.e., the ability to sink into the paper and freedom from smudging ; good initial and final colour ; permanent fluidity and ready flow with freedom from clogging ; minimum acidity ; reasonable cheapness. To obtain all these characteristics in any one ink is a matter of much difficulty and the chemist was faced with numerous problems in attempting work, especially on new materials and without the traditions and practical experience of an established factory.

80. For all 'record' purposes absolute permanency is necessary, and an important recent reference from the Inspector-General of Registration shows that, at all events during the war, inks have

been in use which were far from permanent, so that many documentary registers may have to be recopied. Many cheap inks are, of course, quite fugitive and only suitable for temporary work such as ephemeral correspondence, school exercises, etc. Again, there are excellent and lustrous inks which, from faulty preparation, remain on the surface and not only smudge but can be wiped clear away with a damp cloth since they have never penetrated the paper; this is a fatal fault especially for business and record purposes. Moreover, especially in India, inks of excellent permanence colour, and even penetrative power, clog heavily in the inkstand and are specially unfit for fountain pens. Other inks are thoroughly fluid, but, being acid, corrode ordinary pens, or are so expensive as not to be generally popular. Some inks finally become black, but are so pale or unacceptably coloured at the moment of writing that an expensive provisional colour is necessary.

81. These are but some of the problems which were at once met with in beginning work, and it has required hundreds of experiments and constant study to attain fair success. Sir Frederick Nicholson considers however that, including discoveries made up to the 30th April, he is now able to make a variety of excellent high quality inks, and these will be manufactured on a considerable scale and placed before the public for ample trial as to suitability and cost during the current year.

82. The inks dealt with black only were—

(1) ordinary tannate and gallate,
(2) logwood tannate and gallate,
(3) alizarine,
(4) chrome logwood.

Each class has its own advantages, whether of accessibility of material, ease in preparation, cheapness, colour, suitability for the plains, permanency, fluidity, etc. The inks to be finally selected, whether for record or temporary purposes, will have to be determined largely by the public during the current year.

83. Coloured inks have not been seriously dealt with, since materials are not available. The carmine colour of the common prickly-pear (*opuntia*) has been examined but without satisfactory result at present. To some extent the colour has been fixed, but the tint is not satisfactory. Further experiments will be made. 'Sappan' wood is more promising and is also being further examined. 'Red Sanders' has not hitherto been found of any use, but on the advice of a skilled chemist further experiments will be made.

84. The cost for commercial quantities cannot at present be stated; comparative costs on small quantities have been calculated with very encouraging results, notwithstanding the fancy prices charged for small parcels and retail purchases of materials. Inks of a high quality similar to certain well-known English inks can certainly be made and sold at prices which will halve those now charged retail in the markets, and cheap inks will compete readily with similar inks in the bazaar.

85. Experiments have been made with every available local material from myrabolans to mangrove bark, mango-stones, and wattle, and very promising results have been obtained in unexpected ways. It has been sought first to utilize materials found in the country, so that results may be copied by local manufacturers. Logwood extract and certain chemicals have, however, to be obtained from abroad until substitutes can, if ever, be found. Some objections to local materials are mentioned in the next paragraph.

86. The difficulties met with were great, as was to be expected in attempting to start on a wide, scientific and accurate basis a chemical industry almost new to the Presidency. Materials and their sources were unknown except in a general way; their proper treatment, the proportions in which or the recipes on which they should respectively be used had to be ascertained; the most promising materials were rejected, at least temporarily, owing to unexpected characteristics; the mode, sources, or persons from whom they could be obtained were unknown; persons addressed paid no attention to letters or were unable to supply goods; rates asked were absurd, while the character of the material was often miserable—e.g., gum supposed to be gum arabic (largely used in ink) may be a mixture of dirt, twigs, rubbish, and other gums of little value. For a successful ink industry we need pure materials, and, where possible, the organic matter should be available in the form of extracts.

87. Plant had to be improvised or obtained, chemical apparatus was hardly obtainable and only after much delay; even wooden casks and similar goods were not in the local market. Fortunately some chemical apparatus was obtained from a gentleman who did not require it, and, after much delay, other goods and chemicals were obtained from Madras and Bombay. Even yet colouring matters can hardly be procured.

88. Containers are a standing difficulty; no jars suitable in material or price have as yet been obtainable in India, and inquiries at Home are now being made; it is highly desirable to obtain cheap glass and stoneware bottles and jars from India itself.

89. On a reference by the Inspector-General of Registration regarding the fading of inks in certain registers, experiments were made with distinct success in restoring such writing, probably permanently, without appreciable effect upon the blank portions of the papers.

90. *Adhesives.*—Experiments have been made with gum arabic (so-called), dextrin, and casein, but little systematic or continuous work has been possible owing to concentration upon inks and to initial difficulties, as well as the difficulty of obtaining materials. There are facilities in Coonoor for the manufacture of dextrin; casein is obtainable only from the Bombay Presidency and often delays in transport occur which are detrimental to so putrescible a material; moreover the quality is not all that could be wished.

91. The gross expenditure of the minor industries laboratory was Rs. 2,991-5-11; there were no receipts. The stock in hand was valued at Rs. 971-4-0 giving a net outlay of Rs. 2,020 as the cost of very valuable stock of technical and manipulative experience and knowledge which has been gained and which is not to be found in text books; this far outweighs the actual cost in cash, being as it is the basis of a sound and scientific manufacture of inks and writing fluids.

Fruit-preservation.

92. *Fruit Preserving Factory.*—In G.O. No. 1677, Revenue (Special), dated 3rd September 1919, the Government sanctioned the undertaking of experiments in connexion with the preservation of fruit. Experimental work was carried on between that date and the end of December and proposals were considered for the establishment of an experimental fruit preserving factory.

93. The object of starting this factory is the introduction of a systematized fruit-preserving industry on The Nilgiris coupled with the necessary co-development of systematized fruit-culture, not so much to supply the factory as to the supply of public needs and to benefit fruit-growers actual or future. The main objects of the experiments were—

(*a*) to ascertain what varieties of fruits are available within reach of Coonoor;

(*b*) to ascertain roughly the present quantities obtainable;

(*c*) to experiment in preserving such fruits as jams or jellies, singly or in mixtures, and the best recipes for the same; and

(*d*) to obtain a knowledge of the difficulties and obstacles.

94. Much is, of course, already known domestically and excellent preserves are annually made by housewives, but only in small quantities for private consumption; some fruits are hardly in use; few people record their recipes in exact detail, and the best domestic experience is necessarily private and scattered. It is sought to concentrate this experience, to develop it scientifically to the higher branches, to record and eventually to publish and teach all useful facts.

95. The beginning was necessarily humble in the absence of plant and local knowledge. The work was carried on in a room in Sir Frederick Nicholson's residence at Coonoor and the plant was domestic in character. Besides Miss Chaning Pearce, the Lady Manager, the staff consisted of a second-class cook and a very young chokra both entirely inexperienced in the work.

96. About 1,500 lb. of raw fruit and 1,227 lb. of sugar were used for experiments. The proportion of sugar to fruit varies according to the variety of preserve made—some have equal parts of sugar and prepared fruit, whilst others have half and less of sugar to one of fruit. American and French methods were tried with some success, where the least possible amount of sugar is used. Some 160 experiments were made with about 18 different sorts of fruits. About 1,300 lb. of jams, butters, cheeses and jellies were made and sold. This quantity could have been very largely increased, but when a good result was obtained other experiments were tried. Some 40 recipes were found successful and 36 different varieties of jams and jellies were shown at the Women's Work Exhibition in Madras in November 1919.

97. The results may be summed up as follows:—

(*a*) It was ascertained that there is a large variety of fruits available, every one of which makes excellent preserves, but that those best known at Home (apples, strawberries, gooseberries, etc.) are not available here. Those mostly used during the experiments were oranges, pears (common), tree tomato, ordinary tomato, tipari (cape gooseberry), hill guava, strawberry guava, 'bilberry' (*vaccinium leschenanetti*) rhubarb, papaya, pineapple, banana, granadilla, bilimbi (apparently *averrhoa carambola*).

(*b*) The quantities available are, as expected, very poor in general, since fruit cultivation does not exist as an industry, but only as a casual growth; much of it is wild growth, especially the excellent 'bilberry' so called. Stone pears however are generally abundant, papayas are fairly available, and oranges sufficiently so to supply all present needs for marmalade. But to supply a factory it is essential that cultivation should be encouraged, systematized and

instructed. Fortunately it is easy to grow tipari, tree tomatoes, ordinary tomatoes, rhubarb, and papayas, and these with pears and oranges will form a substantial basis for initial factory work.

(*c*) It was ascertained, inter alia, that the fruits available, when carefully worked up, form most desirable preserves either singly or in mixtures; that, as found in America, France, etc., it is often unnecessary to use so much sugar as English recipes prescribe; that there are very numerous untried recipes, of which some 40 were standardized for future use; and that with proper organization of fruit-cultivation and supply, an extensive, highly developed, and profitable industry is practically certain.

(*d*) Difficulties presented themselves especially with certain fruits, such as difficulties of jellying, difficulties in preserving the full flavour, aroma, and even colour of some fruits, difficulties from moulds and ferments, difficulties as regards containers, not merely in obtaining them but in combating the action of fruit acids on metal, and various others. These and many other matters are now to be studied as practical questions at home by the lady manager.

98. Operations being on an experimental scale were advisedly small; some material was necessarily wasted in experiment. The products however were readily sold and were appreciated, and the experiments will enable factory work to be successfully undertaken. The actual gross cost to Government was Rs. 1,577-2-3 while the receipts were Rs. 773-1-9, leaving a debit balance of Rs. 804-0-6 as the cost of the experiments. From this however should be deducted the value of a considerable amount of plant available for future use. The cost of the experiments does not include the pay (Rs. 850) of the lady manager for the period since it was paid by Sir Frederick Nicholson from the amount he received from Government on account of travelling allowance.

99. The land for the proposed factory was selected at Coonoor. It was decided that Miss Chaning Pearce should proceed to England while the factory is building for further study in the light of experience gained, for the selection of plant and for the study of developments in other branches of preserving and especially pickling.

100. A useful experiment outside the ordinary operations was successfully effected in the drying of ripe bananas. They were dried in a vacuum stove belonging to Sir Frederick Nicholson, and resulted in products which for some months have been lying open to the air without fermentation, moulding, or other injury; parcels have been sent home and very favourably reported on. These 'banana figs' form a product easy and cheap in transport and capable of various uses. The drying of each charge was effected in less than two hours.

Industrial and Technical Education.

101. *General Summary.*—The principal items of interest in the educational branch of the department may be summarized as follows:—

(*a*) Mr. W. Fyfe, who had been acting as Inspector of Industrial Schools in the Department of Industries in addition to his duties as Instructor in Manual Training for European Schools in the Department of Public Instruction, was appointed full-time Inspector of Industrial Schools in the Department of Industries from 14th June 1919.

(*b*) The management of the Government of India State Technical Scholarship scheme was transferred from the Department of Public Instruction to the Department of Industries.

(*c*) Technical scholarships for study abroad were for the first time granted from provincial funds.

(*d*) Scholarships were granted for the first time to graduates in chemistry for the study of applied chemistry in the Indian Institute of Science, Bangalore.

(*e*) More classes were opened in the Government Trades School, Madras.

(*f*) Plans were prepared for enlarging the Leather Trades Institute.

(*g*) Attempts were made to bring managers of assisted schools into closer touch with employers with a view to finding suitable employment for students on completion of their courses.

(*h*) Plans were approved for the reorganizing the assisted agricultural school at Melrosapuram, Chingleput.

(*i*) A new experiment was started in the establishment of the 'Orr Works School.'

(*j*) Attempts were made with reasonable prospects of success to bring about the reorganization of Chengalvaraya Naicker's Institute and the Madras Anjuman Industrial School.

(*k*) The long-pending question of the position of the St. Aloysius' Industrial School at Vizagapatam was finally settled and a definite scheme adopted.

(*l*) The Andhra Jatheeya Kalasala Industrial School at Masulipatam was inspected and again recognized during the latter part of the year.

(*m*) The first batch of cabinet-making teachers trained in the training section attached to St. Joseph's Industrial School at Tindivanam completed their course and returned to their schools as trained teachers of cabinet-making.

102. *Technical Scholarships.*—The Government of India State Technical Scholarship which fell vacant this year was awarded to Mr. Katragadda Seshachalam for the study of the chemistry of leather.

103. In addition to the Government of India State Technical Scholarship the Government of Madras, on the recommendation of the Selection Board, granted three scholarships of similar value from provincial funds, one to P. P. Hayrambha for the study of metallurgy and metal mining; another to K. Madhava Rao and another to R. Lakshminarayanan, both for the study of electrical engineering. This is the first time that such scholarships have been given by the Government of Madras.

104. The Government of Madras for the first time granted scholarships of the value of Rs. 50 per mensem to be held at the Indian Institute of Science, Bangalore, for the study of applied chemistry. Eight graduates were selected and granted scholarships for one year in the first instance, the majority specializing in the study of oils and fats, these subjects being considered likely to be of considerable importance in the immediate future in the industrial development of the country.

105. *Madras Trades School.*—The Government Trades School, Madras, which started in 1916 with two classes and forty students, has now 370 students on the rolls and provides instruction in mechanical engineering, electric wiring, plumbing, machine drawing and practical mathematics; and mechanical drawing is taught in the vernacular to maistris of the wood-working, metal-working and building trades.

The school suffered somewhat at the beginning of the session through changes in staff, but after the new Superintendent and lecturers settled down to work and became acquainted with the requirements of the students the school soon resumed its former businesslike air. A practical mathematics class was started this session to remedy to some extent the defects in the previous education of some of the students, but even with this help it is still found that the wide variation in the educational qualifications of the students makes the work of the lecturers sometimes much more difficult than it ought to be. The number of reasonably well-educated youths taking to industrial pursuits is slowly increasing, but there are still many who seem to imagine that any sort of education is good enough for a manual worker. In the engineering trades, employers could do much to help matters by insisting on a better educated type of apprentice. If employers in selecting young men to serve properly arranged apprenticeships would try to secure youths who have passed the high school examination in a

European school or have obtained a secondary school-leaving certificate with good marks in mathematics, it is believed that the class of apprentices would rapidly improve.

The school is still being conducted in rented buildings. Extra accommodation is required this year. With that extra accommodation the rent is Rs. 450 per mensem. Even with that extra accommodation, however, it is still impossible to install any of the large amount of equipment which is urgently required for the proper training of the advanced classes. A site has been provided for the erection of permanent buildings and plans are in course of preparation. Last year the Government of India gave the Local Government a grant of Rs. 1,00,000 for the building, but, the grant has been merged in the provincial balances and the allotment of Rs. 50,000 made this year in the sanctioned budget has also been resumed. The large numbers attending the school show that it is appreciated both by employers and employees, but I fear that little more development can be expected until the school is provided with suitable accommodation in its own building, and with a permanent staff under a highly trained principal.

Railway Works Classes.—A notable development of the Trades School last year was the establishment of the Perambur Railway Works branch. It was found wasteful of time and energy to send the railway apprentices from Perambur to Madras for training and, in consultation with the authorities of the Madras and Southern Mahratta Railway, arrangements were made whereby the railway authorities built and equipped a small school in the compound of the works. About 100 boys employed in the works received four hours' training per week during working hours in machine-drawing and mechanics, the Madras Trades School supplying the teachers and supervision and the Railway Company bearing the cost. The scheme is working very well and I hope to see it extended later to include a much larger number of railway employees.

The net cost to Government of conducting the Madras Trades School with its Perambur branch during the year under review was Rs. 18,011-11-4, the average cost per student attending it being about Rs. 48-8-0 for the year.

106. *Madura.*—The Madura Technical Institute has to a great extent been marking time during the year under review. The new buildings have not yet all been handed over and it has not been found possible to proceed with new developments. In May, Mr. Davies, the then Director, visited Madura and demobilized most of the students and submitted a report to Government making certain suggestions with regard to the future of the Institute. Mr. Davies'

proposals were published in a press communiqué and the opinions of Collectors invited. Their replies were published in a further press communiqué.

Doctor Marsden was in charge of the Institute during the year until he proceeded on leave on 4th August. Mr. Dunhill was in charge of the mechanical workshops until 4th May when he fell ill and had to take leave. He was recalled from leave to take stock and close the building accounts on 6th July and was again on leave from 6th September till 3rd November.

107. *Aided Industrial Schools.*—The number of Industrial schools aided by the Government during the year was 34. The subjects taught in them included, in boys' schools: carpentry, cabinet-making, fitting, turning, moulding, blacksmithy and weaving with about 4 to 6 hours weekly devoted to drawing and theory; and in girls' schools: lace-work, embroidery, weaving, and mat and basket-making.

The number of pupils under training in these schools was 1,519. The Government grants during the year amounted to Rs. 52,019 in all, the average grant being Rs. 34 per pupil per annum.

108. *Assisted schools in Madras.*—The Chengalvaraya Naicker's Institute and the Madras Anjuman Industrial Schools both enjoy comparatively large Government grants-in-aid and the question of making these two institutions more efficient and up-to-date was taken up during the year. The trustees of the former institution agreed to entertain a highly trained superintendent and to carry out certain minor changes in the organization if the Government would give a larger grant. The managers of the Anjuman have now secured the services of a new superintendent and are giving him a reasonably free hand to carry out his ideas for improvement. I hope to be able next year to record a considerable improvement in the working of both institutions.

Orr Works school.—The Orr Works school represents an attempt by Messrs. P. Orr & Sons, jewellers and scientific instrument makers, Madras, with the assistance of the Government, to provide for the education of the young boys employed in their works. A number of promising boys have been selected and classes were opened on 1st April 1920 for them in practical work in the workshops, and in reading, writing and arithmetic in Tamil in the class-room with a view to turning them out better workmen in a shorter time than men trained under the old conditions. The school has been started as an experiment, the Government assisting with advice and a grant-in-aid calculated to cover not more than half the cost. The initial non-recurring cost is estimated to amount to Rs. 840 for furniture and appliances, etc., and the recurring annual cost of salaries and

contingencies to Rs. 5,515. Should the scheme prove successful, it is hoped that other firms will establish extension classes for their apprentices and boy-workers on similar lines. A properly arranged apprenticeship in a commercial workshop supplemented by class instruction for four to eight hours a week (preferably during working hours) will, it is believed, go far to turn out capable artisans of the type required all over the Presidency. The officers of the department will therefore be willing at all times to assist any employers who contemplate the formation of such classes. At the present day there is a regrettable tendency for apprentices and juvenile workers to move from one firm to another in search of a few annas' increase in wages, with the result that they do not stay long enough in one job to master it thoroughly and in the end are only half-trained, low-paid workmen; this tendency sometimes leads the employer in disgust to let things drift; but it is believed that classes on the lines indicated, supplemented if possible by bonuses to those boys who complete a regular four to five years' course would go a long way to check that wastage and to improve the general value of the Madras workmen.

Vizagapatam.—The question of St. Aloysius' Industrial school has been unsettled for a considerable time but in G.O. No. 2134 of 18th November 1919, the Government finally agreed to hand over to the school authorities two small pieces of land free of charge for right of occupancy and free of assessment subject to the following conditions:—

(*a*) that six apprentices be taken per annum;

(*b*) that the period of training be four years;

(*c*) that the candidates for admission should know sufficient mathematics to profit by the course;

(*d*) that at least three hours a week be spent in mechanical drawing.

The school is managed by a Roman Catholic Mission, but the apprentices are of all classes. At present there are 12 apprentices in training. Of these two are Muhammadans, three are Hindus (non-Brahmans), two are Christians (Protestants), and five others are Christians (Roman Catholics). Many boys admitted do not stand the strain and leave after a short time. Brother Emile, the Superintendent, is a particularly energetic worker himself and he expects his apprentices to share his enthusiasm and to work hard with him or make room for more suitable candidates. The school is a day school and the apprentices live out; this tends to restrict recruitment to a limited area as the lad from a distance must be possessed of some private means to support himself until his ability as a workman justifies the school authorities in making him an allowance.

Masulipatam.—The Andhra Jatheeya Kalasala Industrial School at Masulipatam which provides a training in general mechanical work, was inspected during the year, again recognized and given a grant-in-aid. This school has opened a new class to try to revive the manufacture of the old style of valuable carpets for which the district was at one time famous, but which has recently, and very unfortunately, under the influence of demands for the supply of foreign markets, given place to the production of a much cheaper and inferior article.

Tindivanam.—In January 1920, the first batch of six trained cabinet-making teachers completed their course in the training section attached to the St. Joseph's Industrial School at Tindivanam; there is already evidence that their training is bearing good fruit in the other schools of the Presidency. If schools of cabinet-making are to justify the payment of grants-in-aid by the Government they must turn out better trained workmen than the men trained in the bazaar, but to do so it is absolutely necessary to get rid of the type of teacher who is merely a bazaar trained maistri with all his inherited methods of wastefulness and inefficiency and replace him by men trained in modern methods and the use of modern tools. At Tindivanam we have an ideal training section for training such men. The Superintendent, Brother John Baptiste, is an excellent workman himself and is also an extraordinarily successful teacher—two qualifications which do not always go together. He has entirely eliminated the type of bazaar maistri teacher from the school and the few Indian teachers employed have been trained from boyhood under his personal supervision.

Munitions.

109. Mr. R. W. Davies, I.C.S., was Controller of Munitions till the 30th of September when Mr. Green was appointed to succeed him in addition to his duties as Deputy Controller of Munitions (Manufacture). Mr. A. Y. G. Campbell, I.C.S., became Controller of Munitions on the 12th of December.

110. At the commencement of the year under review there were four offices of the Board of Munitions in existence at Madras, namely, the offices of the Controller of Munitions, Deputy Controller of Munitions (Manufacture), Controller of Tan-stuffs and Deputy Controller of Hides. The two latter offices were abolished in July and the outstanding work connected therewith transferred to the Controller of Munitions. In the early months of the year endeavours were made to close up the large number of outstanding contracts, and to liquidate the commitments of the Board in Southern India, as expeditiously as possible. The outbreak of hostilities on the North-West Frontier however retarded the closing of outstanding contracts

to a considerable degree, and caused further demands to be placed on the officers of the Board for the purchase and manufacture of stores. A number of indents were also received from civil departments of Government.

111. In the office of the Controller of Munitions 61 indents were received during the year for the supply of miscellaneous stores. The majority of these indents were supplied from the surplus stocks of hardware and engineering stores held in the Board's depot at Madras. Amongst the articles supplied in connexion with the North-Western Frontier operations, other than issues from depot stocks, may be mentioned malthoid and rubberoid roofing material and palmyra matting for huts, saturated asphalt, coir string and yarn, coir matting, tiles, beeswax, fish oil, motor lorry chassis, steam road rollers, chrome sandals, leather belts and leather gloves.

112. An urgent indent for 700 tons of coir mattress fibre was received in July 1919 and as the demand could not be met from South India owing to scarcity of the fibre, Mr. Green was sent to Colombo and arranged for the purchase of the balance on very advantageous terms; a consignment of 200 tons of this material was shipped from Colombo to Madras within three days of his arrival at Colombo.

113. The manufacture of tents for the Board by Messrs. Chettle Holt & Co., continued throughout the year and about 850 finished tents were supplied.

114. The Munitions (Manufacture) Branch was originally formed with the primary object of more fully utilizing the workshop resources of India, more especially for the manufacture of ordnance stores. As other branches of the Board were demobilised after the armistice, however, this branch gradually became responsible for the execution of demands for all classes of manufactured stores other than certain classes of textiles. Indents were placed in the manufacture branch during the year to the value of approximately 7 lakhs of rupees. Amongst the articles supplied against new orders issued during the year may be mentioned cleaners for guns, curry combs, eye fringes, axes helves, electric fans, ammunition carriers for Lewis guns, pump leathers, leather gloves for motor cyclists, leather waistcoats, mess-tins, spares for oil engines and a considerable range of leather equipment and accoutrements. A considerable number of railway-carriage and wagon parts, including axle-guards and stretchers, drawbars and drawbar plates, screw couplings with shackles and pins, and buffer yokes, are at present under manufacture for the South Indian and Madras and Southern Mahratta Railway Companies.

115. It was by no means the least important function of this branch to furnish assistance to firms with a view to the development of their resources and to place civil departments of Government in touch with sources of supply.

116. *Hides.*—Captain Guthrie handed over charge of the office of the Deputy Controller of Hides to the Controller of Munitions on the 1st August. The export of hides continued to be under the control of the War Office until July, and the last shipment of hides to London was made in October 1919. The total number of bales of hides shipped from March to October amounted to 38,467, the value of the purchases exceeding $2\frac{3}{4}$ crores of rupees. The Home Government have still substantial quantities of East India tanned kips to dispose of, and the export of hides on private account since the withdrawal of control by Government has been of small proportions.

117. *Tanning stuffs.*—The control over tanning stuffs was relinquished by the Board as from the 15th June 1919 and the considerable stocks of *anogeissus latifolia* bark at Madras and Ranipet were handed over to the Controller of Munitions. The stocks of *anogeissus latifolia* were collected in anticipation of a shortage of avaram and konam barks, and early in 1919, when there was a scarcity of these two barks, a quantity of *anogeissus latifolia* was distributed. The use of *anogeissus latifolia* never became popular, however, as it is difficult to use as a tanning agent in comparison with avaram, and, as there was no shortage of avaram at the beginning of the present year, it was found impossible to dispose of the stocks, that had been collected, except as waste.

Finance.

118. The usual financial statements are appended. The total expenditure on the department was Rs. 6,30,285; the total receipts were Rs. 3,31,114. The net cost was therefore Rs. 2,99,171.

A. Y. G. Campbell,
Director of Industries.

APPENDIX No. I.

Staff of the Department of Industries, 1919–20.

Post.	Incumbent.	Period held.	Remarks.
		Headquarters.	
Director of Industries.	Mr. R. W. Davies, I.C.S.	1st April 1919 to 30th September 1919.	Toured for 81 days. Visited Bombay in connexion with vegetable oil industry, Nellore, in connexion with mica mining and Bangalore in connexion with Indian Institute of Science.
Do.	Mr. L. B. Green, M.B.E.	1st October 1919 to 21st November 1919.	Toured for 45 days. Visited Cochin, Aleppy, Quilon, Madura, Colombo, Bangalore, Bezwada, Calicut, Dowlaishwaram, Trichinopoly and Waltair.
Do.	The Hon'ble Mr. A. Y. G. Campbell, I.C.S.	22nd November 1919 to 31st March 1920.	Toured for 45 days. Visited Calcutta (Commercial Museum), Madura, Coimbatore, Coonoor, Cochin, Calicut, Bangalore, Katpadi, Chittoor and Vellore.
Assistant Director of Industries.	Mr. L. B. Green, M.B.E.	1st April 1919 to 31st March 1920.	Was acting as Director of Industries from 1st October 1919 to 21st November 1919.
Manager	M.R.Ry. R. Varadachari, B.A.	2nd March 1920 to 31st March 1920.	
		District staff.	
Assistant Director of Industries, Madras Circle.	Mr. P. W. Atherton.	3rd March 1920 to 31st March 1920.	In charge of Madras, Chingleput, Nellore, Chittoor, North Arcot and South Arcot districts.
Supervisor	M.R.Ry. C. Sundararama Ayyar.	1st April 1919 to 31st March 1920.	Under the Assistant Director, Madras Circle, with headquarters, Madras.
Do.	M.R.Ry. D. V. Sundaram Dikshitar.	1st April 1919 to 31st March 1920.	In charge of Tanjore and South Arcot districts, with headquarters at Tanjore.
Do.	M.R.Ry. V. R. Venkatarama Ayyar.	1st April 1919 to 31st March 1920.	In charge of Trichinopoly, Madura, Tinnevelly, Ramnad, Salem and Coimbatore districts with headquarters at Trichinopoly.
Do.	M.R.Ry. A. Viswanatha Ayyar.	1st April 1919 to 31st March 1920.	In charge of Vizagapatam, Godavari, Kistna, Guntur, Bellary, Kurnool, Anantapur and Cuddapah districts with headquarters at Bezwada.
Sub-Engineer ..	M.R.Ry. Rao Sahib C. S. Ramachandra Ayyar.	1st November 1919 to 31st March 1920.	Services were lent to the Madras Pencil Factory for a period of one year and five months from 1st November 1918.

Staff of the Department of Industries, 1919-20—*cont.*

Post.	Incumbent.	Period held.	Remarks.
		Education.	
Inspector of Industrial Schools.	Mr. W. Fyfe ..	1st April 1919 to 31st March 1920.	Privilege leave for one month from 1st to 30th September. Toured for 121 days.
Superintendent, M.E. Section of the Madura Technical Institute.	Mr. H. E. R. Dunhill.	1st April 1919 to 31st March 1920.	Privilege leave from 5th May to 5th July 1919 and from 7th September to 3rd November 1919.
Superintendent, Government Trades School.	Mr. G. Verghese ..	1st April to 15th August 1919.	Appointed as Inspector of Factories, Trichinopoly.
Do.	Mr. H. M. Winkler..	16th August 1919 to 31st March 1920.	
Assistant Lecturer, Government Trades School.	M.R.Ry. M. V. Jagannatha Ayyangar.	10th July 1919 to 31st March 1920.	
Do.	M.R.Ry. P. N. Natesa Nayakar	1st April 1919 to 31st March 1920.	
		Chemists.	
Dyeing Expert ..	Dr. F. Marsden ..	1st April to 4th August 1919.	On combined leave from 5th August 1919.
Oil Chemist and Soap Expert.	M.R.Ry. A. Kesava Menon.	1st April 1919 to 31st March 1920.	
Chemistry Assistant to the Director of Industries.	M.R.Ry. Kalyan C. Srinivasan.	1st April 1919 to 31st March 1920.	
Chemical Assistant, Coonoor Industrial Laboratory.	M.R.Ry. S. Venkat. raman.	18th September 1919 to 31st March 1920.	
Assistant Oil Chemist and Soap Expert.	M.R.Ry. P. S. Srinivasan.	1st April 1919 to 31st March 1920.	
Do.	M.R.Ry. P. Kanna Kurup.	15th April 1919 to 31st March 1920.	
Do.	M.R.Ry. T. Krishna Kurup.	28th October 1919 to 31st March 1920.	
		Leather Branch.	
Leather Expert ..	Captain A Guthrie, M.B.E.	....	Till the end of July 1919, he was Deputy Controller of Hides, and from 1st August 1919 on combined leave for ten months and fifteen days.
Assistant Leather Expert.	M.R.Ry. P. K. Rajamanikkam Nayudu.	1st April 1919 to 31st March 1920.	
Assistant in the Leather Trades Institute.	M.R.Ry. K. Seshachallam.	9th July 1919 to 31st March 1920.	

Staff of the Department of Industries, 1919-20—*cont.*

Post.	Incumbent.	Period held.	Remarks.
		Weaving Branch.	
Weaving Expert ..	Mr. D. M. Amalsad.	26th August 1919 to 31st March 1920.	Toured for 94 days and visited important weaving centres.
Weaving Assistant ..	M.R.Ry. N. M. Sundaram.	1st April 1919 to 31st March 1920.	
Do. ..	M.R.Ry. V. Hanumantha Rao ..	1st October 1919 to 31st March 1920.	
Supervisor in charge of Peripatetic Weaving Party No. I.	M.R.Ry. K. Swami ..	1st April 1919 to 31st March 1920.	
Superintendent, Peripatetic Weaving No. II.	M.R.Ry. S. Swaminathan.	1st April 1919 to 31st March 1920.	

APPENDIX No. II.

Statement of Receipts and Charges of the Department of Industries for the year 1919-20.

Receipts.	Amount.	Charges.	Amount.
	Rs. A. P.		Rs. A. P.
1. Weaving Branch including yarn supply scheme.	26,910 5 0	1. Director of Industries ..	63,664 15 7
		Refunds	843 0 0
2. Industrial Schools including Madras Trades school, Leather Trades Institute and Madura Technical Institute.	7,345 10 9	2. Madras Technical Institute (Leather Trades School and Madras Trades School).	62,290 15 3
		3. District Industrial staff.	29,295 1 9
3. Other receipts including district industrial staff, army blankets, pencils, glass and jam and pickle factory.	44,999 10 2	4. Weaving Branch ..	25,679 8 0
		5. Madura Technical Institute.	38,010 15 0
		6. Dyeing Branch ..	8,617 11 0
		7. Miscellaneous experiments.	24,073 1 5
4. Kerala Soap Institute ..	2,51,858 3 0	8. Grants-in-aid	52,019 3 3
		9. Scholarships	13,375 4 5
		10. Kerala Soap Institute ..	3,12,215 9 9
Total receipts ..	3,31,113 12 11	Total charges ..	6,30,285 5 5
Net cost of the department..	2,99,171 8 6		..
Grand total ..	6,30,285 5 5	Grand total ..	6,30,285 5 5

Endorsement by the Accountant-General, No. Tri. P.A. 4-2757, dated 5th November 1920.

Forwarded.

The receipts and charges recorded in this office books for the year 1919-20 (Final) under the various head mentioned in Appendix II of the report are furnished below :—

Receipts.

	Amount. Rs.	A.	P.
1. Weaving branch including yarn supply scheme	26,910	5	0
2. Industrial Schools, including Madras Trades Schools, Leather Trades Institute and Madura Technical Institute	8,060	7	0
3. Other receipts including District Industrial Staff, etc.	44,999	10	2
4. Oil and Soap institute	2,51,839	4	0
Total receipts ..	3,31,809	10	2

Charges.

	Amount. Rs.	A.	P.
1. Director of Industries	64,727	11	0
Do. Refunds	843	0	0
2. Madras Technical Institute (Leather Trades School and Trades School)	67,475	6	3
3. District Industrial Staff	29,295	1	9
4. Weaving Branch	25,721	14	0
5. Madura Technical Institute	38,224	6	0
6. Dyeing Branch	8,817	11	0
7. Miscellaneous experiments	24,111	5	9
8. Grants-in-aid	52,019	3	3
9. Scholarships	15,204	3	6
10. Oil and Soap Institute	3,11,930	14	9
Total charges ..	6,38,370	13	3

G. H. BAILEY,
Deputy Accountant General.

To the Secretary to Government, Revenue (Special) Department.

Order—No. 4, Revenue (Special), dated 3rd January 1921.

Recorded.

2. The Government agree with the Director that the most important event of the year under review was the receipt of the Secretary of State's despatch No. 86, dated the 25th September 1919, in which he accepted the policy recommended by the Industrial Commission and advocated for many years by the Government of Madras that the Government should play an active part in the industrial development of the country, and should for this purpose be provided with adequate administrative machinery and forearmed with reliable scientific and technical advice. The Director in paragraphs 5 to 12 gives a brief and interesting account of this controversial question and of the history of the department which has led up to the inauguration of this new policy. The Government are glad to note that this change in policy has resulted in a great awakening of interest in the industrial development of the Madras Presidency as evidenced by the number of new trading, industrial or banking companies that were floated or were in the course of formation during the year and by the increase in the number of inquiries from the public for assistance from the department.

To cope with the expansion of work in various directions the Government have since the close of the year sanctioned temporarily for a period of two years the employment of an Industrial Engineer and five additional Assistant Directors and trust that the appointment of these officers will, in the course of the current year, result in an appreciable progress in industrial development.

3. *Commercial Museum—paragraph* 23.—The question where the Commercial Museum should be located is still under the consideration of Government. There is much difficulty in finding a suitable building or selecting a site sufficiently central and obtainable at reasonable cost.

4. *Adulteration of oils.*—The scheme of the issue of official certificates of purity of oil for export referred to in paragraph 26 of the Director's report has, since the close of the year, been extended to cocoanut oil. The Director is required to notice the working of the scheme in his next administration report.

5. *Mineral deposits.*—In paragraphs 27-28 the Director refers to coal and iron deposits in this Presidency the development of which should be one of the great factors in promoting industrial development. These questions are still in the early stages of inquiry.

6. *Pioneer work.*—In paragraphs 30-33 the Director describes certain pioneer work done on cement, Cuddapah stone, paper and

phosphatic nodules. Inquiries about paper manufacture did not result in discovering any new raw material in this Presidency suitable for the purpose. Inquiries on the other three subjects mentioned in these paragraphs indicate a more hopeful outlook. The Director is requested to submit a separate report to Government on the question of reduction of railway freight for the transport of Cuddapah slabs referred to in paragraph 31 of the report.

7. *Mechanical Engineering.*—The Director discusses in paragraphs 34–39 the work done by the Mechanical Engineering branch which is likely in future to occupy a large part of the Industries Department. On this point the year was one rather of inquiry than of visible progress. In paragraph 36 the Director describes the trade difficulties which rendered import of machinery almost impossible. It is believed that these difficulties are still being encountered to a great extent.

As recommended by the Indian Industrial Commission in paragraph 307 of their report the Pumping and Boring Department has been retransferred from the Department of Agriculture to the Department of Industries.

8. *The Leather Institute* continued to do valuable work during the year. The boom in the leather trade alluded to in paragraph 43 has since been succeeded by an interval of serious depression which, it is hoped, will prove temporary.

9. *Textile Industries.*—The investigations alluded to in paragraph 58 have since borne fruit in the appointment of a number of peripatetic weaving parties employed for demonstrating to the weavers the advantages of improved methods and appliances. It is hoped that it will be possible when the next administration report is submitted to indicate how far these weaving parties have justified their existence by the popularisation of these methods.

10. *Soap.*—The Government agree with the Director that the question of profit derived from the Kerala Soap Institute is a minor consideration, and that its success should be gauged by the number of men that can be trained and sent out, and by the number of private factories stimulated into successful existence. They observe that so long as the factory is located in the present rented premises, it is impracticable to accept students for training. The question of constructing a small factory at Calicut and a large one at Madras is still under consideration, and Government hope to be able to issue early orders in the matter.

The Government would be glad of information as to the number of private soap factories that have been established so far as a result

of the success attained by the Kerala Soap Institute. The Director is requested to include these points in his next administration report.

Research on glue was continued during the year, and the construction of an experimental glue factory was begin.

11. *Fruit and minor industrial experiments at Coonoor.*—During the year under review the Government sanctioned the establishment of a minor industrial laboratory and a fruit preserving factory at Coonoor both at the initiative and under the direct control of Sir Frederick Nicholson. The former commenced work during the year. The Government observe that as a result of the numerous experiments made in the laboratory, Sir Frederick Nicholson is now able to make a variety of excellent and high quality inks and that these will be manufactured on a considerable scale and placed before the public for trial as to suitability and cost during the current year. The fruit preserving factory has not commenced regular work but Government trust that buildings will soon be ready which will admit of this.

12. *Industrial and Technical Education.*—In paragraphs 101 to 106, the Director deals with Industrial and Technical education. The Madras Trades School is rapidly expanding. A branch of this school is located in the Perambur Workshops with the co-operation of the Madras and Southern Mahratta Railway authorities. In this, the boys are trained in practical mechanics. The Government are glad to note that the Director reports favourably on the first year's working of this interesting development.

Orders for the reorganization of the Madura Technical Institute have since been passed.

The School of Arts, which was hitherto under the Director of Public Instruction, was transferred to the Department of Industries during the year.

Besides these Government institutions, 34 industrial schools under the management of private bodies at Madras and in the mufassal are being aided by the grant of substantial subsidies. Among them was the Orr Works School which was arranged by Messrs. P. Orr & Sons for the practical and literary education of their younger employees. This is the first experiment of its kind in Madras, and if it proves a success the system will be extended.

In addition to the two Government of India State Technical scholarships, four more were issued by this Government, all of them intended for study abroad. Eight scholarships for the study of applied chemistry at the Indian Institute of Science, Bangalore were also issued.

13. *Board of Industries.*—The Industrial Commission's recommendation regarding the appointment of a Board of Industries to advise the Director in matters connected with industrial development and industrial education has been accepted, and an Advisory Board, composed of the Director of Industries as Chairman and eleven non-official gentlemen as members, has recently been appointed.

14. The Director is requested to reconcile the variations between the figures furnished by him in his statement of receipts and charges and those furnished by the Accountant-General.

15. The department continued to be efficiently administered during the year. The report indicates that a great deal of useful spade work was done, and that fresh ground was broken in several new directions.

(By order of the Government, Ministry of Development.)

J. M. TURING,
Temp'y. Addl. Secretary to Government.

To the Director of Industries.
" the Home (Miscellaneous) Department.
" Sir Frederick Nicholson, K.C.I.E.
" R. W. Davies, Esq., I.C.S.
" the Board of Industries and Munitions (with C.L.)
" the Publicity Officer.

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