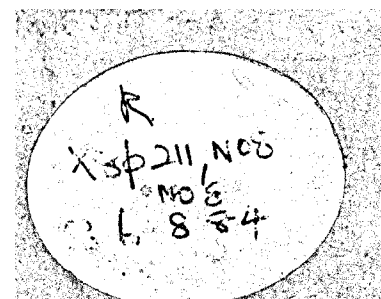


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Papers Relating to the  
Industrial Conference Held at  
DOTACAMUND in Sep. 1908





PAPERS

RELATING TO THE

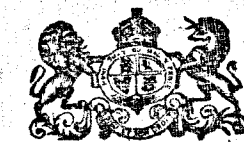
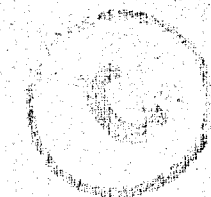
# INDUSTRIAL CONFERENCE

HELD AT

OOTACAMUND

IN

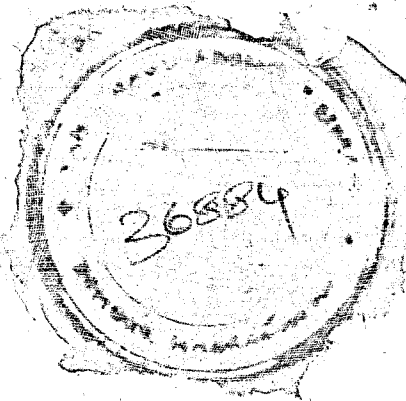
SEPTEMBER 1908.



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1908.



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## PAPERS

RELATING TO

## THE INDUSTRIAL CONFERENCE

HELD AT

## OOTACAMUND

IN

SEPTEMBER 1908.

## PART I.

## G.O., No. 1421, REVENUE, DATED 20TH MAY 1908.

In December 1905 a scheme was submitted to the Government of India for the furtherance of the industrial development of the Presidency. To this end it was proposed to create a department which should make a survey of existing industries and should investigate the possibility of creating new ones. The proposed department was to initiate experiments which might assist private enterprise to take up fresh industrial undertakings, and was to supply information and advice to persons desirous of adopting new methods and appliances. With the sanction of the Right Honourable the Secretary of State, Mr. A. Chatterton, B.Sc., was in August 1906 appointed to the charge of the new department with the title of Director of Industrial and Technical Inquiries.

2. Mr. Chatterton has now been at work for two years and in spite of the limited means at his command he has succeeded in producing results of considerable value. Under his control the possibility of treating leather successfully by the chrome tanning process has been demonstrated and the chrome leather business has grown to such proportions that the Government trust it may soon be possible to hand it over to private enterprise. The investigation of the handloom weaving industry has as yet not produced equally definite results, but it has drawn public attention to the subject and the recent handloom weaving competition, which was held in Madras in February and March last under the auspices of the National Fund and Industrial Association, enabled some very instructive comparisons of the merits of various improved handlooms to be made. Mr. Chatterton has also carried on some important experiments in other directions. By the use of boring tools it has been shown that considerable supplies, often artesian or semi-artesian in character, of subterranean water exist in selected areas of the Presidency, and by encouraging the installation of pumps driven by internal combustion engines it has been proved that these and other supplies of water can be profitably utilised for irrigation.

3. The Government consider that the time has now come when the best method of further developing the useful work thus commenced by the Director of Industrial and Technical Inquiries should be further considered. In order to achieve this object His Excellency the Governor in Council desires to be aided by the advice



of all those who are already engaged in the development and working of the industrial resources of the Presidency. The work to be done by the Department of Industrial and Technical Inquiries is purely pioneer work. It is intended to be merely in aid and encouragement of the introduction of private capital and enterprise. The Government have no intention whatever of embarking on commercial undertakings and are at all times ready to withdraw from any experiment as soon as private enterprise will take it up. In order to discuss in what directions the industrial development of the Presidency could further be assisted and promoted by experiments made by the department, the Government propose to hold a Conference at Ootacamund in September next to which representatives of the leading industrial interests of the Presidency will be invited. Suggestions for practical action will be sought for in advance of the Conference, and a programme of the subjects for discussion will be supplied to Members of the Conference as long as possible before the date of meeting which has been provisionally fixed for Monday the 14th September 1908.

4. In considering the best lines for the promotion of industrial development, it seems to His Excellency the Governor in Council impossible not also to bring under review the question of the improvement and extension of technical education. This will accordingly form the second branch of the subjects to be submitted for the consideration of the Conference. As in regard to industrial development, concrete suggestions regarding the promotion of technical education will be invited and a programme of recommendations will be circulated in advance.

5. Invitations to attend, or to send a representative to, the Conference will be forwarded, amongst others, to the Madras Chamber of Commerce, the Madras Trades' Association, the South Indian and the Madras and Southern Mahratta Railways, the Basel Mission's Mercantile Branch, the Manager of the American Mission Technical School, Manamadurai, and of the Wesleyan Mission Industrial School, Karur, the Coimbatore Spinning and Weaving Company, the South Indian Association, the Muhammadan Educational Association, the Victoria Technical Institute, Sir Frederick Nicholson, K.C.I.E.; Hon'ble B. Narasimheswara Sarma, the Hon'ble Mr. A. J. Yorke (Messrs. Parry & Co.), C. B. Simpson, Esq. (Messrs. Binny & Co.), Mr. F. J. E. Spring, C.I.E., M.R.Ry. Diwan Bahadur P. Rajaratna Mudaliyar Avargal, C.I.E., M.R.Ry. P. Thyagaraya Chetti Garu, M.R.Ry. D. V. Hanumantha Rao Garu, M.R.Ry. M. Venkataswami Nayudu Garu of Kodambakkam and M.R.Ry. L. K. Tulsi Ram Avargal of Madurai. The following officers of Government will also be present:—The Hon'ble Mr. J. Twigg, the Hon'ble Dr. A. G. Bourne, the Hon'ble Mr. F. J. Wilson, Mr. A. Chatterton, Mr. W. H. James, Mr. C. E. Brasier, Mr. Edgar Thurston and Mr. W. S. Hadaway. The Government also hope that sanction will be accorded to the presence of Major D. M. Babington, C.I.E., R.A., Superintendent of the Cordite Factory, Aruvankad.

(True Extract.)

A. G. CARDEW,  
*Secretary to Government.*

## PART II.

### PAPERS PRINTED FOR THE USE OF THE MEMBERS OF THE CONFERENCE.

#### 1. Note by Mr. ALFRED CHATTERTON, B.Sc., Director of Industrial and Technical Inquiries.

The industrial development of the Madras Presidency must mainly depend upon the improvement of its agriculture and, apart from the work to be done in the Agricultural department, we must look to the application of engineering to agriculture to assist in developing the wealth of the Presidency by extending irrigation, by a systematic exploration for water and the raising of the same from the sub-soil by engines and pumps and by encouraging the general use of machinery in place of cattle power and hand labour. Work in these directions has already been started and experience indicates that additional expenditure may be wisely incurred in increasing the facilities for making borings, sinking wells and erecting pumping stations. It should be recognised that Government can only direct the work and that the great bulk of the money required must either be provided by private effort or by "takavi" advances under the Agricultural Land Improvement Loans Act. There is room for the employment of many thousands of oil and gas engines in this Presidency and ultimately capital to the extent of crores of rupees can be invested in them. Labour must be trained to work them and properly equipped schools and workshops opened for the purpose. If large takavi advances are made, it will be necessary for Government to provide a suitable organisation to keep such machinery in working order.

Owing to the rise in the price of foodstuffs and the consequent increase in the cost of labour, the time seems ripe for the supersession of the present methods of extracting oil from seeds and juice from sugarcane by mechanical methods founded on the employment of oil engines as the source of motive power. The work should not be done in large factories such as have been started by European houses of agency, but in the first instance small experimental plants costing from Rs. 5,000 to Rs. 50,000 should be installed and worked by native agency. In these experience would be gained and men trained to manage them, who may subsequently find employment in similar factories. At the outset European experts should be freely employed, but it should be recognised that they will only be required for a few years, and as a rule therefore they should be got out on terminable agreements which should not be renewed.

The development of the use of machinery will necessitate the establishment of workshops in which it can be conveniently repaired, and everything that is possible should be done to encourage the local manufacture of plant and appliances. It is probable that this can best be done by the establishment of suitably equipped industrial schools as it will be necessary to train large numbers of fitters and engine drivers and it is hardly likely that private workshops struggling for an existence would undertake this part of the work.

Experimental work in connection with the production of motive power is probably the most important direction in which scientific and technical investigations can be made as the cost of fuel throughout the Presidency is abnormally high. For this reason it is suggested that greater attention should be paid to the development of the use of internal combustion engines, to the provision of cheap charcoal as fuel and to experimental work in the direction of introducing alcohol for industrial purposes. The unorganised indigenous industries are not a hopeful field for experimental work and it is probable that the most useful results will be obtained by working with a view to organising them in small factories. To this end it seems

desirable that Government should establish small factories worked on a commercial basis to demonstrate that they can be run at a profit. Such undertakings if they are to be a success must be managed on commercial principles and the remuneration of the staff must depend upon the success of their work. This is a matter of vital importance. It is impossible to expect any great industrial development in this Presidency for many years to come, and all that can be done is to start work by providing sound foundations on which subsequently it may be possible to build something. The forests of the Presidency might in the future supply enormous quantities of extremely valuable fuel and for that reason the scientific manufacture of charcoal and the utilisation of all the bye-products is a most important preliminary step. The available sources of water power in the Presidency are neither numerous nor conveniently situated, but it is possible that later on some of them may be utilised for electro-metallurgical work, the necessary fuel, which is required even in such processes, being furnished by charcoal obtained from the forests. It is understood that Government have definitely accepted the principle that industrial development must precede technical education, and accepting that very important principle it is obvious that at the present time the development of higher technical education should be mainly in the direction of providing engineers with sufficient general scientific knowledge to undertake the work outlined in this note.

13th August 1908.

A. CHATTERTON.

## 2. Draft of certain questions proposed for consideration at the Industrial Conference.

### A.—INDUSTRIAL DEVELOPMENT.

#### I

##### Part I.—General Questions.

1. Should there be a special department under a special officer to deal with industrial questions and to control technical education (including under this term industrial education)?
2. If so, what should the functions of this department include? Would the following be a suitable statement of its functions:—
  - (i) the supply of advice in regard to new industries and the introduction of new methods and processes;
  - (ii) the carrying out of investigations and experiments; and
  - (iii) the development of selected industries?
3. What should be the qualifications and designation of the officer at the head of this department?
4. May a fee properly be charged for advice given by the Government department? What limitations, if any, should be put on the advice to be given?
5. What methods should Government adopt in investigating and developing new industries? Is the use of ordinary commercial methods to be recommended, *e.g.*, employment of travellers, the grant of commission to employees?
6. May the Government without objection undertake, as a pioneer, the introduction of new industries or industrial schemes provided that any business thus carried on is transferred to private hands as soon as private enterprise is ready to take it over?
7. Are money grants or subsidies for the assistance of new industries or industrial schemes justifiable, and, if so, on what conditions?
8. In order to encourage the development of industries, may any of the following methods properly be used by Government:—
  - (i) offer of substantial rewards for inventions likely to be of important industrial advantage;
  - (ii) encouragement of exhibitions and offer of liberal prizes for products, methods and appliances;
  - (iii) dissemination through the Press of information as to new industries and free resort to advertisement;
  - (iv) lectures, especially in regard to agriculture, invariably accompanied by practical exhibition either of appliances, improved methods or seeds or produce?
9. When Government have undertaken the introduction or development of a selected industry, may Government departments be directed, as far as possible, to purchase from the special department such of their requirements as the department can supply?

#### II

##### Part II.—Individual Industries.

10. Can the Weaving Trade be improved by such methods as the following:—
  - (a) the establishment in the large weaving centres of factories similar to the Salem factory;
  - (b) the demonstration by competent instructors of the advantages of approved appliances in weaving villages;
  - (c) the organization of labour;

- (d) the introduction of improved methods and looms;
- (e) the improvement of the silk industry?

11. In what directions and to what extent can steps be taken by Government for the development of the following industries:—

- (a) metal work;
- (b) the manufacture of charcoal, acetate of lime, tar and methyl alcohol;
- (c) the treatment of the sugarcane and the manufacture of sugar by the Hathi or other processes;
- (d) the production of industrial alcohol as a fuel for internal combustion engines;
- (e) the extraction of oil from seeds;
- (f) the manufacture of lead pencils, matches and glass;
- (g) the exploitation of forest produce;
- (h) the establishment of chemical industries;
- (i) the manufacture of leather;
- (j) the establishment of dye-works;
- (k) the manufacture of coir and the extraction of other fibres?

12. By what methods and subject to what conditions can Government best promote the extension of lift irrigation by means of oil-engines and pumps?

13. Are any steps necessary to ascertain the existence of subterranean supplies of water? Should provision be made for scientific experts to direct exploration for such supplies and of mechanics to carry out the work and how can the results of such investigation be best developed and brought home to the people?

#### B.—TECHNICAL EDUCATION.

14. The following general propositions regarding technical education have been suggested. May they be accepted?

(1) Technical education should be connected with and developed to suit an existing industry. Until a definite need exists and there is a likelihood of employment for the student on the completion of his course it is useless to establish technical training in that direction.

(2) The teacher should be a practical expert. In the manipulative branches he should have had actual experience in works and in scientific branches he should be an investigator.

(3) The teacher should be given a free hand and should have time for research and experiment. Money should be freely spent on experimental work and in keeping all apparatus, tools, plant and appliances up to date.

15. (a) What trades or manufactures exist in this Presidency which are of sufficient importance to justify the establishment of special technical schools in relation to them?

(b) Should these schools be separate institutions each located in a centre where the industry is largely carried on or should they be concentrated in a central Technological Institute?

(c) In the latter alternative where should the Technological Institute be located? Is it desirable that it should be in an industrial centre, where both professors and students will be in touch with the conditions of actual industrial work?

16. Is the provision of training for the teachers who may be required for imparting manual training in High Schools and Colleges a branch of technical education? And, if so, what provision should be made for such training in the Department of Industries and Technical Education?

17. Is it desirable to increase the number of Industrial Schools in this Presidency or would it be better to improve the status of those already established?

18. What should be the objects aimed at in industrial schools?

19. Should industrial schools be under the direct control of the department or should they be managed by District Boards and Missionary Bodies?

### 3. Note on Technical Education in Madras.

The modern development of technical education in Madras owes its origin to the late Sir Mountstuart Grant Duff who was Governor of this Presidency from 1881 to 1886. The Education Commission of 1882 had left the subject of technical education untouched. In their instructions to the Commission the Government of India, as yet intent only on literary education, had remarked that to extend the enquiry to technical education "would expand unduly the task before the Commission". In Madras the College of Engineering, the Agricultural College, Saidapet, and the School of Arts were already in existence, but no attempt had been made to develop any general system of technical education. The only industrial schools in the Presidency were two orphanages at Ramnad and Nazareth, two schools for Eurasians in Madras and a small school under missionary management in the Tanjore district. Sir Mountstuart Grant Duff's attention appears to have been drawn to the subject of technical education by the report of the Royal Commission on Technical Education in England which was appointed in 1881 and which submitted its final report in April 1884. On the 1st September 1884 the late Mr. Grigg, then Director of Public Instruction, was called on to submit proposals for the encouragement of scientific and technical education in this Presidency.

2. Mr. Grigg's proposals, contained in letters dated 3rd September 1884 and 31st March 1885, set out a comprehensive scheme of development divided into three main sections. The first place was given to the establishment of a system of higher examinations in technical subjects. Mr. Grigg believed that "to institute public examinations in any suitable branches of knowledge is to create a demand for instruction in them." He accordingly proposed to start examinations in some sixty branches of technical science, art and industry. But he did not rely solely on examinations. The second part of his scheme included the provision of grants-in-aid to institutions providing facilities for industrial and technical education and the grant of scholarships to pupils undergoing such instruction, besides grants for machinery, plant, apparatus and chemicals. These provisions were to be embodied in a special chapter of the Grant-in-Aid Code and the grants were on a liberal scale, 25 per cent. above the standard rate. Thirdly, Mr. Grigg proposed the development of the College of Engineering, the School of Arts and the Agricultural College into institutes dealing with the several connected branches of technical works. The College of Engineering was to teach the various branches of engineering, with subsidiary subjects, machine construction and the like. The School of Arts was to add to its curriculum decorative metal work, wood-carving, cabinet-making, furniture and architectural wood-work, pottery, glass manufacture and carpet-weaving. The Agricultural College was to teach, besides agriculture, agricultural chemistry, geology, physiography, forestry and surveying, plan-drawing and veterinary surgery and medicine. Improved provision for instruction in biology and chemistry was to be made in the chief first-grade colleges, while practical training in industries was to be provided in the workshops of the Madras Municipality and Madras Railway.

3. Mr. Grigg's proposals were favourably received by Government. In G.O., No. 377, Educational, dated 3rd June 1885, high appreciation was expressed of the care with which the scheme had been drawn up. A Committee to elaborate the plan of technical examinations was at once appointed. The new chapter of the Grant-in-Aid Code was sanctioned and the "gradual extension of work" at the Agricultural College and the School of Arts was approved. But the extension of the scope of work undertaken at the College of Engineering was negatived, and no notice was taken of the suggested use of Railway and Municipal workshops for practical training. The Government, like the Director, gave the first place to examinations, and prompt action to start these tests was taken. The Committee appointed to fix the character of the syllabuses and the details of the examinations submitted its report in November 1885 together with a draft notification and syllabuses for



examinations in 63 subjects, and in G.O., No. 198 of the 31st March 1886, Educational, the notification and syllabuses were finally approved and sanctioned and the first technical examinations were ordered to be held in the month of August following.

4. The examinations thus created were originally divided into two grades called Preliminary and Advanced; but when the Middle School Examination was abolished in 1889, the scheme of technical examinations was revised in order to include those elementary technical subjects which had hitherto formed a part of that examination, and the technical examinations were now divided into (1) the Lower or Elementary examination, and (2) the Higher examinations in two grades, the Preliminary and the Advanced. In December 1891, the name of the examinations was changed to the "Government Technical Examinations" and the three grades were designated Elementary, Intermediate and Advanced, and in 1892 the notification and the syllabuses relating to the examinations were again revised and received their existing form. The G.O., No. 32, Educational, dated 20th January 1893, which declares their object to be "the encouragement of scientific and technical instruction, with special reference to manufactures and industries and generally to the necessities of the practical side of life."

5. These technical examinations have attracted a considerable number of candidates. In the ten years ending 1906-1907 as many as 22,527 candidates have passed the three stages—Elementary, Intermediate and Advanced. An analysis of these passes is given below. Table No. I shows the number of candidates who have passed in each group and subject in these examinations. It will be observed that out of 22,527 passes as many as 13,954 are accounted for by five groups of subjects:

|                                 |       |
|---------------------------------|-------|
| (1) Agriculture .. .. .         | 1,062 |
| (2) Sanitary Science .. .. .    | 1,483 |
| (3) Civil Engineering .. .. .   | 3,456 |
| (4) Commercial subjects .. .. . | 5,203 |
| (5) Drawing .. .. .             | 7,750 |

In the remaining subjects the great mass of passes have been in the Elementary or Intermediate grades, only 138 passes in the Advanced examinations having been secured in ten years. In Chemistry, the foundation of so many industries, no pass in the Advanced examination has been secured, and the total number of passes in the Elementary and Intermediate tests has been only 49. Table No. II distributes the candidates according to race, religion or caste. The figures given in these tables do not relate to individual candidates as a candidate appearing in each stage, Elementary, Intermediate and Advanced, would be counted three times.

TABLE I.

Number of candidates who have passed the Technical Examinations in each group and subject during last ten years.

|                                         | Advanced. | Intermediate. | Elementary. |
|-----------------------------------------|-----------|---------------|-------------|
| <i>Civil Engineering.</i>               |           |               |             |
| Building Materials and Construction ... | 1         | 121           | 271         |
| Building-drawing and Estimating ...     | 12        | 94            | 312         |
| Hydraulics and Irrigation Works ...     | ...       | 55            | 132         |
| Earthwork and Road-making ...           | *         | 62            | 733         |
| Bridge-work ...                         | *         | 3             | 45          |
| Surveying and Levelling ...             | 11        | 374           | 119         |
| Applied Mechanics ...                   | ...       | 8             | 20          |
| Mensuration ...                         | ...       | 67            | 658         |
| Practical, Plane and Solid Geometry ... | ...       | 12            | 134         |
| Carpentry ...                           | *         | 47            | 163         |
| Total ...                               | 24        | 843           | 2,589       |

Number of candidates who have passed the Technical Examinations in each group and subject during last ten years—cont.

|                                                 | Advanced. | Intermediate. | Elementary. |
|-------------------------------------------------|-----------|---------------|-------------|
| <i>Mechanical Engineering.</i>                  |           |               |             |
| Machine Construction ...                        | *         | 2             | 5           |
| Machine Drawing ...                             | ...       | 28            | 52          |
| Steam and the Steam-engine ...                  | 2         | 3             | 18          |
| Fitters' work ...                               | *         | 25            | 98          |
| Total ...                                       | 2         | 58            | 173         |
| <i>Electrical Engineering.</i>                  |           |               |             |
| Practical Telegraphy ...                        | ...       | 22            | 285         |
| Electric lighting and transmission of power ... | ...       | 1             | *           |
| Electro-Metallurgy ...                          | ...       | ...           | *           |
| Total ...                                       | ...       | 23            | 285         |
| <i>Physical Science.</i>                        |           |               |             |
| Heat ...                                        | *         | ...           | *           |
| Light ...                                       | *         | ...           | *           |
| Electricity and Magnetism ...                   | ...       | 7             | 35          |
| Inorganic Chemistry ...                         | ...       | 33            | 16          |
| Organic Chemistry ...                           | ...       | *             | *           |
| Metallurgy ...                                  | ...       | 57            | 25          |
| Physiography ...                                | *         | ...           | *           |
| Photography ...                                 | ...       | ...           | ...         |
| Total ...                                       | ...       | 97            | 76          |
| <i>Geology.</i>                                 |           |               |             |
| Geology ...                                     | *         | ...           | *           |
| Mineralogy ...                                  | *         | ...           | *           |
| Total ...                                       | *         | ...           | *           |
| <i>Biology.</i>                                 |           |               |             |
| General Biology ...                             | *         | ...           | *           |
| Animal Physiology ...                           | *         | 171           | 35          |
| Botany ...                                      | *         | 1             | 19          |
| Total ...                                       | *         | 172           | 54          |
| <i>Sanitary Science.</i>                        |           |               |             |
| Hygiene ...                                     | *         | 604           | 748         |
| General Biology (Special) ...                   | *         | 10            | *           |
| Minor Sanitary Engineering ...                  | *         | 121           | *           |
| Total ...                                       | *         | 735           | 748         |
| <i>Pharmacy.</i>                                |           |               |             |
| Botany (Special) ...                            | *         | 3             | *           |
| Inorganic Chemistry (Special) ...               | *         | 1             | *           |
| Materia Medica ...                              | *         | 1             | *           |
| Practical Pharmacy ...                          | *         | 1             | *           |
| Special Laboratory Course ...                   | *         | 1             | *           |
| Practical Dispensing (for Compounders) ...      | *         | ...           | *           |
| Total ...                                       | *         | 7             | *           |
| <i>Agriculture.</i>                             |           |               |             |
| Agriculture ...                                 | 79        | 2             | 138         |
| General Chemistry ...                           | *         | 31            | *           |
| Botany (Special) ...                            | *         | 115           | *           |
| Meteorology and Geology (Special) ...           | *         | 37            | *           |
| Surveying and Levelling (Special) ...           | *         | 111           | *           |
| Anatomy and Physiology (Special) ...            | *         | 40            | *           |
| Agricultural Engineering (Special) ...          | *         | 98            | *           |
| Agricultural Chemistry ...                      | 24        | 74            | *           |
| Veterinary Science and Hygiene (Special) ...    | *         | 175           | *           |
| Horticulture ...                                | *         | 5             | *           |
| Forestry ...                                    | 1         | 132           | *           |
| Economic Entomology ...                         | *         | ...           | *           |
| Tobacco ...                                     | *         | ...           | *           |
| Total ...                                       | 104       | 820           | 138         |

\* Indicates that no examinations are held in that grade.

Number of candidates who have passed the Technical Examinations in each group and subject during last ten years—cont.

|                                                   | Advanced. | Intermediate. | Elementary. |
|---------------------------------------------------|-----------|---------------|-------------|
| <i>Veterinary Science.</i>                        |           |               |             |
| Veterinary Science ... ..                         | 1         | ...           | ...         |
| <i>Commerce.</i>                                  |           |               |             |
| Book-keeping ... ..                               | 55        | 508           | 1,085       |
| Theory and Practice of Commerce ... ..            | 49        | 290           | 1,120       |
| Banking ... ..                                    | *         | 137           | 242         |
| Commercial Geography ... ..                       | 27        | 73            | 68          |
| Shorthand ... ..                                  | 9         | 88            | 440         |
| Annuities and Life Insurance ... ..               | *         | ...           | *           |
| Type-writing ... ..                               | ...       | 134           | 878         |
| Total ...                                         | 140       | 1,230         | 3,833       |
| <i>Music.</i>                                     |           |               |             |
| Music ... ..                                      | 1         | 37            | 175         |
| <i>Drawing, etc.</i>                              |           |               |             |
| Freehand Outline Drawing ... ..                   | 78        | 972           | 3,745       |
| Design ... ..                                     | 8         | 107           | 640         |
| Geometrical Drawing ... ..                        | 53        | 384           | 1,029       |
| Painting ... ..                                   | 11        | 106           | 498         |
| Modelling ... ..                                  | 4         | 28            | 54          |
| Wood Engraving ... ..                             | 2         | 21            | *           |
| Copper-plate Engraving ... ..                     | 3         | 9             | *           |
| Total ...                                         | 157       | 1,627         | 5,968       |
| <i>Jewellers' work.</i>                           |           |               |             |
| Jewellers' work ... ..                            | *         | 4             | 24          |
| Silversmiths' work ... ..                         | *         | 3             | 12          |
| Watch and clock repairing ... ..                  | *         | ...           | *           |
| Total ...                                         | *         | 7             | 36          |
| <i>Printing, book-binding and type-founding.</i>  |           |               |             |
| Letter-press printing. { Compositor's work ... .. | *         | 21            | 60          |
| Proof-reader's work ... ..                        | *         | 14            | 53          |
| Press work ... ..                                 | *         | 1             | 30          |
| Machine work ... ..                               | *         | 2             | 21          |
| Printer's warehouse work ... ..                   | *         | ...           | 2           |
| Book-binding ... ..                               | *         | 9             | 49          |
| Type-casting ... ..                               | *         | 2             | 17          |
| Stereotyping ... ..                               | *         | 1             | 12          |
| Electrotyping ... ..                              | *         | ...           | ...         |
| Total ...                                         | *         | 50            | 244         |
| <i>Wood-work and Metal-work.</i>                  |           |               |             |
| Cabinet-making ... ..                             | 86        | 243           | 557         |
| Blacksmiths' work ... ..                          | *         | 43            | 144         |
| Carriage-building ... ..                          | *         | ...           | *           |
| Metal-work ... ..                                 | 21        | 59            | 102         |
| Total ...                                         | 107       | 345           | 863         |
| <i>Leather work.</i>                              |           |               |             |
| Boot and shoe-making ... ..                       | *         | 3             | 15          |
| Tanning leather ... ..                            | *         | ...           | *           |
| Saddlery and harness-making ... ..                | *         | ...           | *           |
| Total ...                                         | *         | 3             | 15          |

\* Indicates that no examinations are held in that grade.

Number of candidates who have passed the Technical Examinations in each group and subject during last ten years—cont.

|                                              | Advanced. | Intermediate. | Elementary. |
|----------------------------------------------|-----------|---------------|-------------|
| <i>Textile fabrics.</i>                      |           |               |             |
| Cotton-spinning ... ..                       | *         | 5             | *           |
| Cotton-weaving ... ..                        | *         | 37            | 134         |
| Bleaching, dyeing and printing cotton ... .. | *         | ...           | *           |
| Silk-dyeing ... ..                           | *         | ...           | *           |
| Silk manufacture ... ..                      | *         | ...           | *           |
| Carpet-weaving ... ..                        | *         | 8             | 26          |
| Lace-making ... ..                           | *         | 37            | 112         |
| Total ...                                    | *         | 87            | 272         |
| <i>Glass and pottery.</i>                    |           |               |             |
| Pottery and porcelain manufacture ... ..     | *         | 5             | 17          |
| Glass-making ... ..                          | *         | ...           | *           |
| Total ...                                    | *         | 5             | 17          |
| <i>Tailoring and dress-making.</i>           |           |               |             |
| Tailoring ... ..                             | *         | 14            | 59          |
| Needle-work and dress-making ... ..          | 27        | 119           | 112         |
| Embroidery ... ..                            | *         | 4             | 26          |
| Total ...                                    | 27        | 137           | 197         |
| <i>Cookery.</i>                              |           |               |             |
| Cookery ... ..                               | *         | ...           | *           |
| Bread-making ... ..                          | *         | ...           | *           |
| Total ...                                    | *         | ...           | *           |
| Grand Total of successful candidates ...     | 563       | 6,283         | 15,681      |

\* Indicates that no examinations are held in that grade.

TABLE II.

Candidates who have passed the Technical Examinations during last ten years distributed in accordance with nationality, religion or caste.

|                                                 | Advanced. | Intermediate. | Elementary. |
|-------------------------------------------------|-----------|---------------|-------------|
| Europeans and Eurasians ... ..                  | 42        | 328           | 1,011       |
| Native Christians ... ..                        | 75        | 708           | 2,353       |
| Muhammadans ... ..                              | 18        | 223           | 678         |
| Brahmans ... ..                                 | 188       | 2,776         | 5,795       |
| Others (mostly non-Brahman Caste Hindus) ... .. | 240       | 2,249         | 5,644       |
| Total ...                                       | 563       | 6,283         | 15,681      |

6. The above figures show the results of the technical examinations, which are perhaps the chief product of Mr. Grigg's scheme of 1884-85. The progress which has been brought about by the institution of these examinations and the provisions which were added to the Grant-in-Aid Code will be apparent from Table No. III which shows the technical and industrial schools now existing in the Presidency. In the educational returns these are divided into two classes: first, higher class,



schools in which the standard of instruction is equal to the elementary or higher grades of the technical examinations, and second, lower class schools which adopt a lower standard regulated by the Madras Educational rules. The former class of schools is again of two kinds: (a) those which give instruction in subjects coming under two or more groups of the Technical Examination scheme, and (b) those which give instruction in only one such group. The statement below shows the number and strength of such schools at the end of the last three quinquennial periods :—

TABLE III.

| Nature of schools.                                                                                                              | By whom supported. | Number and strength on 31st March 1897. |           | Number and strength on 31st March 1902. |           | Number and strength on 31st March 1907. |           |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------|-----------|-----------------------------------------|-----------|-----------------------------------------|-----------|
|                                                                                                                                 |                    | Number.                                 | Strength. | Number.                                 | Strength. | Number.                                 | Strength. |
| I. (a) Higher class schools giving instruction in subjects coming under two or more groups of the Technical Examination scheme. | Government ...     | 1                                       | 633       | 2                                       | 483       | 2                                       | 646       |
|                                                                                                                                 | Local Board ...    | 2                                       | 292       | 2                                       | 229       | 2                                       | 225       |
|                                                                                                                                 | Municipal ...      | ...                                     | ...       | ...                                     | ...       | ...                                     | ...       |
|                                                                                                                                 | Aided ...          | 12                                      | 1,023     | 16                                      | 1,000     | 12                                      | 830       |
|                                                                                                                                 | Unaided ...        | ...                                     | ...       | 3                                       | 43        | 7                                       | 388       |
|                                                                                                                                 | Total ...          | 15                                      | 1,948     | 23                                      | 1,755     | 23                                      | 2,089     |
| I. (b) Higher class schools giving instruction in only one such group.                                                          | Government ...     | 4                                       | 346       | 3                                       | 337       | 2                                       | 261       |
|                                                                                                                                 | Local Board ...    | 1                                       | 4         | ...                                     | ...       | 1                                       | 12        |
|                                                                                                                                 | Municipal ...      | ...                                     | ...       | 2                                       | 35        | 2                                       | 29        |
|                                                                                                                                 | Aided ...          | 12                                      | 793       | 13                                      | 627       | 25                                      | 1,178     |
|                                                                                                                                 | Unaided ...        | ...                                     | ...       | 4                                       | 63        | 8                                       | 151       |
|                                                                                                                                 | Total ...          | 17                                      | 1,142     | 22                                      | 1,062     | 38                                      | 1,629     |
| II. Lower class schools ...                                                                                                     | Government ...     | ...                                     | ...       | ...                                     | ...       | ...                                     | ...       |
|                                                                                                                                 | Local Board ...    | 1                                       | 38        | 1                                       | 33        | 1                                       | 10        |
|                                                                                                                                 | Municipal ...      | ...                                     | ...       | 1                                       | 7         | 1                                       | 9         |
|                                                                                                                                 | Aided ...          | 2                                       | 47        | 5                                       | 120       | 7                                       | 192       |
|                                                                                                                                 | Unaided ...        | 1                                       | 52        | 5                                       | 246       | 5                                       | 79        |
|                                                                                                                                 | Total ...          | 4                                       | 137       | 12                                      | 406       | 14                                      | 290       |
|                                                                                                                                 | Grand Total ...    | 36                                      | 3,227     | 57                                      | 3,223     | 75                                      | 4,008     |

7. The subjects taught in these technical schools and the average number of pupils who have studied each year during the last five years are shown in the following statement :—

TABLE IV.

| Group.                | Subject.                                | Number of pupils. |
|-----------------------|-----------------------------------------|-------------------|
| Civil Engineering ... | Building Materials and Construction ... | 4                 |
|                       | Building-drawing and Estimating ...     | 13                |
|                       | Hydraulics and Irrigation Works ...     | ...               |
|                       | Earthwork and Road-making ...           | 17                |
|                       | Surveying and Levelling ...             | 25                |
|                       | Mensuration ...                         | 31                |
|                       | Practical, Plane and Solid Geometry ... | 1                 |
|                       | Carpentry ...                           | 571               |
|                       | Wood-turning ...                        | 11                |
|                       | Bridge work ...                         | ...               |
|                       | Total ...                               | 673               |

| Group.                                           | Subject.                      | Number of pupils. |
|--------------------------------------------------|-------------------------------|-------------------|
| Mechanical Engineering ...                       | Machine Drawing ...           | 9                 |
|                                                  | Fitter's work ...             | ...               |
|                                                  | Total ...                     | 9                 |
| Electrical Engineering and Practical Telegraphy. | ...                           | 51                |
| Physical Science, Electricity and Magnetism.     | ...                           | 8                 |
| Sanitary Science ...                             | Hygiene ...                   | 277               |
| Agriculture ...                                  | Agriculture ...               | 64                |
| Commerce ...                                     | Book-keeping ...              | 122               |
|                                                  | Commercial Correspondence ... | 100               |
|                                                  | Banking ...                   | 86                |
|                                                  | Commercial Geography ...      | 24                |
|                                                  | Shorthand ...                 | 142               |
|                                                  | Typewriting ...               | 269               |
|                                                  | Total ...                     | 763               |
| Music ...                                        | ...                           | 351               |
| Drawing ...                                      | Freehand Outline Drawing ...  | 1,370             |
|                                                  | Design ...                    | 14                |
|                                                  | Geometrical Drawing ...       | 21                |
|                                                  | Painting ...                  | 29                |
|                                                  | Modelling ...                 | 18                |
|                                                  | Wood Engraving ...            | 34                |
|                                                  | Total ...                     | 1,486             |
| Jewellers' work ...                              | Jewellers' work ...           | 8                 |
|                                                  | Silversmiths' work ...        | 8                 |
|                                                  | Total ...                     | 16                |
| Printing, etc ...                                | Compositor's work ...         | 56                |
|                                                  | Proof-reader's work ...       | 42                |
|                                                  | Press work ...                | 9                 |
|                                                  | Book-binding ...              | 40                |
|                                                  | Stereotyping ...              | 5                 |
|                                                  | Total ...                     | 152               |
| Wood and metal work ...                          | Cabinet-making ...            | 240               |
|                                                  | Blacksmiths' work ...         | 104               |
|                                                  | Rattan work ...               | 31                |
|                                                  | Total ...                     | 375               |
| Leather work ...                                 | Boot and shoe-making ...      | 27                |
| Textile Fabrics ...                              | Cotton-weaving ...            | 126               |
|                                                  | Carpet-weaving ...            | 30                |
|                                                  | Lace-making ...               | 344               |
|                                                  | White embroidery ...          | 9                 |
|                                                  | Tape-making ...               | 21                |
|                                                  | Hand knitting ...             | 82                |
|                                                  | Total ...                     | 612               |
| Tailoring and Dress-making ...                   | Tailoring ...                 | 87                |
|                                                  | Dress-making ...              | 53                |
|                                                  | Total ...                     | 140               |
| Pottery and Porcelain Manufacture.               | ...                           | ...               |
|                                                  | Grand Total ...               | 5,002             |

Note.—Comparison with Table III will show that the pupils in column 3 of Table IV have in many cases been counted more than once, the actual number of pupils being 3,000 to 4,000, not 5,002.

8. The cost at which this progress in technical education has been made will be apparent from the following figures, in which the expenditure on technical education during the last ten years is compared with the total expenditure on education :—

TABLE V.  
*Expenditure on Technical Education*

| Year.         | Total expenditure on educa-<br>tion. | Total expenditure on techni-<br>cal education.* | Percentage of expenditure on<br>technical education to total<br>expenditure on education. | Proportion of expenditure on<br>technical education met<br>from Provincial funds. | DETAILS OF EXPENDITURE FROM PROVINCIAL<br>FUNDS ON TECHNICAL EDUCATION. |                                   |                                               |                                   |                 | Total expenditure from Pro-<br>vincial funds on technical<br>education. | Number of<br>scholarships<br>awarded.† |
|---------------|--------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------|-----------------------------------|-----------------|-------------------------------------------------------------------------|----------------------------------------|
|               |                                      |                                                 |                                                                                           |                                                                                   | Grants-in-aid.                                                          |                                   | Scholarships.                                 |                                   | Other charges.* |                                                                         |                                        |
|               |                                      |                                                 |                                                                                           |                                                                                   | Amount granted<br>for technical<br>schools.                             | Proportion<br>to<br>total grants. | Amount granted<br>in<br>technical<br>schools. | Proportion<br>to<br>total grants. |                 |                                                                         |                                        |
| 1             | 2                                    | 3                                               | 4                                                                                         | 5                                                                                 | 6                                                                       | 7                                 | 8                                             | 9                                 | 10              | 11                                                                      | 12                                     |
|               | RS.                                  | RS.                                             |                                                                                           |                                                                                   | RS.                                                                     |                                   | RS.                                           |                                   | RS.             | RS.                                                                     |                                        |
| 1837-1898 ... | 66,84,435                            | 1,37,776                                        | 2.8                                                                                       | 43                                                                                | 17,735                                                                  | 3.2                               | 14,603                                        | 22                                | 47,519          | 79,862                                                                  | 195                                    |
| 1898-1899 ... | 69,12,173                            | 1,96,084                                        | 2.8                                                                                       | 36                                                                                | 14,810                                                                  | 2.7                               | 15,801                                        | 21                                | 39,338          | 69,949                                                                  | 147                                    |
| 1899-1900 ... | 69,29,266                            | 2,19,701                                        | 3.2                                                                                       | 39                                                                                | 15,006                                                                  | 2.7                               | 15,834                                        | 21                                | 54,053          | 84,893                                                                  | 94                                     |
| 1900-1901 ... | 71,76,850                            | 2,17,638                                        | 3.0                                                                                       | 37                                                                                | 14,517                                                                  | 2.7                               | 13,560                                        | 18                                | 53,007          | 81,084                                                                  | 51                                     |
| 1901-1902 ... | 78,61,012                            | 2,66,953                                        | 3.5                                                                                       | 23                                                                                | 14,012                                                                  | 2.5                               | 15,265                                        | 20                                | 45,704          | 75,881                                                                  | 53                                     |
| 1902-1903 ... | 84,81,400                            | 2,69,351                                        | 3.2                                                                                       | 38                                                                                | 14,728                                                                  | 1.7                               | 10,293                                        | 13                                | 77,396          | 1,02,417                                                                | 165                                    |
| 1903-1904 ... | 86,22,864                            | 2,48,930                                        | 2.9                                                                                       | 34                                                                                | 14,693                                                                  | 1.8                               | 13,005                                        | 16                                | 56,728          | 84,423                                                                  | 173                                    |
| 1904-1905 ... | 86,50,460                            | 2,90,699                                        | 3.4                                                                                       | 29                                                                                | 15,396                                                                  | 1.8                               | 14,475                                        | 16                                | 55,272          | 85,143                                                                  | 164                                    |
| 1905-1906 ... | 90,84,226                            | 2,98,761                                        | 3.3                                                                                       | 27                                                                                | 13,151                                                                  | 1.6                               | 12,788                                        | 22                                | 54,472          | 80,411                                                                  | 129                                    |
| 1906-1907 ... | 94,59,318                            | 2,99,365                                        | 3.2                                                                                       | 24                                                                                | 24,124                                                                  | 3.6                               | 10,272                                        | 16                                | 36,667          | 71,093                                                                  | 130                                    |

\* The expenditure shown in column 3 includes all outlay, whether from public funds or private resources, on the School of Arts and all Technical schools and classes, but does not include the College department of the College of Engineering or the Agricultural College. The expenditure of 1906-1907 excludes the amount spent on the "school department" of the College of Engineering which was included in the previous years. The total average cost of the College of Engineering is Rs. 89,687 per annum, and the total average cost of the Saidapet Agricultural College was Rs. 46,375 per annum.

† The number of these scholarships was 195 in 1897, but was reduced to 180 in 1899. In 1906 it was raised again to 203. The scholarships vary in value from Re. 1 to Rs. 10 per mensem.

9. It will be apparent from these facts and figures that, though some progress has been made in technical education since Sir Mountstuart Grant Duff first drew attention to the subject in 1884, and though some twenty-five lakhs of rupees have been spent thereon during the last ten years the general result is, as the Director of Public Instruction remarked in his report for 1906-1907, still far from satisfactory. "Out of the large population of this Presidency," he wrote: "less than three thousand children were receiving technical instruction in the various handicrafts and of these less than nine hundred were non-Brahman Hindus, the class of the community to which the bulk of hereditary workers in wood and metal and textile fabrics belong. There is as yet little demand for technical education, and the little advance that has been made has practically left unaffected the great mass of the industrial population." It will be noticed that of the five thousand children shown in table IV as receiving technical instruction a large proportion were studying such subjects as Book-keeping, Commercial Correspondence and Drawing.

10. The causes which have led to the failure of Mr. Grigg's scheme of 1884-1885 are not far to seek. In the first place only part of that scheme was carried out, some of the most valuable suggestions contained in it being allowed to drop out of sight. The attempt moreover to create examinations without first providing qualified teachers and adequately equipped training institutions was to reverse the true order

of progress. Most important of all was the neglect to bring the scheme of technical education into relation with the industrial needs and conditions of the country. It was not sufficient to draw up syllabuses ranging from copperplate engraving to embroidery. Some effort was necessary to connect the new system of technical education with existing industries, the great hand-loom industry, the indigenous dyeing industry, the nascent cotton factory system and so on. Even in providing scholarships for the encouragement of handicrafts, sufficient care was not taken to see that they were reserved for members of the artisan classes. The Scholarship notification, which is published annually in the *Fort St. George Gazette*, stipulates only that the candidates shall have been for a year a student in a recognized technical class, and the scholarships given by local bodies have not usually even this stipulation. The caste system of the country being thus ignored, the scholarships too often fell to youths who had not the least intention of following the industry as a livelihood and who merely drew the scholarship while it lasted and then betook themselves to the rôle of clerk, peon, policeman or whatever the customary occupation of their class might be. It is thus not surprising that though a large number of persons have passed the Technical examinations which Mr. Grigg established, the general effect of the scheme on the industrial progress of the country has been slight.

11. An attempt has been made by means of a circular addressed to the leading firms and employers of labour in the Presidency to ascertain what importance is attached by practical men to the possession of a certificate of having passed the Technical examinations. The answers are inconclusive, but suffice to show that several large employers attach no importance to such a certificate.

12. When Mr. Grigg's scheme of technical education was launched in 1884-1885, there were already in existence, as above noticed, three large technical institutions, the College of Engineering, the School of Arts and the College of Agriculture. The College of Engineering claims to date from the year 1794 when a school for surveyors was established in Madras. Its modern existence however commenced in 1859 when it received the title of the Civil Engineering College and was reorganized on the model of the Roorkee College (founded 1847), the main object being to provide subordinates (Assistant Engineers, Overseers, Draftsmen and Surveyors) for the Public Works Department. In 1883-1884 it was again reorganized it being remarked that the College "had now ceased to be a mere appanage of the Public Works Department" and that a demand for trained men had now arisen outside Government service. The College at present consists of three classes—

- the Engineer class for the training of Civil and Mechanical Engineers;
- the Upper Subordinate class for the training of supervisors and overseers for the Public Works Department, the Local Fund Engineering Department and for the Minor Irrigation Department;
- the Lower Subordinate class for training sub-overseers, surveyors and draftsmen.

The course for classes (i) and (ii) lasts four years, three being spent in the college and the fourth chiefly on works. The course for class (iii) lasts three years. The number of students admitted annually is limited to twenty in the Engineer class, thirty in the Upper Subordinate class and sixty in the Lower Subordinate class. The total number of students averages about 300.

13. The School of Arts owes its origin to Dr. Hunter, then Surgeon of Black Town, who opened a School of Arts at his own expense in Popham's Broadway in 1850. In 1854-1855 it was taken over by Government, and in 1857 was removed to its present site on the Poonamallee Road. Dr. Hunter became Superintendent and continued to occupy that position until he retired in 1873. In 1831 the first Superintendent appointed from England, Mr. E. B. Havell, arrived and held charge until 1892, when he went on furlough and subsequently resigned. The school has since been under the Superintendence of Mr. Holder (1892-1897), Mr. Porterfield (1899-1900) and Mr. Chatterton, who introduced the manufacture of aluminium and the study of cotton-weaving. In 1907 a fresh whole-time Superintendent, Mr. W. S. Hadaway, was appointed by the Secretary of State. The present strength of the school is 464.

14. The College of Agriculture was established in 1876 at Saidapet, where some land which had previously been a pleasure garden of the Nawab of the Carnatic had since 1865 been used for experimental purposes. After the establishment of the Technical examinations in 1885, the college course was reorganized so as to adapt it to those examinations, and it continued to work on much the same lines until the end of 1907. It was found, however, that the instruction given was not sufficiently practical, that the students turned out seldom continued to practise agriculture, and that the land round the college was too inferior to serve the purpose of a college farm. The Saidapet Agricultural College accordingly ceased to exist at the end of 1907. In the meantime a fresh site for a College, Central Farm and Research Institute had been selected at Coimbatore, and the first pupils have been admitted there in June of the current year.

15. The principles which should guide the future development of technical education are clearly indicated by the history of past experiment in this Presidency. In order to be of practical value technical education must be developed in relation to the industrial conditions and needs of the country. The first proposition accepted by the Naini Tal Conference on this subject was that "technical work should be connected with a local industry of the province and have a definite object." In other words, in considering proposals for technical education it is necessary to consider for what classes the technical education is intended and what industries it is to assist. As a general rule it is desirable that technical training should be directed to existing industries and should, in all cases, result in practical employment in the industry taught.

16. In considering the practical action to be taken in encouragement of technical education, the artisan classes may be first dealt with. These can only be reached in the larger centres whence improved methods may gradually filter through to the villages. Even in the larger centres pupils of the artisan classes will only attend technical schools if attracted by scholarships larger than the wages they can earn in the trade. The Technical School at Madura (and possibly other existing technical schools) seems to have erred in two directions. First an insufficient attempt has been made to ensure that the students will practise the trade as a means of livelihood. Boys of all castes have been admitted and given scholarships with the result that much of the money has been wasted. Secondly, instead of a serious attempt to teach trades, attention has been given to the production of artistic work, especially carved wood-work, for which paid workmen are employed. These technical institutes, which are at present under Local Fund management, should be taken over by the Department of Technical Industry and Education. They should provide thorough practical teaching in actual trade work, carpentry (including building and furniture-making), blacksmith's work (including the making, tempering and repair of tools) and brick-layer's work (including the various bonds of brick-work at different angles, arch-work and the making of bricks). Attention should not be devoted to fancy subjects such as wood-carving but to the every-day work of the trade. It is sometimes said that the Indian artisan cannot be taught anything useful that he does not know, but there can be little doubt as to the need for an improved supply of mechanics able to repair the tools required for industrial processes, ginning machines, sugar mills, pumps and agricultural implements. In order to attract students of the proper class scholarships must be given, but such scholarships should be open only to the artisan classes or in special circumstances to Christians, Muhammadans or Pariahs whose fathers are already engaged in the handicraft. Such a restriction coincides with practice in other countries. The trade classes in most English Technical Schools are open only to those engaged in the several trades and the *Fachschulen* of Germany admit apprentices only. Artisan schools on these lines might be opened by the Department of Industrial Development and Education at a dozen or half a dozen centres, the District Board's schools at Madura and Tinnevely being taken over and forming a nucleus. One should be in Madras City, and might be developed on a more liberal scale than the others, so as to provide a more thorough training in the use of machine tools. The main difficulty lies in the provision of qualified teachers. Unless the teacher is a practical expert little useful result can be expected, and it will probably be necessary to obtain trained and expert teachers from England at any rate in the first instance.

17. The next class that deserves consideration is the factory worker. These are of course found only in a very few centres, of which Madras is the most important. Mr. C. B. Simpson of Messrs. Binny & Co., in the two interesting letters he has sent in, strongly urges the claims of this class. He suggests that night schools should be started in the neighbourhood of large factories and that reading, writing and arithmetic, machine and freehand drawing, measuring, weighing and the theory of the trade followed in the factory should be taught. He adds that a small beginning with night classes has been made at the Buckingham and Carnatic Mills. This seems to be a matter appertaining more to general than to technical education, the object in view being to give the factory worker an elementary education combined with elementary instruction in the theory of his employment. Mr. Simpson's remarks may be commended to the notice of the Director of Public Instruction. In England the factory workers attend evening classes in great numbers, in order to study the scientific side of their work. In Bolton, Birmingham, Leicester, Derby, Salford, etc., the number of evening students is reckoned in thousands and almost all are from the mills. But the normal English factory week contains only 54 hours or 9 hours a day, whereas the Indian mill hands work (nominally at least) from 12 to 14 hours a day. At the end of a 14-hour day, the difficulties in the way of working a night school successfully must be very great.

18. After the artisan classes and the factory workers, come the larger industries of the country, weaving, dyeing and tanning; it seems evident that these industries cannot be ignored in any scheme of technical education. Dealing first with weaving, weaving schools for the popularization of improved methods and machinery, such as the flyshuttle and Mr. Churchill's bicycle-action loom, may be established at half a dozen centres of the hand-loom industry, such as Salem, Conjeeveram, Madura. Each must be in charge of a practical expert, obtained either from Bombay or Europe. The comparative want of success which has attended Mr. Chatterton's Salem Weaving Factory may be ascribed to its being under a man who is not himself an expert but merely an intelligent amateur.

19. Referring next to dyeing the question of the action to be taken has been referred to Hon'ble Mr. P. Theagaraya Chetty, Messrs. Binny & Co., and Mr. Chatterton. Mr. Theagaraya Chetty thinks it would be of great use to bring out an expert who would study indigenous dyes and methods and check the import of German dyes. Messrs. Binny & Co. point out that aniline dyes are cheaper and more effective than the indigenous vegetable dyes and consider that it would be of no use to employ an expert merely with the object of reviving the native dyes. They would, however, welcome the establishment of a dyeing institute where practical dyeing would be taught. Mr. Chatterton thinks we must accept the fact that the synthetic dyes have driven vegetable dyes out of use, and doubts whether students would attend classes in dyeing. He would propose to get out an expert, let him study the existing industry, and then report whether he could do anything to improve matters. If he replied in the affirmative, Mr. Chatterton would start dyeing on a commercial basis. Mr. Chatterton's suggestion might perhaps be adopted, an expert in dyeing being procured from Europe, and an institute for giving instruction in the theory and practice of dyeing being started later in accordance with the expert's advice.

20. The third large industry mentioned above is tanning. The introduction of chrome tanning in lieu of the native process might be advanced by the establishment of another chrome tanning factory in the Salem or Coimbatore district. It will be necessary, however, to provide for expert management, without which the establishment of technical institutes is likely to result in waste of money. Both in this additional tannery and in the one at Sembiam students might be admitted and taught the theory and practice of tanning.

21. In addition to schools for the training of artisans and mechanics and institutes for giving instruction in special industries such as weaving, dyeing, and tanning, provision must be made for the higher scientific training of students such as is provided in England by the new Universities of Birmingham, Liverpool, Manchester, Leeds, Sheffield and South Wales and in Germany by the Technical



High Schools at Berlin (Charlottenburg), Munich, Dresden, Stuttgart, Brunswick, Karlsruhe, Darmstadt, Aachen, Hanover and Danzig. On the Engineering side, this place will be filled by the College of Engineering, which may be further developed so as to give instruction in Electrical Engineering, while the Tata Institute of Science in Bangalore may possibly be utilized to supply the requisite training in chemistry as applied to actual trades. If, however, the admission of a sufficient number of candidates from this Presidency into the Bangalore Institute cannot be guaranteed, it will be necessary to start a Chemical Institute in this Presidency. Both in regard to the College of Engineering and in the Chemical Institute it will be desirable that the need for practical work should be recognised. Even in Germany it is a charge against the technical high schools that their training is too theoretical, and the tendency to prefer theory to practice is still more likely to exist in India. Attention may be drawn to Mr. C. B. Simpson's suggestion that in technical training schools work should begin at 6 A.M., so that the student may become early accustomed to factory hours.

22. The subjects of art schools seems to be rather apart from that of technical education, but Mr. Hadaway's suggestion that schools for artistic workmen should be established in centres in which artistic work is already being done may be worthy of adoption. It would seem worth while to establish one or two such schools at least in selected localities.

23. Another matter which seems worthy of consideration is the provision of itinerant teachers or preachers who would visit the villages and endeavour to foster village industries. Mr. Simpson states that injury is done to the wool by uneven shearing of the sheep and that damage is done to the cotton by bad ginning. Mr. Jackson of the Buckingham and Carnatic Mills also refers to the damage caused to the staple in ginning, and Mr. Simpson suggests that where wood, suitable for some particular purpose, say the hub of a bullock cart, is plentiful the village people might be induced to turn out such parts and send them to a central market, "as the various units of a chair are made in different villages of Oxfordshire and Buckinghamshire." Mr. Atkinson suggests that competent travellers might be employed to visit workers in their homes, instruct them in the kind of goods required, point out defects in design, and bring them into relation with markets. It would no doubt be a very difficult task to find men suitable to undertake such work with any useful result, but as the cost would be small, it might be worth while to spend a little on the experiment.

24. The cost of the suggestions made in the last four paragraphs may be roughly estimated as follows:—

|                                  | Initial. | Recurring<br>per annum. |
|----------------------------------|----------|-------------------------|
|                                  | RS.      | RS.                     |
| 12 artisan schools .. .. .       | 1,20,000 | 1,20,000                |
| 6 weaving institutes .. .. .     | 30,000   | 60,000                  |
| 1 chrome leather factory .. .. . | 50,000   | 80,000                  |
| 1 dyeing factory .. .. .         | 40,000   | 50,000                  |
| 1 chemical institute .. .. .     | 4,00,000 | 1,00,000                |
| 2 art industry schools .. .. .   | 5,000    | 5,000                   |
| 6 itinerant teachers .. .. .     | 2,500    | 2,500                   |
| Total .. .. .                    | 6,47,500 | 4,17,500                |

*Note.*—The receipts of the chrome leather factory will meet the whole, or a major part of the charges. Possibly the same would be the case with the dyeing factory.

25. Other suggestions for technical education which have been at various times put forward may now be noticed:—

(1) The Industrial Education Committee of 1903 proposed that an "institute of experiment in the metal industries" should be started in Madras at a cost of one lakh and a recurring expenditure of half a lakh a year. This was to train metal-workers and to introduce new metal manufactures. It may be observed, in regard to this proposal, first, that the Committee's scheme is extremely vague. It is not

clear what metal manufactures—whether of machinery, railway plant or cutlery—are intended to be studied. Secondly, it will be observed that the proposed institute does not subserve any existing industry. Thirdly, it assumes that skilled workmen can be produced by a technical school, which is contrary to all experience. "Industrial skill is acquired in the workshop and the mill" (Shadwell), not in a school.

(2) The same Committee also suggested the creation of training schools for instructors in industries. This suggestion is based on the same misconception as that just noticed, viz., that a practical workman can be produced by a course of teaching in a mere technical school. The instructors in industries which are so much wanted, as the Committee observes, must come from workshops, not from class rooms, and have worked for years in the trade, not gone through a technical class and passed a technical examination.

(3) The same Committee also laid great stress on the introduction of a scheme of apprenticeship under Government control. As inducements to private firms to adopt the Government apprenticeship method, it proposed that their names should be placed on a list of firms entitled to receive Government orders and that they should be provided with the best expert advice. Both proposals seem slightly impractical, and the proposal hardly needs further notice.

(4) The National Fund and Industrial Association, Madras, recommend the establishment of one first-rate College of Technology in Madras which would provide instruction in all technical subjects. From this recommendation it does not clearly appear whether the proposed institute is intended to produce scientific experts, or foremen, or merely trained workmen. Probably the first is meant, and, if so, the combined Engineering and Chemical College will cover the ground.

(5) The National Fund and Industrial Association further suggest that an up-to-date institute to teach textile and leather industries in all their branches should be provided. In this connection, the main principle of technical education, viz., that it should subserve an existing industry, deserves to be kept in view. An institute teaching the textile and leather industries in all their branches would hardly conform to that principle. Moreover, the schools of this class in other countries do not, as a rule, attempt to teach all the branches of an industry. They are generally highly specialised, and serve only the local industry. Thus in Germany the school at Gladbach deals with cotton, that at Aachen with wool, that at Crefeld with silk, and so on. There are nearly 40 schools in Lancashire which teach cotton-weaving and spinning; they do not attempt to teach the textile industry "in all its branches." The cotton mill industry in Madras is perhaps hardly so far developed as to justify the establishment of a high-class technical school to teach spinning and weaving on factory lines. The local industry which seems to need help is the great hand-loom industry. This has been dealt with in the proposals already noticed. Similarly in regard to leather, an institute dealing with all branches of the trade would not subserve an existing industry. What needs assistance is the tanning trade and that also has been dealt with above.

(6) The Chamber of Commerce, Madras, endorses the remarks of Mr. C. B. Simpson on technical education. Mr. Simpson draws attention to the need for men with technical and theoretical knowledge of dyeing, bleaching, finishing, electricity, drawing and tool-using, and insists on the necessity of such men being ready to keep mill-hours, and to use their hands. Dyeing would be dealt with if the dyeing school already referred to is established; electricity and drawing will be taught in the College of Engineering. Tool-using should be an important subject in the artisan school suggested.

(7) The Hon'ble Mr. Yorke (Messrs. Parry & Co.) suggests that competent plumbers are much wanted. Instruction in plumber's work might be given in the College of Engineering if a sufficient demand is found to exist.

(8) The President of the Victoria Technical Institute (Hon'ble Mr. Atkinson) considers that a limited number of experts in such subjects as weaving, dyeing, metallurgy and chemistry would find employment, but that to imagine that the industries of the country would be extended or improved by the mere turning out of an army of pupils from technical schools is a dangerous fallacy.



(9) The Agent of the South Indian Railway (Mr. Priestley) remarks that the Railway workshops represent a many-sided Technical school, and he observes that before educating craftsmen it is necessary to consider how employment will be found for them. This is in accord with the principles already laid down in paragraph 15.

26. In some of the replies doubts have been raised as to the existence in this Presidency of any openings for technically trained men. In order to obtain some definite information on this point a circular letter was addressed to all known factories, industrial firms, and employers of labour asking for information as to the number of their appointments above Rs. 100 per mensem. The replies, so far as they have been received up to date, have been tabulated and are shown in the following Table VI. They prove that there is a fair opening for technically trained men :—

TABLE VI.

Number of appointments carrying over Rs. 100 per mensem in cotton mills and other works and the nationality of persons at present holding these appointments.

|                          | Number of appointments carrying over Rs. 100 per mensem in |                    |              | Nationality of persons at present holding these appointments. |            |          | Total. |
|--------------------------|------------------------------------------------------------|--------------------|--------------|---------------------------------------------------------------|------------|----------|--------|
|                          | Cotton mills and presses.                                  | Engineering works. | Other works. | Europeans.                                                    | Eurasians. | Natives. |        |
| Manager ...              | 7                                                          | ...                | 4            | 8                                                             | 1          | 2        | 11     |
| Chief Engineer ...       | 2                                                          | ...                | ...          | 2                                                             | ...        | ...      | 2      |
| Mechanical Engineer ...  | * 7                                                        | 2                  | † 10         | § 12                                                          | 4          | 3        | 19     |
| Electrical Engineer ...  | 1                                                          | ...                | ...          | 1                                                             | ...        | ...      | 1      |
| Assistant Engineer ...   | 9                                                          | ...                | ...          | 4                                                             | 5          | ...      | 9      |
| Carding master ...       | 8                                                          | ...                | ...          | 3                                                             | 2          | 3        | 8      |
| Spinning master ...      | † 10                                                       | ...                | ...          | 4                                                             | 3          | § 3      | 10     |
| Weaving master ...       | 8                                                          | ...                | ...          | 6                                                             | ...        | 2        | 8      |
| Hosiery master ...       | 2                                                          | ...                | ...          | 1                                                             | 1          | ...      | 2      |
| Woollen master ...       | 1                                                          | ...                | ...          | 1                                                             | ...        | ...      | 1      |
| Dyeing master ...        | 1                                                          | ...                | ...          | 1                                                             | ...        | ...      | 1      |
| Chemists ...             | 6                                                          | ...                | 9            | 13                                                            | 1          | 1        | 15     |
| Executive assistants ... | ...                                                        | 4                  | ...          | 2                                                             | 2          | ...      | 4      |
| Warehouse master ...     | 2                                                          | ...                | ...          | 2                                                             | ...        | ...      | 2      |
| Factory Foreman ...      | 2                                                          | 4                  | 2            | 4                                                             | 3          | 1        | 8      |
| Head Draughtsman ...     | ...                                                        | ...                | 1            | ...                                                           | ...        | 1        | 1      |
| Others ...               | ...                                                        | ...                | 5            | 2                                                             | 1          | 2        | 5      |
| Total ...                | 66                                                         | 10                 | 31           | 66                                                            | 23         | 18       | 107    |

\* One of these is also an Electrical Engineer.  
† Two of these are also carding masters.  
‡ Five of these are also Electrical Engineers.

§ Six of these are also Electrical Engineers.  
|| One of these is also carding master.

27. In this note the term "technical education" has been used to cover all forms of training in industries. It thus applies equally to trade-classes teaching merely a handicraft and devoted to working hands only, to technical middle schools designed to turn out foremen, factory overseers and practical manufacturers, and to technical high schools which aim at producing scientifically trained experts.

26th July 1908.

A. G. CARDEW.

## 4. Notes on Industries.

Although no formal industrial survey has been undertaken in the Madras Presidency, much information regarding its leading industries has from time to time been collected and is to be found in the monographs written by Messrs. Chatterton, Thurston, Harris, Holder and others, in the article on Madras in the Imperial Gazetteer, and in many of the District Gazetteers edited by Mr. W. Francis, I.C.S. From these and other sources the following notes on industries have been compiled in the Revenue Secretariat by M.R.Ry. S. Qandapani Aiyar, B.A., under my supervision. No suggestions for further development have been attempted, the object in view being merely to present in an accessible form the chief statistical and other information illustrating the present position of existing industries. Mr. Chatterton has kindly looked through the notes and has added some marginal remarks.

16th August 1908.

A. G. CARDEW.

## (1) ALUMINIUM INDUSTRY.

G.O., Nos. 504, 505, Educational, dated 5th August 1899.

This industry was started in the Madras School of Arts at the end of March 1898 and the business was transferred to a private company on the 15th September 1903. The following statement exhibits the financial position of the concern during the period it was under Government management :—

|                                                    | Year.        | Expenditure. |    |    | Receipts. |     |     |
|----------------------------------------------------|--------------|--------------|----|----|-----------|-----|-----|
|                                                    |              | Rs.          | A. | P. | Rs.       | A.  | P.  |
| G.O., No. 471, Educational, dated 2nd August 1904. | 1897-1898 .. | 3,800        | 0  | 0  | ...       | ... | ... |
|                                                    | 1898-1899 .. | 45,014       | 7  | 5  | 44,621    | 13  | 9   |
|                                                    | 1899-1900 .. | 93,000       | 0  | 0  | 91,432    | 0   | 8   |
|                                                    | 1900-1901 .. | 1,94,936     | 14 | 0  | 1,37,452  | 2   | 9   |
|                                                    | 1901-1902 .. | 2,34,874     | 7  | 7  | 1,84,549  | 13  | 8   |
|                                                    | 1902-1903 .. | 2,24,001     | 0  | 8  | 1,60,711  | 15  | 0   |
| G.O., No. 863, Judicial, dated 20th June 1908.     | 1903-1904 .. | 94,142       | 15 | 1  | 2,91,582  | 1   | 6   |
|                                                    | Total ..     | 8,99,769     | 12 | 9  | 9,19,352  | 6   | 4   |

Excess of receipts, Rs. 29,580.

Financial and Commercial Statistics for 1907, page 466, and Statements of Sundry Industries for 1906 and 1907.

2. The Indian Aluminium Company, Madras, to whom the business was transferred by Government in 1903, has a nominal capital of Rs. 10 lakhs. Paid-up capital of the company on 31st March 1908 was Rs. 3,45,200. The number of hands employed daily by the company during the last seven years is shown below :—

The decrease in the number of workmen employed is due to the greater use which is now made of machinery. Recently very extensive additions have been made and the workshops are now fully equipped with an up-to-date metal-working plant.

A. CHATTERTON.

| Year.   | Number of hands. | Year.   | Number of hands. |
|---------|------------------|---------|------------------|
| 1901 .. | 150              | 1905 .. | 316              |
| 1902 .. | 150              | 1906 .. | 294              |
| 1903 .. | 364              | 1907 .. | 265              |
| 1904 .. | 56               |         |                  |

From the beginning this company has been fairly successful, but very few of the shares are held by Indians although the company mainly supplies native requirements.

A. CHATTERTON.

3. The shares of the company are reported to change hands at about Rs. 67-8-0, the paid-up value being Rs. 75. The company has paid dividends of 7 per cent., 7 per cent. and 9 per cent. during the last three years.

4. The value of imports of the metal (which was all from the United Kingdom) during the last five years is shown below :—

| Year.           | Rs.      |
|-----------------|----------|
| 1903-1904 .. .. | 1,67,869 |
| 1904-1905 .. .. | 1,05,240 |
| 1905-1906 .. .. | 1,80,585 |
| 1906-1907 .. .. | 2,18,000 |
| 1907-1908 .. .. | 1,89,000 |

#### (2) BRICK AND TILE-MAKING.

Outside the two districts of Malabar and South Canara, the bricks and tiles required by the people are made by the village potter and there is no organized industry in these articles. But in the two districts mentioned above, clays are found which are excellently suited for the manufacture of roofing and ornamental tiles, and several organized works for the manufacture of these articles exist. Sixteen of these works employ more than 50 hands daily and, in 1907, 2,600 persons were employed in all. The most important of these are the Henke's Tile Works near Calicut employing more than 500 workmen and the six works controlled by the Basel German Mission in which 1,359 persons were employed in 1907. The Government Brickfields in Madras (Egmore) give work to 150 hands daily.

2. The value of bricks and tiles imported into the Presidency during the five years ending with 1906-1907 averaged about Rs. 47,000 *per annum*. A considerable quantity of the West Coast product is exported to Ceylon and other Provinces of India, chiefly Bombay, and this trade is steadily increasing. The average annual value of the exports during the five years ending 1906-1907 was nearly Rs. 5 lakhs.

#### (3) CEMENT WORKS.

The only cement works in the Presidency appear to be the Madras Portland Cement Works at Madras. These works are owned by the Arbuthnot's Industrials, Limited, and Portland cement, cement paving slabs, cement concrete pipes, etc., are manufactured there. The number of hands employed daily in the works during the last seven years is shown below :—

| Year.   | Number of hands | Year.   | Number of hands. |
|---------|-----------------|---------|------------------|
| 1901 .. | 357             | 1905 .. | 800              |
| 1902 .. | 353             | 1906 .. | 539              |
| 1903 .. | 430             | 1907 .. | 349              |
| 1904 .. | 615             |         |                  |

Reviews of Sea-borne Trade.

Census Report, 1901, vol. XV, pages 206-207.

*Imperial Gazetteer*, article on Madras Presidency, page 60.

Statement of Sundry Industries for 1907.

Volume of Sea-borne Trade and Navigation for 1906-1907.

For many years tiles of a superior quality were made at the School of Arts, Madras, but chiefly on account of the unsuitability of the site the industry was given up in 1899. It never attained large dimensions and the tiles were always sold at a loss. Lately the Zamindar of Singampatti has started a brick and tile factory in his village near Ambasamudram in the Tinnevely district. Excellent tiles have been made, but as yet the factory is only partially developed.

A. CHATTERTON.

Statement of Sundry Industries for 1907.

Lawrence Asylum Press Almanac for 1907, page 1712.

Financial and Commercial Statistics for 1906, page 468, and Statement of Sundry Industries for 1906 and 1907.

Page 259 of the volume of Sea-borne Trade and Navigation for 1906-1907.

Page 118, *ibid*.

There was hardly any export of cement from this Presidency during the five years ending 31st March 1907, while the imports during the same period averaged nearly 8,000 tons *per annum* valued at Rs. 3.15 lakhs.\* The countries from which cement was imported are shown below :—

| Name of country.      | Quantity in tons. | Value in rupees. |
|-----------------------|-------------------|------------------|
| 1. United Kingdom ..  | 6,456             | 2,64,420         |
| 2. Belgium ..         | 1,038             | 34,165           |
| 3. Germany ..         | 247               | 9,937            |
| 4. Other countries .. | 103               | 6,352            |
| Total ..              | 7,844             | 3,14,874         |

The chief obstacle to the development of the Madras Cement Industry is the high price of fuel. With the raw materials available very excellent cement can be made. Extended experience of Madras leads to the conclusion, however, that the quality is very variable due to insufficient care in the processes of manufacture.

A. CHATTERTON.

On an average nearly 50,000 tons of cement worth nearly Rs. 20 lakhs are imported annually into India from the United Kingdom alone.

\* The value of the imports in 1907-1908 amounted to nearly Rs. 5 lakhs.

#### (4) COFFEE-CURING.

Statement of Sundry Industries for 1907.

The number of coffee-curing works employing not less than 50 hands in 1907 was as follow :—

| District.       | Locality.                      | Number of works. | Number of hands employed. |
|-----------------|--------------------------------|------------------|---------------------------|
| Coimbatore ..   | Coimbatore ..                  | 2                | † 350                     |
|                 | Tellicherry ..                 | 3                | 617                       |
| Malabar ..      | Cheruvannur (Calicut taluk) .. | 1                | 300                       |
|                 | Kaccheri (Calicut taluk) ..    | 1                | 112                       |
| South Canara .. | Mangalore ..                   | 7                | 2,000                     |
|                 | Total ..                       | 14               | 3,379                     |

† Pepper-cleaning is also carried on in two of these.

#### (5) COIR-MAKING.

Columns 1568 to 1572 of Table XV at page 298 of the Census Imperial Tables for 1901, volume XV-A, and Tables for the Laccadives at page 382 *ibid*.

*Population supported*.—The following statement shows the number of persons returned as subsisting on this industry at the census of 1901 :—

|                    | Actual workers. |          | Dependents of both sexes. | Total actual workers and dependents. |
|--------------------|-----------------|----------|---------------------------|--------------------------------------|
|                    | Males.          | Females. |                           |                                      |
| Malabar ..         | 2,387           | 31,246   | 7,681                     | 41,314                               |
| South Canara ..    | 512             | 3,653    | 1,289                     | 5,454                                |
| Gôdâvari ..        | 199             | 1,304    | 506                       | 2,009                                |
| Other districts .. | 2,304           | 4,407    | 5,110                     | 11,821                               |
| Total ..           | 5,402           | 40,610   | 14,586                    | 60,598                               |

Of the actual workers, the large majority of whom are women, 73 per cent. were found in Malabar and another 10 per cent. in South Canara. The industry is therefore practically confined to these two districts. Some rope is also made in, and exported from, the Gódvári district.

2. *Trade statistics.*—The import trade in coir and coir cordage is quite negligible, the value of imports from foreign countries being less than a half lakh. The export trade in these articles is, however considerable, as the following average figures for five years ending 1906-1907 will show:—

Gódvári District Gazetteer, page 107, and page 348 of the volume of Sea-borne Trade and Navigation for 1906-1907.

Page 120 *ibid.*  
Pages 260 and 504 *ibid.*

| Countries to which sent.                | Coir.     |           | Cordage and rope. |          |
|-----------------------------------------|-----------|-----------|-------------------|----------|
|                                         | Quantity. | Value.    | Quantity.         | Value.   |
|                                         | TONS.     | RS.       | TONS.             | RS.      |
| United Kingdom ... ..                   | 8,918     | 16,96,527 | 195               | 39,413   |
| Germany ... ..                          | 7,039     | 15,69,940 | 41                | 8,631    |
| Belgium ... ..                          | 2,282     | 4,67,097  | ...               | ...      |
| France ... ..                           | 2,055     | 4,00,752  | ...               | ...      |
| Holland ... ..                          | 1,663     | 3,48,973  | ...               | ...      |
| United States ... ..                    | 981       | 2,25,659  | ...               | ...      |
| Turkey ... ..                           | ...       | ...       | 173               | 25,091   |
| Arabia ... ..                           | ...       | ...       | 118               | 17,776   |
| Persia ... ..                           | ...       | ...       | 82                | 13,161   |
| Other countries ... ..                  | 1,363     | 2,69,582  | 150               | 27,679   |
| Other Provinces of British India ... .. | 8,313     | 12,20,396 | 4,576             | 6,22,905 |
| Total ...                               | 33,279    | 62,07,826 | 5,335             | 7,54,656 |

Almost the whole of this trade is with the two ports of Calicut and Cochin, where several coir presses have been established. At Cochin, Messrs. Brunton & Sons, Volkart Brothers and Messrs. Pierce Leslie & Co. have presses, and the last-named firm also has a press at Calicut. Messrs. Brunton's Press employs sixty hands.

3. *Process of manufacture.*—The process of manufacture of coir in Malabar is as follows: The husks of cocoanuts are soaked for six months or longer in water, being buried in pits as near as possible to the water line of rivers and backwaters. The colour of the yarn, which regulates to a great extent the price it commands, is said to depend very much on the water in which the husks are steeped. It should be running water and, if possible, fresh, as salt water is said to affect the colour of the yarn injuriously. On being removed from the pits, the fibre is beaten out with wooden hammers by women, it is dried in the sun for twelve hours and is then ready to be pressed and baled for export. Fibre is also extracted from the stalks of the leaves of palmyra palms in some parts of Palghat taluk, and exported

Page 351 of the volume of Sea-borne Trade and Navigation for 1906-1907.

Lawrence Asylum Press Almanac for 1907, page 1715, and statement of Sundry Industries for 1907.

Malabar District Gazetteer (Government Press, 1908), pages 250 and 251.

Lawrence Asylum Press Almanac for 1907, page 1715, and Statement of Sundry Industries for 1907.

Malabar District Gazetteer, page 251.

Letter, dated 24th June 1908.

to Ceylon and elsewhere. Most of the fibre is exported as yarn. There are certain matting works and roperies in the district (Messrs. Goodacre & Son's works at Cochin make coir mats and employ 158 hands daily) and it is stated that "excellent ropes and mats are made in Cochin, and a coarser quality in Calicut."

4. The Agent and Manager, Basel Mission Industrial Establishments, mentions coir industry as one of the "industries to be started by Government with the aim eventually to hand it over to private firms", and states that he is prepared to give a fuller explanation at the Conference.

#### (6) COTTON.

Census Report for 1901, volume XV-A, pages 288 to 291.

*Population supported.*—The number of persons subsisting on industries connected with cotton is second only to the population dependent on agriculture. The following statement shows the numbers returned in the Census of 1901 as engaged in the various processes of cotton manufacture:—

| Major head.                     | Minor head.                           | Actual workers. |          | Dependents. | Total.    |
|---------------------------------|---------------------------------------|-----------------|----------|-------------|-----------|
|                                 |                                       | Males.          | Females. |             |           |
| Cleaning, ginning and pressing. | <i>Mill Industry—</i>                 |                 |          |             |           |
|                                 | Owners, Managers and Superior staff.  | 32              | ...      | 80          | 112       |
|                                 | Operatives and other subordinates ... | 1,922           | 177      | 2,651       | 4,757     |
|                                 | <i>Hand Industry ... ..</i>           | 10,632          | 11,269   | 16,502      | 38,453    |
|                                 | Total ...                             | 12,643          | 11,446   | 19,233      | 43,522    |
| Spinning and weaving.           | <i>Mill Industry—</i>                 |                 |          |             |           |
|                                 | Owners, Managers and Superior staff.  | 60              | ...      | 181         | 241       |
|                                 | Operatives and other subordinates ... | 6,791           | 2,188    | 8,268       | 17,245    |
|                                 | <i>Hand Industry—</i>                 |                 |          |             |           |
|                                 | Weavers ... ..                        | 383,132         | 163,036  | 517,711     | 1,063,879 |
|                                 | Spinners, sizers and yarn beaters ... | 6,414           | 59,456   | 15,216      | 81,086    |
|                                 | Carpet and rug makers ... ..          | 555             | 338      | 1,099       | 1,992     |
|                                 | Calenderers, fallers and printers ... | 711             | 1,122    | 1,640       | 3,473     |
|                                 | Cotton dyers ... ..                   | 5,726           | 2,364    | 10,931      | 19,021    |
|                                 | Tape makers ... ..                    | 99              | 62       | 124         | 285       |
|                                 | Tent makers ... ..                    | 18              | ...      | 27          | 45        |
|                                 | Total ...                             | 403,506         | 228,564  | 555,197     | 1,287,267 |
|                                 | Grand Total ...                       | 416,149         | 240,010  | 574,430     | 1,230,589 |

#### Agricultural Statistics.

2. *Cotton cultivation.*—The area under cotton cultivation in the Presidency during the year 1906-1907 was over 1,833,000 acres, and formed 6 per cent. of the total cropped area of the province. The area under cultivation has advanced about 30 per cent. during the last 25 years. Nearly 60 per cent. of the area in the Presidency on which cotton is grown lies in the four Deccan districts.



(Cuddapah, Kurnool, Bellary and Anantapur) and in Guntur, and over 30 per cent. in the districts of Coimbatore, Madura and Tinnevely. The following statement shows the area cultivated with cotton in each district during each of the last six years.

|                    | Actual area under cultivation in. |            |            |            |            | Average for the quinquennium. | Actual area cultivated in 1906-1907. |
|--------------------|-----------------------------------|------------|------------|------------|------------|-------------------------------|--------------------------------------|
|                    | 1901-1902.                        | 1902-1903. | 1903-1904. | 1904-1905. | 1905-1906. |                               |                                      |
| <i>East Coast.</i> | ACS.                              | ACS.       | ACS.       | ACS.       | ACS.       | ACS.                          | ACS.                                 |
| Ganjam ...         | 1,777                             | 1,544      | 1,283      | 1,147      | 1,157      | 1,382                         | 1,374                                |
| Vizagapatam ...    | 10,798                            | 9,505      | 9,040      | 9,265      | 7,394      | 9,201                         | 6,520                                |
| Godavari ...       | 5,019                             | 3,945      | 3,469      | 3,372      | 4,739      | 4,109                         | 6,826                                |
| Kistna ...         | 189,204                           | 191,169    | 241,392    | 55,386     | 48,870     | 218,218                       | 54,287                               |
| Guntur ...         | ...                               | ...        | ...        | 210,487    | 174,584    | ...                           | 193,202                              |
| Nellore ...        | 17,337                            | 22,031     | 21,744     | 9,994      | 15,771     | 17,375                        | 18,038                               |
| Total ...          | 204,135                           | 223,194    | 276,928    | 289,651    | 252,515    | 250,285                       | 280,247                              |
| <i>Deccan.</i>     |                                   |            |            |            |            |                               |                                      |
| Cuddapah ...       | 69,593                            | 69,354     | 137,409    | 127,854    | 113,533    | 107,547                       | 112,326                              |
| Kurnool ...        | 170,647                           | 232,861    | 275,406    | 238,067    | 281,020    | 245,600                       | 249,092                              |
| Bellary ...        | 287,896                           | 328,267    | 333,019    | 408,988    | 394,607    | 350,435                       | 360,402                              |
| Anantapur ...      | 145,171                           | 136,276    | 146,544    | 171,050    | 152,757    | 150,160                       | 147,520                              |
| Total ...          | 673,247                           | 785,758    | 892,389    | 975,359    | 941,977    | 853,742                       | 869,340                              |
| <i>South.</i>      |                                   |            |            |            |            |                               |                                      |
| Chingleput ...     | ...                               | 8          | 5          | 5          | ...        | 4                             | ...                                  |
| North Arcot ...    | 14                                | 11         | 9          | 25         | ...        | 12                            | 6                                    |
| Salem ...          | 11,455                            | 15,016     | 14,482     | 14,278     | 15,754     | 14,197                        | 15,773                               |
| Coimbatore ...     | 177,661                           | 231,219    | 230,595    | 256,948    | 253,899    | 230,064                       | 250,661                              |
| South Arcot ...    | 4,726                             | 2,097      | 3,509      | 4,342      | 3,026      | 3,540                         | 3,176                                |
| Tanjore ...        | 2,503                             | 2,260      | 1,764      | 2,205      | 2,175      | 2,241                         | 3,185                                |
| Trichinopoly ...   | 14,457                            | 15,857     | 17,684     | 17,320     | 16,513     | 16,366                        | 16,954                               |
| Madura ...         | 77,811                            | 94,847     | 83,676     | 196,483    | 155,064    | 122,176                       | 146,510                              |
| Tinnevely ...      | 214,634                           | 205,440    | 245,728    | 250,621    | 255,220    | 234,189                       | 247,529                              |
| Total ...          | 502,861                           | 566,755    | 600,452    | 742,127    | 701,353    | 622,729                       | 683,794                              |
| <i>West Coast.</i> |                                   |            |            |            |            |                               |                                      |
| Nalgirra ...       | ...                               | ...        | ...        | ...        | ...        | ...                           | 111                                  |
| Malabar ...        | ...                               | ...        | ...        | ...        | ...        | ...                           | 89                                   |
| South Canara ...   | 156                               | 160        | 162        | 160        | 160        | 160                           | 163                                  |
| Total ...          | 156                               | 160        | 162        | 160        | 160        | 160                           | 363                                  |
| Grand Total ...    | 1,380,499                         | 1,580,867  | 1,769,911  | 2,007,297  | 1,896,305  | 1,726,976                     | 1,833,744                            |

3. *Export of raw produce.*—The average annual export of cotton during the five years ending 1906-1907 was nearly 40,000 tons, of which 38,500 tons were sent to foreign countries and the rest to other Provinces of British India. Most of the exported cotton goes from the ports of Madras, Cocanada and Tuticorin. The following statement shows the chief countries to which it was sent:—

|                              | Quantity in tons. | Value in rupees. |
|------------------------------|-------------------|------------------|
| Japan ...                    | 12,568            | 70,28,924        |
| Belgium ...                  | 8,455             | 49,55,850        |
| United Kingdom ...           | 6,476             | 39,30,018        |
| Germany ...                  | 4,535             | 27,19,535        |
| France ...                   | 2,202             | 12,26,898        |
| Italy ...                    | 1,082             | 6,68,642         |
| Austria-Hungary ...          | 1,017             | 6,32,857         |
| Other foreign countries ...  | 2,104             | 12,61,426        |
| Other Provinces of India ... | 1,472             | 9,13,289         |
| Total ...                    | 39,979            | 2,33,87,439      |

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G.O., No. 410, dated 30th March 1906.

Paras. 3-4 of letter at page 4 of G.O., No. 436, dated 25th February 1907, and G.O., No. 2179, dated 30th August 1907.

The quality of the Indian cotton has deteriorated in recent years, chiefly due to the use of mixed seed and poor methods of cultivation. Systematic endeavours are now being made to introduce the growth of pure cotton and improve the methods of cultivation. A cotton expert has recently been added to the Imperial Agricultural Department.

4. *Cotton ginning, cleaning and pressing.*—The large export trade referred to in the preceding paragraph requires that the cotton should be ginned, cleaned and pressed preparatory to export; and accordingly a number of establishments for this purpose are found in the various cotton-growing areas noted in paragraph 3 above. Formerly all the cotton presses were in Madras and the raw cotton was brought to them in carts, taking months upon the road. The construction of railways has altered this and, cotton is now ginned and pressed locally. The number of ginning and cleaning mills which was 34 in 1881 is now nearly one hundred. Of these 34 employ over 50 hands and upwards. Their distribution in the various cotton-growing districts is shown below:—

|                | Number. | Hands employed. |
|----------------|---------|-----------------|
| Kistna ...     | 3       | 150             |
| Guntur ...     | 3       | 259             |
| Kurnool ...    | 1       | 62              |
| Bellary ...    | 8       | 729             |
| Anantapur ...  | 2       | 103             |
| Coimbatore ... | 2       | 116             |
| Madura ...     | 2       | 118             |
| Tinnevely ...  | 13      | 1,175           |
| Total ...      | 34      | 2,713           |

5. *Hand industry.*—In addition to the organized works referred to above, there are 21,951 persons subsisting on hand ginning, etc., of cotton. More than half of these are found in Vizagapatam (4,177), Nellore (2,812), Kistna (2,436) and Tinnevely (2,003). The work is largely done by women.

Table XV (page 289) of Census Report, 1901, volume XV-A.

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6. *Import of manufactured cotton.*—The average value of the imports of cotton twist and yarn, and of woven piece-goods imported by sea into this Presidency during the last five years is shown in the following statements.

## I.—Twist and Yarn.

| Foreign manufactures.           | From Foreign countries. |                   |                 | Indian manufacture—<br>from other<br>Indian provinces. |
|---------------------------------|-------------------------|-------------------|-----------------|--------------------------------------------------------|
|                                 | Mule and water.         | Orange, red, etc. | Total.          |                                                        |
| Counts 1 to 25 ... ..           | RS.<br>57,350           | RS.<br>59,769     | RS.<br>1,17,119 | RS.<br>18,78,093                                       |
| 26 to 30 ... ..                 | 2,50,948                | 1,61,636          | 4,12,584        |                                                        |
| 31 to 40 ... ..                 | 14,74,898               | 33,75,425         | 48,50,323       |                                                        |
| 41 to 50 ... ..                 | 3,12,414                | 38,509            | 3,50,923        |                                                        |
| Above 50 ... ..                 | 5,11,597                | 6,52,592          | 11,63,989       |                                                        |
| Unspecified descriptions ... .. | ...                     | ...               | 13,93,253       |                                                        |
| Total ...                       | 26,07,007               | 42,87,931         | 82,88,138       | 19,73,063                                              |

## II.—Piece-goods.

| Foreign manufacture.                               | Description.       |                   |                            | Total.           | Indian manufacture.                                                                                                                                       |
|----------------------------------------------------|--------------------|-------------------|----------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    | Grey (unbleached). | White (bleached). | Coloured, printed or dyed. |                  |                                                                                                                                                           |
| Cambries, sheetings, drills, twills, muslins, etc. | RS.<br>62,379      | RS.<br>4,46,339   | RS.<br>7,47,328            | RS.<br>12,57,087 | Piece goods—<br>(a) Grey (unbleached) 1,66,261<br>(b) White (bleached) 4,507<br>(c) Coloured, printed or dyed. 21,94,917<br>Other Manufactures ... 33,031 |
| Dhuties, saris, scarves, etc.                      | 40,81,872          | 2,58,021          | 23,16,323                  | 66,56,216        |                                                                                                                                                           |
| Jaconets ... ..                                    | 13,94,355          | ...               | 73,696                     | 14,68,051        |                                                                                                                                                           |
| Mulls ... ..                                       | 12,10,454          | 9,30,223          | 1,23,989                   | 23,14,666        |                                                                                                                                                           |
| Shirtings ... ..                                   | 52,49,557          | 3,55,445          | 7,96,428                   | 64,01,430        |                                                                                                                                                           |
| Nainsooks ... ..                                   | ...                | 10,22,404         | ...                        | 10,22,494        | Total ... 23,58,716                                                                                                                                       |
| Prints and chintz ... ..                           | ...                | ...               | 23,17,731                  | 23,17,731        |                                                                                                                                                           |
| Miscellaneous ... ..                               | ...                | 1,26,787          | 8,98,163                   | 10,24,950        |                                                                                                                                                           |
| Total ...                                          | 1,19,93,617        | 31,82,800         | 72,74,168                  | 2,24,62,575      |                                                                                                                                                           |

The foregoing figures of imports and exports of cotton goods present a striking contrast to the state of things little more than a century ago when the imports of cotton manufactures into India were practically nil, while the exports to England of Indian cotton manufactures were valued at nearly £3,000,000 annually and formed one-third of the export trade of India.

7. *Local cotton manufactures.*—In spite of these huge imports of manufactured cotton goods, the outturn of local mills, handspinnors and handloom weavers is still very large. Of the local consumption no estimate can be made. The average annual value of cotton goods exported during the last five years is shown in the following table:—

## (a) To foreign countries.

| Item.                            | Average annual value. |
|----------------------------------|-----------------------|
| (1) Twist and yarn ... ..        | RS.<br>14,90,843      |
| (2) Piece-goods—                 |                       |
| (a) Grey (unbleached) ..         | 5,56,590              |
| (b) White (bleached) ..          | 13,212                |
| (c) Coloured, printed or dyed .. | 70,85,252             |
| (3) Handkerchiefs and shawls ..  | 7,90,852              |
| (4) Other manufactures ..        | 7,286                 |
| Total ...                        | 99,53,041             |

Imperial Gazetteer, Madras Presidency article, page 55.

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## (b) To other parts of British India.

| Item.                          | Average annual value. |
|--------------------------------|-----------------------|
| (1) Twist and yarn ... ..      | RS.<br>1,64,625       |
| (2) Piece-goods—               |                       |
| (a) Grey (unbleached) ..       | 5,94,843              |
| (b) White (bleached) ..        | 2,80,368              |
| (c) Coloured, printed or dyed. | 13,13,042             |
| (d) Other sorts ... ..         | 72,279                |
| Total ...                      | 24,25,157             |

8. *Mill industry.*—The progress of the cotton mill industry in Madras is shown in the following statistics:—

| Number of             | 1881.  | 1891.   | 1901.    | 1907.   |
|-----------------------|--------|---------|----------|---------|
| Mills ... ..          | 3      | 8       | 11       | 11      |
| Looms ... ..          | ...    | 555     | 1,735    | 1,738   |
| Spindles ... ..       | 48,000 | 173,000 | 2,88,000 | 308,000 |
| Hands employed daily. | 1,400  | 5,600   | 12,600   | 16,740  |

Of the eleven mills working in 1907 the two largest are the Buckingham and Carnatic Mills at Madras, which give employment between them to 8,250 persons daily, and which are the only ones where weaving is carried on. The following statement gives some particulars of the eleven mills referred to above:—

G.O., No. 1636, Revenue, dated 12th June 1908.

| Serial number. | Place of working.         | Date of establishment. | Limited company or private. | Nominal share capital. | Paid-up share capital. | Debentures. | Number of looms. | Number of spindles. | Description of goods. | Average number of hands employed. |        |                |           |        |
|----------------|---------------------------|------------------------|-----------------------------|------------------------|------------------------|-------------|------------------|---------------------|-----------------------|-----------------------------------|--------|----------------|-----------|--------|
|                |                           |                        |                             |                        |                        |             |                  |                     |                       | Men.                              | Women. | Young persons. | Children. | Total. |
| 1              | 2                         | 3                      | 4                           | 5                      | 6                      | 7           | 8                | 9                   | 10                    | 11                                | 12     | 13             | 14        | 15     |
| 1              | Bellary                   | 1883                   | Private.                    | RS.<br>2,50,000        | RS.<br>2,50,000        | RS.<br>...  | ...              | 17,788              | Yarn ...              | 319                               | 19     | 99             | ...       | 437    |
| 2              | Madras (Perambore)        | 1881                   | Joint Stock.                | 10,00,000              | 10,00,000              | 5,00,000    | 928              | 32,912              | Yarn and cloth.       | 2,534                             | 92     | 807            | 813       | 3,946  |
| 3              | Do. ( do. )               | 1876                   | Do.                         | 10,50,000              | 9,80,000               | 7,50,000    | 829              | 35,120              | Do.                   | 2,574                             | 81     | 799            | 854       | 4,308  |
| 4              | Do. (Choolai)             | 1873                   | Do.                         | 5,00,500               | 3,00,500               | ...         | ...              | 37,104              | Yarn ...              | 453                               | 135    | 228            | 296       | 1,117  |
| 5              | Do. (Koyapuram)           | 1904                   | Private.                    | 1,97,551               | 1,97,551               | ...         | ...              | 17,584              | Twist ...             | 543                               | 49     | ...            | 74        | 696    |
| 6              | Coimbatore                | 1888                   | Joint Stock.                | 9,00,000               | 6,74,950               | ...         | ...              | 27,032              | Yarn ...              | 232                               | 237    | 472            | 222       | 1,163  |
| 7              | Madras                    | 1892                   | Do.                         | 10,00,000              | 8,00,000               | ...         | ...              | 36,341              | Do.                   | 974                               | 318    | ...            | 491       | 1,783  |
| 8              | Tatticorin                | 1889                   | Do.                         | 12,00,000              | 9,70,290               | 2,71,175    | ...              | 43,120              | Do                    | 1,991                             | 537    | ...            | 349       | 1,857  |
| 9              | Kolipatti                 | 1892                   | Do.                         | 5,00,000               | 5,00,000               | ...         | ...              | 15,196              | Yarn and twist.       | 361                               | 149    | ...            | 85        | 595    |
| 10             | Papanatam                 | 1885                   | Do.                         | 8,00,000               | 4,84,806               | ...         | ...              | 27,040              | Yarn ...              | 302                               | 166    | ...            | 135       | 623    |
| 11             | Calicut (Kootoosparamba). | 1883                   | Do.                         | 6,00,000               | 6,00,000               | ...         | ...              | 18,424              | Yarn and twist.       | 390                               | 16     | ...            | 9         | 415    |

9. *Outturn in mills.*—The cloth made in these mills is chiefly the coarser kinds and is largely consumed locally and is also exported to the Straits Settlements and Ceylon. The yarn is nearly all of the lower counts, and much of it is absorbed by the hand-weavers throughout the province. It is also exported to China, the

Volume of Sea-borne Trade and Navigation for 1906–1907.

value of yarn sent during the five years ending 1906-1907 having been on an average Rs. 13½ lakhs per annum. The total outturn of all the mills in certain years is given below :—

| Year.            | Thousands of pounds of |        |
|------------------|------------------------|--------|
|                  | Yarn.                  | Cloth. |
| 1896-1897 ... .. | 29,319                 | 5,285  |
| 1900-1901 ... .. | 27,653                 | 5,710  |
| 1903-1904 ... .. | 28,714                 | 5,344  |
| 1905-1906 ... .. | 35,262                 | 8,186  |
| 1906-1907 ... .. | 36,724                 | 7,953  |
| 1907-1908 ... .. | 36,933                 | 7,593  |

The outturn of yarn and cloth in the Presidency during the triennium ending with 31st March 1908 was 6 and 5 per cent., respectively, of the total quantity of those produced in British India during the same period. The Jail department, also carries on some manufacture of cotton goods for supply to Government departments, and the Central Jail, Coimbatore, possesses 80 looms driven by steam-power with subsidiary machinery.

10. *Hand-industry*.—There are a number of weaving establishments in the Presidency, which are not classed as mills, in which organized work is carried on. Five of these works are under the supervision of the Basel German Mission and are located on the West Coast. These employ 945 hands daily. At Madura there is a very large hand-weaving factory devoted to the manufacture of expensive bordered cloths. Nearly 200 looms have been installed in a large shed specially built for the factory. A. J. Peris' weaving establishment at Mangalore has 50 workmen. At Tondiarpet, Madras, the Hon'ble Mr. P. Theagaraya Chetti Garu maintains a handloom factory giving work to 94 hands daily and another weaving factory with over 100 looms is owned by some Nattukottai Chetties. Two establishments at Nidadavolu in the Kistna district do weaving and knitting work and employ 75 hands daily. There are several other factories scattered about the Presidency and the number of Industrial schools (Nazarath, Karur, Arni, Coimbatore, Chingleput, Ayyampet) having weaving departments in which the work is properly organized. Outside these few small factories, the mass of the handloom weavers represent an entirely unorganised industry.

*Imperial Gazetteer*, Madras Presidency article, page 59.

Statistics of Cotton Shipping and Weaving for March 1908, published by the Commerce and Industry Department.

Statement of Sundry Industries for 1907.

Practically each loom, or at the outside each weaving family, is the unit of the trade. With the object of attempting to assist the handloom weavers, a handloom factory has been opened at Salem under the control of the Director of Industrial and Technical Enquiries. An account of the work done at this factory will be found in a paper presented to the Surat Industrial Conference by Mr. Chatterton.

*Imperial Gazetteer*, Madras Presidency article, page 55.

11. *Centres of hand-weaving industry*.—The largest centres of the handloom weaving trade are in the districts of Madura, Tanjore, Salem and Chingleput. Fine cotton and silk cloths for female attire are made at Tanjore, Madura, Conjeeveram, Kuttalam and Kornad in the Tanjore district, Kampli and Adoni in the Bellary district, Arani in the Chingleput district, and in several other places. The satins made at Ayyampettai (Tanjore district), Ariyalur (Trichinopoly district), and Arcot and Walajapet in the North Arcot district for women's jackets and Muhammadan trousers are of considerable beauty. The fine lace-like patterns on the fabrics of Paramagudi, Manamadurai and Pamban—all in the Madura district—when drawn or painted by hand with the first preparation of wax are exceedingly effective. The muslins manufactured at Arani and Chieacole are justly celebrated. Full information regarding these manufactures and the processes employed in them will be found in Mr. Thurston's Monograph on the Cotton Fabric Industry published in 1897. Cotton carpets are largely made in Kurnool and Adoni. Cotton printers occur mostly in Tanjore. A few tape-makers and tent-makers are shown in the Census returns, but neither of these industries is conspicuous in this Presidency.

Census Report, 1901, Vol. XV, page 208.

*Godavari District Gazetteer*, page 112.

12. *Embroidery and lace-making*.—At the last Census 1,654 persons were returned as engaged on these industries most being in Madras City, where a considerable number of Muhammadans are thus employed. Mrs. Cain, wife of the Rev. J. Cain, of the C.M.S. Mission, has started a lace-work industry at Dummagudem in the Godavari Agency. The lace made there is not the "pillow lace" made elsewhere in South India, but what is called "darned net work," which somewhat resembles Limerick lace in appearance. The produce finds a sale not only in India, but also in England and Australia. Lace-making is also taught to

girls in various Mission institutions, and specimens of their work were shown in the Madras Industrial Exhibition of 1903.

13. *Gold and silver thread*.—Gold and silver thread (technically called "gold lace") for use in weaving "lace cloths" is largely imported, the annual value of this article imported in 1906-1907 and 1907-1908 being Rs. 20 lakhs and Rs. 31 lakhs respectively. Most of it comes from France. Nearly two-thirds of the total imports of this article to British India in 1906-1907 was received in this province.

#### (7) DYEING.

*Population supported*.—The information supplied by the Census returns regarding the population connected with the dyeing industry is imperfect. Cotton dyeing and silk dyeing, according to native methods, form separate occupations followed by different sections of the weaving caste. The cotton dyers numbered 8,090 at the Census of 1901 and are found in almost every district. Silk dyeing is shown in the Census returns as supporting only 138 persons, of whom 107 were in the Tanjore district, but these figures are doubtless incorrect. In Mr. Holder's Monograph on Dyeing (Government Press, 1896) he showed silk dyeing to be practised in 140 villages distributed over twelve districts. Carpet weavers generally dye their own wool, and hence wool dyers do not form a separate class.

2. *Materials and processes*.—A full description of the indigenous colouring substances and of the method of dyeing cotton, silk and wool followed by native dyers will be found in Mr. Holder's Monograph referred to above. The indigenous dye stuffs have, however, of late years been largely ousted by synthetic dyes, produced mainly in Germany. The great change that has occurred in this respect in the last twenty years will be seen from the following figures. During the decade ending 1890-1891, the average annual imports of foreign dyes amounted to only 46,000 lbs., while during the succeeding decade (ending 1900-1901) they rose to 1,347,000 lbs., or nearly 30 times as much. The average annual imports during the quinquennium

Report of the Madras Exhibition of 1903, page 55.

Volume of Sea-borne Trade and Navigation for 1906-1907.

Recently a factory for the manufacture of gold thread has been started at Perambore. It is under the management of a French expert and his wife. The plant and machines have been obtained from France. The thread turned out is of fair quality, but it is not equal to the best French thread owing to the inferior quality of the Indian spun silk.

A. CHATTERTON.

Page 9 of the Monograph on Dyes and Dyeing.

Census Report, 1901, vol. XV-A, page 291.

Page 9 of the Monograph.

Census Report, 1901, vol. XV-A, page 287.

Sir F. Nicholson's Note on the material condition of the Presidency at page 14 of G.O., No. 711, dated 11th August 1902.

Volume of Sea-borne Trade and Navigation for 1906-1907.

#### Agricultural Statistics.

ending with 1906-1907 amounted to 1,186,000 lbs. The extent to which indigo has been replaced by aniline dyes is well known. The average area annually under indigo cultivation was 428,000 acres in the five years ending 1890-1891. Since then there has been a steady decline as follows:—

For five years ending—

|                           | ACRES.  |
|---------------------------|---------|
| 1895-1896 .. ..           | 394,000 |
| 1900-1901 .. ..           | 303,000 |
| 1905-1906 .. ..           | 195,000 |
| And for the year 1906-07. | 183,000 |

Madura, which was once very famous in Southern India for its native dyeing, is now the biggest centre for the use of aniline and alizarine dyes. The following remarks by the Director of Technical and Industrial Enquiries in connection with the dyeing industry are of interest:—

"The industry to be selected for a scholarship should be dyeing and bleaching and the candidate to whom it is awarded should be a Graduate in Chemistry. The industry is one of gradually increasing importance in this Presidency as of late years there has been a great expansion in the dyeing of turkey red in Madura. Roughly there are three branches of the industry:—

"(1) The work done in European dye-houses, such as exist in the Buckingham and Carnatic Mills in Madras and the mills at Madura.

"(2) *Native dye-houses using aniline and alizarine dyes*.—These are scattered all over the country, the biggest centre being at Madura.

"(3) *Native dye-houses using natural dyes*.—This branch of the industry is by no means extinct, but nowhere is it worked on a large scale.

"In regard to bleaching, it is at the present moment entirely confined to mills, but there is no question that hand-made goods would be more popular and command higher prices if before putting them upon the market they were subjected to a finishing bleaching process. I am of opinion that a chemist with a practical knowledge of dyeing and bleaching would be able to make a very good income in Madras, and if



"employed by Government he might do  
"a great deal to improve the textile  
"industries. As an example of what I  
"mean I may mention that I have  
"recently ordered some samples of dyed,  
"worsted and woollen yarn from Europe  
"with a view to manufacture native  
"shawls in hand-loom. If these are  
"successful, it is proposed to import only  
"grey yarn and to get all the dyeing  
"done in this Presidency with vegetable  
"dyes. It appears to me to be an exceed-  
"ingly promising experiment, and I am  
"almost certain that, when we come to  
"the development of the dyeing, we shall  
"require the services of an expert  
"chemist.

"The carpet industry is not a very  
"important one from an industrial point  
"of view, but it might be improved if  
"more attention is paid to the dyeing of  
"wool. This is only practicable by  
"chemists who are experts at tinctorial  
"work."

#### (8) GLASS.

There is no glass manufacture of  
importance in the Presidency. An  
inferior make of brittle glassware in  
quaint forms of cups, bottles, etc., is  
said to be produced in Vellore, Salem,  
Trichinopoly and Anantapur; but only  
twelve persons (one in North Arcot and  
eleven in Coimbatore) returned themselves  
at the last Census as engaged in such  
manufactures. Glass bangles are also  
made, the population subsisting on this  
industry being according to the last  
Census—

Report of the Madras Exhibition of 1903.

Census Report for 1901, vol. XV-A, page 302.

Page 271, *ibid.*

| District.       | Actual workers. |          | Total. |
|-----------------|-----------------|----------|--------|
|                 | Males.          | Females. |        |
| Vizagapatam     | 163             | 243      | 406    |
| Ganjām          | 256             | 75       | 331    |
| North Arcot     | 253             | 33       | 286    |
| Anantapur       | 104             | 18       | 122    |
| Other districts | 143             | 117      | 260    |

2. Glassware to the value of Rs. 8-70  
lakhs per annum was imported into the  
Presidency during the five years ending  
1906-1907.

Volume of Sea-borne Trade and Navigation for  
1906-1907.

3. The following remarks of Mr.  
Chatterton on the prospects of a glass  
factory in this Presidency may be of some  
interest:—

"I do not know whether this Presidency  
"possesses natural facilities and suitable  
"materials for the manufacture of glass.  
"Fuel, which is certainly an important item

Letter, dated 7th August 1905, at page 7 of  
G.O., No. 46, Educational, dated 23rd  
January 1906.

Recently some attempts to manufacture glass  
have been made near Ennore by a Madras  
Syndicate who are employing a young man  
who went to Japan to learn the trade. The  
latest information is to the effect that as yet  
success has not been attained.

A. CHATTERTON.

#### (9) JUTE.

*Population supported.*—Statistics as to  
the population depending on this industry  
are not available.

*Vizagapatam District Gazetteer*, pages 101-102.

2. *Raw agricultural produce.*—The real  
jute (*Corchorus capsularis*) is not grown in  
this Presidency; but what is locally  
known as "jute" is the "Deccan hemp"  
(*Hibiscus cannabinus*) grown chiefly on  
the red soils in the zamindari area in the  
centre of the Vizagapatam district. The  
exact area under the crop is not known,  
but has been computed at 49,000 acres.  
After harvesting and cleaning, the fibre is  
washed and dried and taken either to  
Kalingapatam or (more generally) to  
Bimlipatam. Some of it is pressed into  
bales by machinery and exported to  
Europe, where it is considered as good  
as the Calcutta jute. It was sold till  
recently at Rs. 26 per candy of 500 lbs.,  
but the price has now risen to Rs. 45.

G.O., No. 1636, dated 12th June 1908, and  
*Vizagapatam District Gazetteer*, page 228.

3. *Manufactures.*—There are two jute  
mills in the Presidency. One of them  
was originally a sugar factory belonging  
to Messrs. Arbuthnot & Co., but was con-  
verted in 1867 into a mill for spinning  
and weaving the local "jute" referred  
to above. The concern now belongs to  
the Arbuthnot's Industrials (Limited),  
contains 154 looms and 3,328 spindles,  
and employed 1,209 hands daily during  
the year 1907-1908. It is reported to  
turn out about 26 lakhs of gunny bags  
annually. A second mill has recently (in  
1907) been started at Ellore in the Kistna  
district, with a nominal capital of Rs. 5  
lakhs, for the manufacture of gunny bags.  
It has 80 looms and 1,704 spindles and  
employed 380 hands daily during the  
year 1907-1908. In three or four  
villages near Palkonda and one or two  
round Anakapalle, both in the Vizaga-  
patam district, this same fibre is woven  
on hand-loom into long strips of gunny  
which are sold to the local grain-dealers  
and by them cut up and stitched into  
bags.

*Vizagapatam District Gazetteer*, page 122.

4. *Trade.*—The average annual value of export of raw jute during the five years ending with 1906–1907 was Rs. 18 lakhs. Over 82 per cent. of this was sent to the United Kingdom and 16 per cent. to Germany. There was hardly any export of manufactured articles. The average value of imports during the same period was about Rs. 24 lakhs and consisted chiefly of gunny bags from Ceylon and Bengal.

#### (10) LEATHER.\*

*Population supported.*—The following table shows the population subsisting on industries connected with leather:—

|                                                                         | Actual workers. |          | Dependents. | Total.  |
|-------------------------------------------------------------------------|-----------------|----------|-------------|---------|
|                                                                         | Males.          | Females. |             |         |
| Tanneries and leather factories. { Owners, managers and superior staff. | 11              | 1        | 83          | 95      |
| Operatives and other subordinates.                                      | 4,908           | 726      | 8,939       | 14,573  |
| Tanners and curriers                                                    | 3,219           | 403      | 5,798       | 9,420   |
| Leather dyers                                                           | 70              | 7        | 130         | 207     |
| Shoe, boot and sandle makers                                            | 99,967          | 11,618   | 157,866     | 269,451 |
| Water-bag, well-bag, bucket and gheepot makers                          | 45,262          | 5,533    | 81,203      | 131,999 |
| Total                                                                   | 153,437         | 18,283   | 254,019     | 425,744 |

2. *Tanneries.*—There are a dozen tanneries in the Presidency which employ 50 hands or more daily. These are distributed as follows:—

| District.    | Locality.                      | Number of hands employed daily. |
|--------------|--------------------------------|---------------------------------|
| Ganjām       | Russellkonda                   | 60                              |
| Vizagapatam  | Vizianagram                    | 110                             |
| Anantapur    | Chetrepalle (near Gooty town). | 130                             |
| Chingleput   | Tiruvottiyur                   | 70                              |
|              | Pallavaram                     | 70                              |
|              | Kodambakam (two tanneries).    | 200                             |
| North Arcot  | Ambūr                          | 146                             |
| Coimbatore   | Coimbatore                     | 150                             |
| Trichinopoly | Trichinopoly (two tanneries).  | 100                             |
|              | Srirangam                      | 100                             |
| Total        |                                | 1,235                           |

3. *Trade, Imports.*—The average annual value of the imports of leather by sea into this Presidency during the five years ending with 1906–1907 was Rs. 7.24 lakhs. In addition to these imports by

Volume of Sea-borne Trade for 1906–1907.

\* A full account of this industry will be found in the Madras Monograph on the Tanning Trade which was prepared by Mr. Chatterton. It was the enquiries then made that brought to light the necessity for experiments in the manufacture of chrome leather.

A. CHATTERTON.

Census Report, vol. XV-A, pages 313–315.

Statement of Sundry Industries for 1907.

Volume of Sea-borne Trade and Navigation for 1906–1907.

Volumes of Rail-borne Trade for three years ending 1906–1907.

sea, large quantities of hides and skins are received by rail into the Presidency, mostly for re-export. The average annual value of the articles so received during the triennium ending 1906–1907 is shown below:—

| Province or State from which imported. | Hides.   |                    | Skins.    |                    |
|----------------------------------------|----------|--------------------|-----------|--------------------|
|                                        | Raw.     | Dressed or tanned. | Raw.      | Dressed or tanned. |
|                                        | RS.      | RS.                | RS.       | RS.                |
| Bombay                                 | 57,891   | 87,554             | 21,11,751 | 13,54,391          |
| Bengal                                 | 1,23,066 | 1,27,825           | 78,008    | 41,339             |
| United Provinces                       | ...      | ...                | 89,245    | 81,820             |
| Punjab                                 | ...      | 6,193              | 42,606    | 14,88,095          |
| Central Provinces                      | 8,779    | 40,681             | 4,04,265  | 2,80,848           |
| Nizam's Dominions                      | 1,35,206 | 1,94,377           | 26,30,102 | 3,85,083           |
| Mysore                                 | 3,02,646 | 4,322              | 45,37,643 | 10,55,483          |
| Rajputana                              | ...      | ...                | 91,472    | 5,131              |
| Other places                           | 8,642    | 11,173             | ...       | ...                |
| Total                                  | 6,36,230 | 4,78,125           | 99,85,692 | 46,92,180          |

Reviews of the Sea-borne Trade of the Madras Presidency for three years ending 1906–1907.

4. *Export of raw hides and skins.*—The exports of raw hides are small, their value during the five years ending 1906–1907 having averaged only Rs. 31,000 per annum. Raw skins are, however, largely exported, the annual average having been 55,678 cwt. valued at Rs. 55 lakhs. There are great fluctuations in this trade, due to changes in the foreign demand. The value of the exports was only Rs. 20 lakhs in 1900–1901, but in the next year it rose to Rs. 60 lakhs. A falling off in the chrome leather trade in the United States reduced the exports of raw skins, during the next two years; but improved conditions in America and France then again produced an advance. The value of raw skins exported rose in 1904–1905 to over Rs. 53 lakhs, in 1905–1906 to Rs. 91 lakhs, and in 1906–1907 to Rs. 93 lakhs. Goat skins form the bulk of these exports.

5. *Export of tanned skins and hides.*—The subjoined table shows the progress of this trade during the five years ending 1906–1907 and the average value per lb. as deduced from the Custom House declarations:—

| Year.     | Tanned hides. |             |              | Tanned skins. |             |              |
|-----------|---------------|-------------|--------------|---------------|-------------|--------------|
|           | Quantity.     | Value.      | Rate per lb. | Quantity.     | Value.      | Rate per lb. |
|           | CWT.          | RS.         | A. P.        | CWT.          | RS.         | RS. A. P.    |
| 1902–1903 | 97,049        | 51,54,662   | 8 0          | 117,211       | 1,76,40,183 | 1 5 5        |
| 1903–1904 | 93,922        | 54,80,759   | 8 4          | 124,898       | 1,89,34,580 | 1 5 7        |
| 1904–1905 | 112,486       | 74,18,239   | 9 5          | 101,555       | 1,44,86,367 | 1 4 4        |
| 1905–1906 | 177,744       | 1,33,59,408 | 10 9         | 100,688       | 1,50,21,729 | 1 5 4        |
| 1906–1907 | 197,490       | 1,51,98,048 | 11 0         | 109,410       | 2,03,31,548 | 1 11 2       |
| Average   | 135,738       | 93,82,223   | 9 10         | 110,748       | 1,73,84,631 | 1 6 5        |

The general shortage of leather supplies in the world's markets coupled with the increasing number of uses to which leather is put have resulted in a gradual rise in prices. The United Kingdom is the distributing centre, although direct shipments to other countries are increasing.

6. *Government Tannery*.—In order to introduce the chrome-tanning process into this Presidency, the Government sanctioned, in November 1903, a grant of Rs. 2,000 for experiments in this process. Further grants were sanctioned in subsequent years; and these having proved successful, the scope of the operations has been recently enlarged by the building of a well-equipped Government tannery at Perambur near Madras.

Mr. Chatterton's note in G.O., Nos. 650, 651, dated 22nd May 1906.

G.O., No. 1188, dated 3rd December 1906, and Mr. Chatterton's report for 1907-1908.

The locally-made chrome leather is chiefly in demand for kavalais, sandals and boots and shoes. In connection with the tannery, but located in the Poonamallee Road in the workshops attached to the office of the Director of Industrial and Technical Enquiries, is a leather goods manufactory in which on an average 70 chucklers are employed. The sales have gradually increased till they amount to about 1 lakh a year. Chrome leather is also made in Coimbatore and a new chrome leather company with a capital of 1 lakh has been started in Bangalore, but has not yet commenced operations as the machinery ordered from Europe has not yet arrived. Chrome leather can be best manufactured on a large scale with suitable machinery and its extensive use will lead to the concentration of the leather industry in a few large tanneries. The experience of the last four years shows that chrome-tanned leather is at least twice as durable as the indigenous vegetable-tanned leather. Its adoption will therefore lead to a diminution in the internal demand for hides and a corresponding increase in the number available for export.

A. CHATTERTON.

### (11) MANURES.

The demand for artificial manures in this Presidency is mainly confined to planters, the native ryot making but little use of these manures other than oil-cake. Ten firms, mostly under European management, are engaged in the industry. The chief artificial manures produced are bone meal, oil-cake, milled or dried fish and saltpetre, both refined and unrefined.

Among large producers of artificial manures in this Presidency are Messrs. Parry & Co., Managing Agents of the Presidency Manure Works at Rānipétai,

Dr. Lehmann's Memorandum at page 57 of the Proceedings of the Board of Agriculture in India on the 18th February 1907.

Report of the Madras Exhibition of 1903, page 87.

Dr. Lehmann's Memorandum.

and Messrs. Stanes & Co. of Coimbatore. The manufactures of the former firm include phosphatic nodules, ground and vitriolized, bone-meals, muriate of potash and sulphate of potash. The manufacture of sulphuric acid in the Rānipétai works is separately noticed (see Sulphur). Messrs. Stanes & Co. of Coimbatore are manufacturing a neutral sulphate of potash out of the acid sulphate of potash obtained as a bye-product from the Cordite Factory at Wellington.

Nearly 49,000 tons of manure valued at over Rs. 26 lakhs were exported annually during the triennium ending 1907-1908, oil-cake forming the bulk of the exports. Other considerable items are bones and fish manure. The trade is chiefly with Ceylon.

### (12) METALS AND PRECIOUS STONES.

*Population supported*.—The following statement shows the population, according to the last Census, subsisting on work in metals and precious stones :—

Census Report for 1901, vol. XV-A, pages 297-301.

|                                                       | Actual workers. |          | Dependents. | Total.  |
|-------------------------------------------------------|-----------------|----------|-------------|---------|
|                                                       | Males.          | Females. |             |         |
| Goldsmiths' dust-washers                              | 806             | 152      | 1,470       | 2,428   |
| Electroplaters                                        | 598             | 22       | 1,074       | 1,694   |
| Gold and silver wire-drawers and braid-makers         | 268             | 6        | 538         | 812     |
| Workers in gold, silver and precious stones           | 94,456          | 3,502    | 181,777     | 279,735 |
| Pearl divers                                          | 101             | 13       | 498         | 612     |
| Brass, copper and bell-metal workers                  | 14,248          | 826      | 25,646      | 40,720  |
| Workers in tin, zinc, quicksilver and lead            | 3,334           | 157      | 6,270       | 9,761   |
| Iron Foundries. { Owners, managers and superior staff | 6               | ...      | 18          | 24      |
| { Operatives and other subordinates                   | 260             | ...      | 511         | 771     |
| Workers in iron and hardware                          | 49,762          | 3,904    | 94,837      | 148,503 |
| Total                                                 | 168,839         | 8,583    | 312,639     | 485,060 |

Most of the workmen are Kammalans by caste.

2. *Raw material*.—None of the metals referred to above are now mined in the Presidency; and the raw materials required are all imported. The value of the imports during the last two years is shown below together with the averages for the previous five years :—

Review of the Sea-borne Trade of 1907-1908.

|               | Average of five years ending 1905-1906. |                | 1906-1907. |                | 1907-1908. |                |
|---------------|-----------------------------------------|----------------|------------|----------------|------------|----------------|
|               | Weight.                                 | Value.         | Weight.    | Value.         | Weight.    | Value.         |
| German silver | CWT. 2,901                              | LAHRS RS. 2.41 | CWT. 1,295 | LAHRS RS. 1.06 | CWT. 2,337 | LAHRS RS. 2.22 |
| Brass         | 934                                     | 49             | 570        | 38             | 1,166      | 79             |
| Copper        | 32,025                                  | 15.44          | 21,205     | 12.54          | 30,691     | 20.62          |
| Tin           | 1,875                                   | 1.80           | 998        | 1.42           | 2,049      | 2.63           |
| Zinc          | 4,702                                   | .93            | 4,146      | .98            | 5,879      | 1.32           |
| Quicksilver   | 203                                     | .39            | 180        | .29            | 47         | .08            |
| Lead          | 9,610                                   | 1.24           | 6,197      | .95            | 8,153      | 1.33           |
| Iron          | 614,844                                 | 38.23          | 575,003    | 40.14          | 773,208    | 55.71          |
| Steel         | 132,687                                 | 11.18          | 149,545    | 11.79          | 234,526    | 19.01          |

German silver, brass and copper are received chiefly from the United Kingdom; tin comes chiefly from the Straits Settlements and zinc from Belgium; and iron and steel from the United Kingdom and Belgium and to a small extent from Germany. The figures for aluminium are given in the section devoted to that industry.

3. *Large industries.*—The chief iron and brass foundries in the Presidency are the following:—

(1) The Napier Works of Messrs. Massey & Co., Limited (262 hands);

(2) The Beehive Foundry of Messrs. Oakes & Co., Limited (222 hands);

(3) The Reliance Foundry owned by the Arbuthnot's Industrials, Limited (204 hands);

(4) The Basin Foundry (107 hands); and

(5) The Victoria Works of Messrs. D. Raju & Co. at St. Thomé (71 hands). These works are all in Madras City. Outside its limits, the only works of importance are (i) the Basel Mission Mechanical Works at Mangalore and (ii) Messrs. Martin & Co.'s Iron Foundry at Cocanada. The operations of the Aluminium Company have been separately referred to.

4. The manufacture of brass locks, etc., is carried on to a considerable extent at Dindigul and Tuticorin and iron trunks are now being made at Negapatam in the Tanjore district. But the largest metal manufactures of the province consist of the brass, copper and bell-metal utensils for domestic purposes and wedding gifts required by the upper and middle classes, the iron agricultural and industrial tools, and the jewellery worn by all classes of the population (the metal of which they are made varying with the wearer's station in life).

5. Much of the metal work of the Presidency possesses artistic merit. Tanjore is now the chief centre for such work, and the three main varieties made there consist of combinations of copper and silver or of brass and copper, and of graven brass. The encrusting of copper with silver figures is a modern adaptation of the older art, and the demand for these wares is almost entirely European. Brass trays and plates, with thin plates of copper with crude representations let in or damascened, of gods, are made at

Statement of Sundry Industries for 1907.

Lawrence Asylum Press Almanac for 1907, page 1720.

Imperial Gazetteer, Presidency article, page 56.

Tirupati, in the North Arcot district. At Vellore in the same district exists an industry in pierced brass trays engraved with mythological figures. An interesting type of brass-work is carried on in the Ganjam district, namely, the making of grotesque animal and human figurines, cast by the *cire per due* process, which are said to be used as wedding presents by the Khonds. At Sivaganga, brass models of lizards, cobras, frogs and other animals are made. At Kurumbalur in the Trichinopoly district, brass trays and vessels inlaid with zinc are manufactured. The Madras Museum possesses a good collection of the metal artware of the Presidency. The manufacture of fine ornamental brass and bronze work, in the shape of many-branched lamps, sacrificial utensils, images, etc., for which Southern India was once famous, has now become almost a lost art.

6. *Trade.*—The import of raw metal has already been referred to. Besides this, a large quantity of machinery, mill-work, hardware, cutlery, etc., is annually imported. The statement below compares the value of the imports of the last two years with that of the preceding quinquennium:—

|                                         | Average of the<br>quinquennium<br>ending 1905-<br>1906. | 1906-1907. | 1907-1908. |
|-----------------------------------------|---------------------------------------------------------|------------|------------|
|                                         | RS.                                                     | RS.        | RS.        |
| <i>Machinery and Mill-work.</i>         |                                                         |            |            |
| Locomotive and other steam-<br>engines. | 5,88,012                                                | 14,97,925  | 8,51,340   |
| Electrical machinery ... ..             | 20,09,023                                               | 2,04,845   | 6,10,234   |
| Mining do. ... ..                       |                                                         | 5,16,123   | 7,09,096   |
| Textile do. ... ..                      |                                                         | 5,33,496   | 11,71,550  |
| Other kinds of machinery ...            |                                                         | 6,42,524   | 10,78,838  |
| <i>Hardware and Cutlery.</i>            |                                                         |            |            |
| Cutlery ... ..                          | 81,220                                                  | 83,068     | 1,10,104   |
| Agricultural implements ...             | 1,06,965                                                | 1,57,473   | 1,60,228   |
| Other implements and tools ...          | 1,71,715                                                | 2,61,129   | 2,60,060   |
| Enamelled ironware ... ..               | 1,38,512                                                | 1,23,747   | 3,11,865   |
| Sampware ... ..                         | 1,80,223                                                | 2,33,108   | 2,47,116   |
| Sewing machines ... ..                  | 78,979                                                  | 1,10,296   | 1,21,654   |
| Other sorts ... ..                      | 12,75,772                                               | 15,79,174  | 19,47,331  |
| Total ... ..                            | 42,31,470                                               | 59,72,808  | 75,80,122  |

There is hardly any export of raw metal or metalware from the Presidency.

7. Mr. Chatterton's remarks on this subject are reproduced below:—

Letter, dated 7th August 1905, at page 7 of G.O., No. 40, Educational, dated 23rd January 1906.

"Metal plate work is an important indigenous industry in this Presidency and it is still carried on in a very crude manner. The works of the Indian



"Aluminium Company, Triplicane, represent the highest development of this trade and they are an immense advance upon anything else in this Presidency; but a good deal could still be done both in that metal and with brass and copper if men skilled in European processes were available to direct operations. The Indian Aluminium Company are endeavouring to produce drawn steel grain measures, but have not yet succeeded through inexperience with this kind of work. If they did succeed, it is probable that they would get very large orders for such measures. Such work is regularly done every day in Europe in connection with the enamelled iron trade."

### (13) MINES AND MINERALS.

*Minerals produced.*—Except salt and building materials, such as granite, limestone, laterite, clay, etc., the only minerals which are at present produced in any quantity in this Presidency are manganese, mica and saltpetre. Iron, coal, diamonds and other minerals occur, but are not at present worked on any large scale.

2. *Manganese.*—Manganese ore occurs in the Sandur State, in the Bellary district, and in the Vizianagram zamindari of the Vizagapatam district. The ore found in Sandur and Bellary is reported to be rich in quality, but is only now beginning to be worked by the Sandur General Mining Company. In the Vizagapatam district, manganese mining is being carried on by the Vizianagram Mining Company which began work in 1892 and by the Madras Manganese Company, which started operations in 1906. In the Vizagapatam district the mines are large open excavations and contain no underground workings. The ore occurs mainly in veins, which are visible on the surface and usually dip down without diminishing in richness. Ore and earth are brought to the surface together, and the former is then hand-picked and sent by rail to Vizagapatam, whence it is shipped to America, Middlesborough, Dunkirk and other places for use in the manufacture of steel and in chlorination processes such as those adopted in gold mines. Between 1900 and 1904 the output seriously declined owing to competition from newly opened mines in Russia, Brazil and elsewhere, and in the last of these years, the Company was unable to pay any

*Imperial Gazetteer, Presidency article, page 52.*

*Bellary District Gazetteer, page 17.*

*Vizagapatam District Gazetteer, page 125.*

Reports under the Mines Act for 1904 to 1907; and volume of Sea-borne Trade and Navigation for 1906-1907.

dividend. Since then, however, matters have taken a turn for the better, as the following statistics show :—

| Year.    | Output.   |          | Export.   |          | AVERAGE DAILY NUMBER OF PERSONS EMPLOYED. |          |           |        |               |          |           |        |
|----------|-----------|----------|-----------|----------|-------------------------------------------|----------|-----------|--------|---------------|----------|-----------|--------|
|          | Quantity. | Value.   | Quantity. | Value.   | Above ground.                             |          |           |        | Below ground. |          |           |        |
|          |           |          |           |          | Males.                                    | Females. | Children. | Total. | Males.        | Females. | Children. | Total. |
|          | TONS.     | RS.      | TONS.     | RS.      |                                           |          |           |        |               |          |           |        |
| 1904 ... | 53,649    | 3,95,903 | 52,925    | 4,23,403 | 168                                       | 102      | 31        | 301    | 1,088         | 530      | ...       | 1,618  |
| 1905 ... | 62,495    | 4,69,599 | 64,275    | 5,14,205 | 641                                       | 397      | 77        | 1,115  | 915           | 478      | ...       | 1,393  |
| 1906 ... | 108,966   | (a)      | 106,635   | 8,52,340 | 1,653                                     | 1,047    | 290       | 2,990  | 1,822         | 986      | 50        | 2,858  |
| 1907 ... | 125,820   | 6,00,524 | 121,735   | 9,74,004 | 3,696                                     | 1,731    | 270       | 5,697  | 1,740         | 975      | 5         | 2,720  |

(a) Not furnished.

*Imperial Gazetteer, Presidency article, page 52.*

Reports under the Mines Act for 1904 and 1905.

Report for 1906.

Review of the Sea-borne Trade of the Madras Presidency for 1906-1907, page 18.

Report under the Mines Act for 1907.

Volume of Sea-borne Trade and Navigation for 1906-1907.

3. *Mica.*—Mica is found in several districts, but is only extensively mined in Nellore. Operations there may be said to have been begun in 1887, but it was not until ten years later that the industry assumed any considerable proportions. During the quinquennium ending with the year 1905, the average annual output was only 237 tons, but in the year 1906, the output was 1,214 tons (valued at Rs. 8.8 lakhs), the number of mines worked in the year having risen to 142 from 87 in the preceding year. A great portion of the larger output of 1906 consisted, however, of splittings used in the manufacture of micanite and fetched about Rs. 18 per cwt. less than the product of the previous year. In 1907, the output fell to 769 tons, but this was due to the better quality of the material produced and does not indicate any decline in the industry. The following figures show the progress of the export trade in mica during the quinquennium ending 1906-1907 :—

| Year.        | Quantity exported. CWTs. | Value of exports. RS. |
|--------------|--------------------------|-----------------------|
| 1902-1903 .. | 3,755                    | 2,89,805              |
| 1903-1904 .. | 3,330                    | 2,71,818              |
| 1904-1905 .. | 6,334                    | 5,79,202              |
| 1905-1906 .. | 9,788                    | 7,57,534              |
| 1906-1907 .. | 15,296                   | 9,12,034              |

Most of the mica produced is sent to the United Kingdom; but recently Germany has also begun to take it, the value of the exports to that country during the three years ending 1906-1907 having been respectively Rs. 25,641, Rs. 94,276 and Rs. 2,78,327.

*Imperial Gazetteer, Presidency article, page 53.*

The mica mines are mainly owned by natives who are often the ryotwari holders of the land, and are seldom elaborately equipped. The explorer generally selects

his starting point from surface indications, obtains a lease and sets a few labourers to dig pits. Should the plot appear promising, he increases the number of coolies and uses explosives to blast the rocks in which the mica lies embedded. In these earlier stages no expensive plant is used, though, if the excavations eventually reach any considerable depth, machinery worked by hand or driven by steam is employed for drawing up spoil or keeping the excavation clear of water. The mica is obtained in rough slabs of various dimensions which are trimmed, cleaned and sorted on the spot, and then packed and shipped. For further particulars regarding the industry, reference may be made to the *Memoirs of the Geological Survey of India*, vol. XXXIV, Part II.

The number of persons employed in mica mines during the year 1907 was 6,271, of whom 3,855 (2,116 males, 1,613 females and 126 children) were working below ground and 2,416 (688 males, 852 females and 876 children) above ground. Two thousand eight hundred and ninety-five persons were engaged in splitting mica rounds during the same year.

Good ruby mica of fair size is mined at Cherambadi on the western frontier of the Nilgiri district by Messrs. Pierce Leslie & Co. of Calicut and by the Indian Glenrock (Wynaad) Company. The output in 1906 was 12,600 lb.

4. *Saltpetre*.—Crude saltpetre is obtained by lixiviating the nitrous effluence found in several districts, and is then sent to refineries. Since edible salt can be educed in these processes, manufacture is only permitted under license from the Salt department. In 1906-1907 there were 1,631 factories managed by native agency for the production of crude saltpetre and 36 refineries, and the amount of refined saltpetre made during the three years ending 1906-1907 averaged annually 1,694 tons. The greater part of this was produced in the two districts of Coimbatore and Trichinopoly. Nearly 80 per cent. of the persons returned at the last census as saltpetre refiners were found in these two districts.

5. *Building materials*.—Statistics as to the quantities of clay and building stones extracted annually are not procurable. A fine-grained and compact variety of limestone found in the Cuddapah district is employed for a

Report under the Mines Act and statement of sundry industries for the year 1907.

*Nilgiri District Gazetteer*, page 13.

*Imperial Gazetteer*, Presidency article, page 53.

Salt Administration Report for 1906-1907.

Census Report for 1901, vol. XV-A, page 309.

*Imperial Gazetteer*, Presidency article, page 53.

*Ibid*, Article on Cuddapah District, pages 2-3.

*Imperial Gazetteer*, Presidency article, page 53.

*Imperial Gazetteer*, Presidency article, page 53.

G.O., No. 1821, dated 2nd July 1908.

*Imperial Gazetteer*, Presidency article, page 54.

*Imperial Gazetteer*, Presidency article, page 54.

Reports under the Mines Act for 1904 to 1907.

*Imperial Gazetteer*, Presidency article, page 54.  
*Vizagapatam District Gazetteer*, page 125.  
*Goddavari District Gazetteer*, page 11.

*Imperial Gazetteer*, Presidency article, page 54.

variety of purposes under the name of Cuddapah slabs. Laterite is the ordinary building material of the West Coast.

6. *Minerals not successfully worked*.—Iron has been smelted in primitive fashion in many districts from time immemorial; and a full report on the subject was published by Mr. E. Balfour of the Madras Museum in 1855. The extraordinary deposits of magnetic iron in the Kanjamalai Hill and other parts of the Salem district are occasionally from 50 to 100 feet thick and run continuously for miles. The chief hindrance to working them is the absence of fuel. The possibility of smelting this ore by water power has been suggested.

Coal has been worked in the Godavari district but with little success, the coal seam having disappeared at a fault.

Gold is obtained by washing by villagers in the rivers of several districts. The only considerable outturn recently has been from a shaft (now closed) sunk by the Mysore Reefs Company in the Kan-gundi zamindari in North Arcot, but the Anantapur Gold Mining Company is now conducting operations in the Anantapur district with favourable prospects. The working of the Wynaad Gold Fields in the early eighties of the last century ended in failure.

Magnesite deposits occur in some hills near Salem town which have long been called the Chalk Hills from the innumerable white patches of this substance which cover their sides. This mineral is stated to be useful for making plaster, tiles, paving-blocks, etc., and also in refractory linings for furnaces, and as a dephosphorising agent in the steel industry. A license has been taken out for the mining of magnesite, but the work appears to be conducted in a spasmodic fashion as the following figures of output show:—

| Year.   | Output in tons. | Year.   | Output in tons. |
|---------|-----------------|---------|-----------------|
| 1901 .. | $\frac{1}{2}$   | 1905 .. | 2,063           |
| 1902 .. | 3,540           | 1906 .. | 1,832           |
| 1903 .. | 826             | 1907 .. | 186             |
| 1904 .. | 1,315           |         |                 |

Graphite was mined by the Godavari Coal Company at Pedakonda in Bhadrachalam taluk (Godavari Agency), but no operations are now carried on there. Prospecting for the mineral is going on in both the Vizagapatam and Godavari districts.

Corundum is most plentiful in Coimbatore and Salem districts, but is worked in a fitful fashion.

Copper ore appears once to have been worked in the Nellore district, where there are numerous traces of old mines, and lead ores have been found in several places in the Ceded Districts. It is also stated that some of the ores of lead found near Kurnool and Cuddapah showed silver in appreciable quantities. The working of none of these has been taken up.

Diamonds are said to have been formerly largely mined in the Presidency. They are still occasionally found in the Anantapur district, especially near the village of Vijrakarur where the villagers search for them after heavy showers of rain. Some twenty years ago, a diamond was picked up in this village which after it had been cut at Amsterdam, was valued at upwards of £10,000. Operations with modern machinery have recently been conducted by some European companies.

7. The following remarks of the Director of Industrial and Technical Enquiries may be of interest in this connection:—

“All mining enterprises, except those in the Nellore district for mica, are in the hands of European syndicates and the work is entirely conducted by men trained at home and with varied experience of mining in different parts of the world. If a native of India took up mining after a practical course of instruction in England, it would be necessary for him to spend 10 or 15 years in mining camps in other countries before he would be likely to inspire confidence among the promoters of such ventures in India. As matters at present stand, I think it will be waste of money to give State scholarships for mining in this Presidency.”

#### (14) OIL AND OIL-SEEDS.

*Population supported.*—The following statement shows the population, according to the last Census, subsisting on oil-pressing:—

|                                                            | Actual workers. |          | Dependents. | Total. |
|------------------------------------------------------------|-----------------|----------|-------------|--------|
|                                                            | Males.          | Females. |             |        |
| Oil-mills ... { Owners, managers and superior staff ... .. | 25              | ...      | 67          | 92     |
| Oil-mills ... { Operatives and other subordinates ... ..   | 760             | 141      | 1,378       | 2,269  |
| Oil pressers ... ..                                        | 14,312          | 4,307    | 21,213      | 39,832 |
| Pressers of vegetable oil for lighting ... ..              | 5,115           | 2,520    | 8,472       | 16,107 |
| Total ...                                                  | 20,202          | 6,968    | 31,130      | 58,300 |

Ball's *Economic Geology*, pages 232 and 241, quoted in Mr. Sambasiva Aiyar's paper on Mineral Industries of India.

*Imperial Gazetteer*, Presidency article, page 54. *Anantapur District Gazetteer*, pages 167-168.

A Madras syndicate is at present carrying on mining operations for diamonds in the Banganapalle State where there are very extensive ancient workings.

A. CHATTERTON.

Letter, dated 7th August 1905, at page 7 of G.O., No. 46, Educational, dated 23rd January 1906.

Census Report for 1901, volume XV-A, pages 246, 247, 249 and 259.

#### Agricultural Statistics.

2. *Raw agricultural produce.*—No mineral oil is produced in the Presidency; but about two million acres are annually cultivated with oil-seeds. The table below shows the average area under the different kinds of seeds during the quinquennium ending 1905-1906 and the area cultivated in the year 1906-1907:—

|                    | Quinquennium ending 1905-1906. | Year, 1906-1907. |
|--------------------|--------------------------------|------------------|
|                    | ACRES.                         | ACRES.           |
| Til or gingelly .. | 842,819                        | 662,606          |
| Linseed ..         | 29,378                         | 33,538           |
| Other oil-seeds .. | 1,141,808                      | 1,294,519        |
| Total ..           | 2,013,505                      | 1,990,663        |

Gingelly is grown throughout the Presidency, but linseed is raised to any considerable extent only in the Kurnool district. Ground-nut, grown chiefly in the South Arcot district, is the principal item included under “other oil-seeds,” castor coming next. Cotton seeds are largely used as food for bullocks. Small quantities of “rape” seed are exported, but the area under cultivation is not reported. Coconut oil is largely made on the West Coast.

3. *Oil-pressing.*—Oil-pressing is still mostly carried on in primitive fashion by the members of the “Vaniyan” caste; oil mills of European design have, however, in recent years, been set up in a few places in the Presidency; but only two of them (both in Madras City) are of any size, employing between them 229 hands. The Hon'ble Mr. Yorke has expressed the opinion that “oil-pressing in itself is a simple process and it has not yet been clearly proved that western methods are really economically better than the crude ones in vogue in this country.”

4. *Trade, Imports.*—There is hardly any import of oil-seeds into the Presidency. The imports of vegetable oils consist chiefly of coconut oil from Ceylon and linseed oil from the United Kingdom. The annual value of these during the five years ending 1906-1907 averaged Rupees 1,33,158 and Rs. 40,874 respectively. For purposes of comparison the quantity and value of the different kinds of mineral oils imported from foreign countries

#### Statement of Sundry Industries for 1907.

Page 4 of notes to G.O., No. 103, Educational, dated 16th February 1903.

There is a growing demand for oil mills to be worked by oil-engines and there is not the least doubt that if a really good oil mill or press were on the market the number sold would be very large. This is the result of the rise in wages consequent upon high prices and a general increase in the demand for labour.

A. CHATTERTON.

during the last two years are shown below together with the averages of the five preceding years :—

|                              | Average of five years ending 1905-1906. |           | 1906-1907. |           | 1907-1908. |           |
|------------------------------|-----------------------------------------|-----------|------------|-----------|------------|-----------|
|                              | Quantity.                               | Value.    | Quantity.  | Value.    | Quantity.  | Value.    |
|                              | GALS.                                   | RS.       | GALS.      | RS.       | GALS.      | RS.       |
| Fuel oils ... ..             | 239,205                                 | 36,509    | 276,744    | 30,365    | 350,218    | 27,175    |
| Lubricating oils ... ..      | 144,090                                 | 96,023    | 149,413    | 1,18,458  | 343,300    | 2,51,827  |
| Kerosine oil, in bulk ... .. | 7,390,395                               | 24,13,352 | 2,922,074  | 9,39,408  | 4,233,629  | 15,24,989 |
| in cases ... ..              | 3,643,228                               | 17,80,265 | 3,624,066  | 17,16,081 | 4,623,241  | 24,03,913 |
| Other kinds ... ..           | 283,909                                 | 1,08,119  | 13,084     | 15,896    | 63,380     | 59,919    |

Russia used formerly to supply most of the kerosine oil consumed in this Presidency; but of the 22 million gallons imported in 1907-1908, while thirteen millions came from Burma, five from the United States, and three from Dutch Borneo, Sumatra and Roumania, only six lakhs of gallons were received from Russia.

5. *Exports.*—The export trade in oils and oil-seeds is considerable. The following table shows the transactions since the year 1900-1901 :—

|                         | SEEDS.                                  |           |            |           |            |           |
|-------------------------|-----------------------------------------|-----------|------------|-----------|------------|-----------|
|                         | Average of five years ending 1905-1906. |           | 1906-1907. |           | 1907-1908. |           |
|                         | Quantity.                               | Value.    | Quantity.  | Value.    | Quantity.  | Value.    |
|                         | 2                                       | 3         | 4          | 5         | 6          | 7         |
| 1                       |                                         |           |            |           |            |           |
|                         | CWTS.                                   | RS.       | CWTS.      | RS.       | CWTS.      | RS.       |
| Castor ... ..           | 262,308                                 | 13,71,153 | 321,777    | 23,57,081 | 611,619    | 47,68,613 |
| Cotton ... ..           | 71,756                                  | 1,82,613  | 127,549    | 3,74,035  | 294,571    | 8,50,563  |
| Ground-nut * ... ..     | 1,295,288                               | 80,99,520 | 1,350,096  | 99,14,087 | 1,218,092  | 96,33,437 |
| Niger ... ..            | 47,505                                  | 2,38,687  | 64,048     | 4,12,082  | 3,156      | 21,781    |
| Rape ... ..             | 32,342                                  | 1,83,726  | 11,027     | 84,235    | 33,368     | 2,65,845  |
| Gingelly ... ..         | 202,850                                 | 13,88,604 | 60,715     | 5,21,441  | 181,532    | 16,71,738 |
| Cocconut (copra) ... .. | 178,434                                 | 21,42,773 | 125,129    | 18,76,172 | 118,003    | 21,28,000 |

|                         | OILS.                                   |           |            |           |            |           |
|-------------------------|-----------------------------------------|-----------|------------|-----------|------------|-----------|
|                         | Average of five years ending 1905-1906. |           | 1906-1907. |           | 1907-1908. |           |
|                         | Quantity.                               | Value.    | Quantity.  | Value.    | Quantity.  | Value.    |
|                         | 8                                       | 9         | 10         | 11        | 12         | 13        |
|                         | CWTS.                                   | RS.       | CWTS.      | RS.       | CWTS.      | RS.       |
| Castor ... ..           | 193,397                                 | 1,86,792  | 78,978     | 1,04,505  | 132,573    | 1,82,636  |
| Cotton ... ..           | ...                                     | ...       | ...        | ...       | ...        | ...       |
| Ground-nut * ... ..     | 14,698                                  | 18,709    | 1,741      | 2,543     | ...        | ...       |
| Niger ... ..            | ...                                     | ...       | ...        | ...       | ...        | ...       |
| Rape ... ..             | ...                                     | ...       | ...        | ...       | ...        | ...       |
| Gingelly ... ..         | 21,725                                  | 31,856    | 14,765     | 25,472    | ...        | ...       |
| Cocconut (copra) ... .. | 1,920,775                               | 27,87,872 | 943,062    | 13,85,722 | 1,137,520  | 16,43,747 |

\* Exclude the exports from Pondicherry, the statistics of which are not available here.  
† Figures not available.

Review of the Sea-borne Trade of the Presidency for 1904-1905 and 1907-1908.

Castor-seed is sent chiefly to the United Kingdom, Belgium, France and Italy; and cotton and rape seed mostly to the first-named country. The oil expressed from the latter seed is considered by the railway authorities to be the oil *par excellence* for illuminating signals and for lubrication. The groundnuts go chiefly to France, where the oils they yield are used in the soap-making industries. The principal customers for gingelly are France, Austro-Hungary and Belgium, the poorer classes especially in Austro-Hungary using the oil in lieu of the more costly olive oil. Castor oil is sent principally to Ceylon and cocconut oil to Europe where it is used in the butter and soap-making industries.

Review of Sea-borne Trade for 1907-1908; Malabar District Gazetteer, page 250.

6. *Essential oils.*—Lemon-grass oil, manufactured mainly by the Mappillas, from a grass which grows wild in the Ernad and Walavanad taluks of the Malabar district and in Travancore, is the chief oil of this class exported from the Presidency. The following statement shows the quantity and value of the exports during the last five years and the average price per gallon :—

| Year.            | Quantity. | Value.   | Price per gallon. |
|------------------|-----------|----------|-------------------|
|                  | GALS.     | RS.      | RS.               |
| 1903-1904 ... .. | 3,754     | 1,53,914 | 41                |
| 1904-1905 ... .. | 2,623     | 1,36,396 | 52                |
| 1905-1906 ... .. | 2,626     | 1,53,241 | 58                |
| 1906-1907 ... .. | 12,814    | 4,86,150 | 38                |
| 1907-1908 ... .. | 16,195    | 3,86,453 | 24                |

Review of Sea-borne Trade for 1906-1907.

The large output in the last two years was due to the introduction of a better class of stills, but some of the grass is still exported in the raw state. It has been reported that the Brazilian and West Indian oils are unable to compete with the East Indian oil on account of their insolubility in alcohol, and there seems likely to be an increasing demand for Indian lemon-grass oil for use in perfumery and in the manufacture of scents.

#### (15) PAPER.

*Manufacture.*—There is no important manufacture of paper in the Presidency. Very rough paper is manufactured in certain districts, but it does not find any sale beyond the locality in which it is made. At the last Census, 192 persons (168 in the Chingleput district and 24 in Madras City) were returned as employed in paper mills, but there is no mill of any

Census Report, volume XV-A, page 269.



size in either locality. Sixty-three males and 6 females were returned as "paper makers and sellers and palm leaf binders", about 40 per cent. of whom occur in Madras City.

2. *Trade*.—Paper and paste-board to the value of over Rs. 15½ lakhs were imported (chiefly from the United Kingdom) during the year 1907–1908, the corresponding figures for the quinquennium ending 1905–1906 and the year 1906–1907 being Rs. 8½ and Rs. 11½ lakhs respectively. There is also an increasing import trade with Bengal in printing paper, the figures for the five years ending 1906–1907 being as shown below :—

| Year.     | Quantity in cwt. | Value in rupees. |
|-----------|------------------|------------------|
| 1902–1903 | 7,585            | 1,36,757         |
| 1903–1904 | 13,649           | 2,71,051         |
| 1904–1905 | 10,845           | 2,19,190         |
| 1905–1906 | 25,467           | 5,31,544         |
| 1906–1907 | 31,432           | 6,48,717         |

#### (16) POTTERY.

*Population supported*.—At the last Census 164,534 persons were returned as subsisting on this occupation, 89,540 (males 57,927 and females 31,613) of whom were actual workers. 13,359 of the actual workers were partially agriculturists.

2. *Articles manufactured*.—The pottery produced in this Presidency mainly consists of rough earthenware vessels for domestic use and little of it possesses artistic merit. The glazed pottery of Madura is mentioned by Sir George Birdwood, but the industry appears to have now declined. At Kanigiri in the North Arcot district, vases and other articles are produced with a pretty green glaze. Some of these are imitations of Delft ware and other European patterns introduced in recent years. In South Canara, water-vessels and toy representations of articles used for domestic or ceremonial purposes are made in black clay; and at Panruti and Villupuram in the South Arcot district representations of fruit, Hindu gods, etc., are made of a fine clay found locally. An account of modern Madras pottery and the processes followed by the Madras potters will be found in a paper contributed by Mr. Edwin Holder to the *Journal of Indian Art*, volume VII.

The paper manufactured in the neighbourhood of Madras is unglazed and of a whitey-brown colour. The raw material is the waste paper of the city which is ground to pulp and macerated. Each sheet is made separately by the dexterous manipulation of a fine sieve on the surface of a tank full of pulp. It is probable the quality of the paper could be improved without materially adding to the cost. One of the largest of these native paper factories is on the Poona-mallee Road just outside the toll bar and is worth a visit.

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Volume of Sea-borne Trade and Navigation for 1906–1907.

Census Report, 1901, vol. XV-A, page 303.

*Imperial Gazetteer*, Presidency Article, pages 57–58; *Report of the Madras Exhibition of 1903*, pages 69–70.

*Journal of Indian Art*, vii, 7–10.

*South Arcot District Gazetteer*, page 161.

Volume of Sea-borne Trade and Navigation for 1906–1907.

Page 4 of notes to G.O., No. 103, Educational, dated 10th February 1908.

Letter dated 7th August 1905 (at page 7 of G.O., No. 46, Educational, dated 23rd January 1906).

3. *Trade*.—The trade in pottery and other earthenware is not considerable. The average value of the exports was less than Rs. 35,000 *per annum* during the five years ending 1906–1907, while the imports during this period averaged slightly over Rs. 2 lakhs *per annum* chiefly from the United Kingdom. Messrs. Parry & Co. have drawn attention to the need for acid-proof jars in connection with their chemical works at Rānipétai.

4. The following remarks of the Director of Industrial and Technical Enquiries may be of interest in this connection :—

"From our experience in the School of Arts when pottery was manufactured here there seems to me to be but little doubt that a good deal might be done to utilise the brick earths and pottery clays of this Presidency if the work were taken up in a scientific way. If a student who had passed through the Engineering College is given a State Technical scholarship to study brick-making and pottery manufacture in England, on his return his services might well be utilized in the Consulting Architect's division if he found it impracticable to engage in private enterprise."

#### (17) PRINTING AND BOOK-BINDING.

Census Report for 1901, vol. XV-A, page 270.

*Population supported*.—The statement below shows the population returned at the last census as subsisting on printing and book-binding :—

|                                                                | Actual workers. |          | Dependents. | Total. |
|----------------------------------------------------------------|-----------------|----------|-------------|--------|
|                                                                | Males.          | Females. |             |        |
| Printing presses ... { Owners, managers and superior staff ... | 366             | ...      | 1,072       | 1,438  |
| ... { Workmen and other subordinates ...                       | 4,212           | 12       | 8,392       | 12,616 |
| Hand press proprietors, lithographers and printers ...         | 174             | ...      | 334         | 528    |
| Book-binders ...                                               | 1,200           | ...      | 1,949       | 3,149  |
| Total ...                                                      | 5,952           | 12       | 11,767      | 17,731 |

Nearly two-thirds of the actual workers are found in Madras City.

Statement of Sundry Industries for 1907.

2. *Large industries*.—Besides the Madras Government Press, which gave daily employment to 1,171 hands in the year 1907, there are in the Presidency 18 printing presses employing 50 hands or more. Fourteen of these works, employing over 3,000 hands, are in Madras City, the more important of them being Messrs. Graves, Cookson & Co.'s printing and

type-casting establishment in the Popham's Broadway and the Lawrence Asylum Press on the Mount Road. Two presses employing 135 hands are working in each of the districts of South Canara and Triebinopoly.

3. *Trade*.—The value of printing materials imported during the years 1906-1907 and 1907-1908 was Rupees 1,62,279 and Rs. 1,72,646, respectively, against Rs. 1,36,838, the average for the preceding quinquennium.

Review of the Sea-borne Trade of 1907-1908.

*Book-binding*.—Most of the book-binding is done in Madras in connection with the various presses and publishing firms. Cheap bindings are mostly in vogue, but very fair leather binding is done when required. Except for common work, such as account books, all the leather used is imported.

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### (18) RICE-POUNDING AND HUSKING.

*Population supported*.—The following statement shows the number of persons subsisting on this industry according to the last census:—

Census Report for 1901, vol. XV-A, pages 247-250.

|                                                          | Actual workers. |          | Dependents. | Total.  |
|----------------------------------------------------------|-----------------|----------|-------------|---------|
|                                                          | Males.          | Females. |             |         |
| Rice mills ... { Owners, managers and superior staff ... | 50              | 21       | 197         | 268     |
| Operatives and other subordinates ...                    | 834             | 352      | 1,200       | 2,486   |
| Rice pounders and huskers ...                            | 14,517          | 150,510  | 85,220      | 250,547 |
| Total ...                                                | 15,701          | 150,883  | 86,716      | 253,300 |

2. *Rice mills*.—The rice mills in the Presidency, which are inspected by the Inspector of Factories or give daily employment to fifty hands or over, number nineteen, as shown below:—

Statement of Sundry Industries for 1907.

| District.    | Town.                       | Number of hands. |
|--------------|-----------------------------|------------------|
| Vizagapatam. | Vizianagaram ...            | 50               |
| Gódvári ...  | Cocanada ...                | 110              |
|              | Nilapalli ...               | 188              |
|              | Bezwada (eleven factories). | 290              |
| Kistna ...   | Ellore ...                  | 75               |
|              | Nidadavole ...              | 95               |
| Guntúr ...   | Tenali ...                  | 82               |
| Tanjore ...  | Tiruválúr ...               | 182              |
|              | Kajagopalapuram ...         | 51               |
|              | Total ...                   | 1,123            |

Most of these have been started quite recently stimulated by the demand for "boiled rice for export to Ceylon and the Mauritius. Oil-engines are largely used as a source of motive power. In Bezwada alone there are over forty rice mills, mostly small, now in work.

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3. *Hand industry*.—Rice-pounding and husking by manual labour is done chiefly by women, the number of them so employed being more than ten times that of the men. Half the number of the actual workers are found in the four districts of Tanjore (82,043), Malabar (21,959), Gódvári (16,271), and Tinnevely (12,160).

Census Report for 1901, vol. XV-A, page 250

### (19) SILK.

Census Report, vol. XV-A, pages 287-88.

*Population supported*.—The following table shows the number of persons returned at the Census of 1901 as subsisting on the silk industry:—

|                                                                          | Actual workers. |          | Dependents. | Total. |
|--------------------------------------------------------------------------|-----------------|----------|-------------|--------|
|                                                                          | Males.          | Females. |             |        |
| Silk worm rearers and cocoon gatherers ...                               | 30              | 16       | 66          | 112    |
| Silk carders, spinners, and weavers; makers of silk braid and thread ... | 14,219          | 16,204   | 23,877      | 54,300 |
| Silk dyers ...                                                           | 127             | 11       | 274         | 412    |
| Total ...                                                                | 14,376          | 16,231   | 24,217      | 54,824 |

2. *The silk worm industry*.—The silk worm moth (*Bombyx mori*) is not indigenous to this Presidency and its culture is not practised in it at present to any large extent. The tassar silk moth (*Antheraea mytilata*) is indigenous, but so far as is known its culture is not practised at all. The only area in which the silk worm (*Bombyx mori*) is reared to any considerable extent is the Kollegal taluk of the Coimbatore district. In that taluk the area under mulberry cultivation in 1906 was 14,000 acres and has undergone considerable expansion of late years. The silk is spun from the cocoons by means of a light wheel turned by hand. Several attempts have been made by Government to start a silk-producing industry but without success. In the Mysore province the silk worm is largely reared and the Tata experimental farm at Bangalore is well known.

3. *Silk manufacture*.—There are no silk mills in the Presidency. Hand-woven fabrics of pure silk are made in most of the Tamil districts, and in Berhampur and Jaggayapetta in the Northern Circars. Fine cloths of mixed cotton and silk for female attire and other purposes are made in several places in the Presidency and have already been mentioned under "Cotton". Further information on the silk fabric industry of the Presidency will be found in Mr. Thurston's monograph on the subject published in 1899.

Rail-borne Trade Returns from 1904-1905 to 1906-1907 and Volume of Sea-borne Trade and Navigation for 1906-1907.

4. *Trade*.—Raw silk is obtained almost solely from Mysore, the annual imports from that Province during the last three years having averaged Rs. 35 lakhs, while the value of Bengal silk imported during the same period was less than Rs. 23,000. Articles of European manufacture are also

imported to the value of about Rs. 1½ lakhs per annum. Raw silk is exported, mostly to France, the value of this export being Rs. 2½ lakhs a year. Manufactured articles of silk to the annual value of Rs. 60,000 were exported during the five years ending with 1906-1907, mostly to Burma.

#### (20) SUGAR.

*Population supported.*—At the Census of 1901, 67,921 persons or 18 per 10,000 of the population were returned as subsisting on the sugar industry, 43,249 being actual workers and 24,672 being dependents. The former number is composed as follows:—

- (1) Factories: owners, managers and superior staff .. .. . 54
- (2) Factories: operatives and other subordinates .. .. . 1,645
- (3) Makers of sugar, molasses and gur by hand .. .. . 41,550

Of the 41,550 actual workers by hand, 95 per cent. occur in the six districts specified below:—

| Name of district.       | Actual workers. |        |          |
|-------------------------|-----------------|--------|----------|
|                         | Total.          | Males. | Females. |
| Tinnevely .. .. .       | 11,879          | 102    | 11,777   |
| Coimbatore .. .. .      | 9,726           | 1,014  | 8,712    |
| Malabar .. .. .         | 7,122           | 4,961  | 2,161    |
| South Canara .. .. .    | 5,063           | 1,971  | 3,092    |
| Salem .. .. .           | 3,526           | 577    | 2,949    |
| Gódvári .. .. .         | 2,286           | 944    | 1,342    |
| Other districts .. .. . | 1,948           | 906    | 1,043    |
| Total                   | 41,550          | 10,474 | 31,075   |

2. *Factories.*—There are at present in this Presidency five sugar factories giving daily employment to 50 persons or more. These are—

(1) the Aska Sugar Works of the late Mr. F. J. Minchin, which employ 348 hands;

(2) the sugar works managed by Messrs. Parry & Co. at Samalkot (Gódvári district), Nellikuppam (South Arcot) and Kulasekarapatnam (Tinnevely), which together give employment to 1,277 persons; and

(3) the works of the Pettai Sugar Refining Company, Limited, at Tachanallur in the Tinnevely district which employ 82 hands.

3. *Trade statistics.*—The following statement shows the average imports and

Pages 247 and 249 of volume XV-A of Census Report for 1901.

#### Statement of Sundry Industries for 1907.

Volume of Sea-borne Trade and Navigation for 1906-1907.

exports of sugar *per annum* during the five years ending 1906-1907:—

|                           | IMPORTS.       |          |                  |          |           |        |                |          | EXPORTS.       |           |                  |          |
|---------------------------|----------------|----------|------------------|----------|-----------|--------|----------------|----------|----------------|-----------|------------------|----------|
|                           | Refined sugar. |          | Unrefined sugar. |          | Molasses. |        | Confectionery. |          | Refined sugar. |           | Unrefined sugar. |          |
|                           | Quantity.      | Value.   | Quantity.        | Value.   | Quantity. | Value. | Quantity.      | Value.   | Quantity.      | Value.    | Quantity.        | Value.   |
| <i>British Empire.</i>    | TONS.          | RS.      | TONS.            | RS.      | TONS.     | RS.    | TONS.          | RS.      | TONS.          | RS.       | TONS.            | RS.      |
| United Kingdom ..         | 28             | 8,375    | ...              | ...      | ...       | ...    | 324            | 2,05,965 | ...            | ...       | 8,121            | 7,88,910 |
| Mauritius ..              | 11             | 2,131    | 1,040            | 1,32,151 | 194       | 9,035  | ...            | ...      | ...            | ...       | ...              | ...      |
| Straits Settlements ..    | 182            | 40,335   | ...              | ...      | ...       | ...    | 4              | 1,223    | 5              | 899       | ...              | ...      |
| Ceylon ..                 | 8              | 1,764    | 8                | 985      | ...       | ...    | 2              | 1,584    | 403            | 66,871    | 1,019            | 97,648   |
| Other countries ..        | ...            | 29       | 1                | 261      | ...       | ...    | 12             | 15       | 1              | 127       | 16               | 2,476    |
| <i>Foreign Countries.</i> |                |          |                  |          |           |        |                |          |                |           |                  |          |
| Germany ..                | 176            | 31,512   | ...              | ...      | ...       | ...    | ...            | ...      | ...            | ...       | ...              | ...      |
| Austria-Hungary ..        | 112            | 20,598   | ...              | ...      | ...       | ...    | ...            | ...      | ...            | ...       | ...              | ...      |
| Java ..                   | ...            | ...      | 3,778            | 5,13,623 | ...       | ...    | ...            | ...      | ...            | ...       | ...              | ...      |
| Other countries ..        | 32             | 6,597    | ...              | ...      | ...       | ...    | 28             | 1        | 2,258          | ...       | 5                | 37       |
| <i>British India.</i>     |                |          |                  |          |           |        |                |          |                |           |                  |          |
| Bengal ..                 | 87             | 19,854   | 26               | 2,083    | ...       | ...    | ...            | ...      | 7,149          | 15,84,142 | 415              | 15,757   |
| Bombay ..                 | 278            | 73,297   | ...              | ...      | ...       | ...    | ...            | ...      | 162            | 30,994    | 570              | 75,001   |
| Burma ..                  | ...            | ...      | ...              | ...      | ...       | ...    | ...            | ...      | 1,323          | 2,99,694  | 57               | 8,648    |
| Other provinces ..        | 9              | 1,821    | 23               | 3,230    | ...       | ...    | ...            | ...      | 7              | 1,362     | 5                | 595      |
| Total ..                  | 923            | 2,06,313 | 4,876            | 6,52,363 | 194       | 9,075  | 331            | 2,11,345 | 9,050          | 19,81,094 | 10,240           | 8,94,779 |

NOTE.—The imports of beet sugar into this Presidency have been about 25 per cent. of the total quantity imported into British India during the ten years ending 1905-1906.

Agricultural Statistics for 1904-1905 to 1906-1907.

Notes on Sugar in India, pages 25, 26.

4. *The sugarcane cultivation.*—Sugar is chiefly produced in this Presidency from the juice of the sugarcane, about 68,000 acres of which are under cultivation in an average year. Over half this area lies in the five districts of Coimbatore (8,854 acres), Bellary (8,770 acres), Gódvári (6,851 acres), Trichinopoly (6,137 acres) and South Arcot (5,734 acres). Large areas of sugarcane are also found in Vizagapatam (5,496 acres), North Arcot (5,486 acres), Cuddapah (4,659 acres) and Salem (4,335 acres). The yield of sugar from this cultivation in India compares unfavourably with that obtained in other countries possessing richer soil and more forcing climate. While it is over 4 tons to the acre in Hawaii, 3 to 4 tons in Java, 2 tons in Cuba, 1.8 to 2.4 tons in Egypt and about 1.7 tons in Porto Rico, it is not more than 1.3 tons to the acre in India. A special agricultural farm for conducting experiments on improved methods of cultivation and for distributing healthy canes to the ryot population has been established at Samalkot. A full account of the work done in this farm will be found in the First and Second reports of the Samalkot Agricultural Station published in 1907 and 1908.

5. *Manufacture of cane-sugar.*—Besides the sugar manufactured in factories managed on European lines and noticed in paragraph 2, the manufacture of jaggery from the cane is carried on in villages in very primitive fashion, the only noticeable improvement being that iron mills have of late years partially superseded the old wooden mills. For the product of this crude indigenous manufacture, there is a fairly good local market for the purposes of native confectionery, which custom demands shall be made of jaggery. Religious scruples also prevent the free use of white sugar, though there is a growing demand for it. Cane jaggery is also used in distilleries for the manufacture of arrack and, in cheap years, is sometimes exported to Europe for the manufacture of alcohol.

6. *Palm-sugar.*—Nearly 88,000 acres of sugar-yielding palms are also grown in the Presidency in an average year, but these are mostly tapped for toddy and not for jaggery-making. The only districts in which palm jaggery is made to any appreciable extent are Tinnevely (which contains more than 54 per cent. of the total area of sugar-yielding palms), where women mostly carry on the work, Gódvári, Malabar and South Canara. In the first two of these districts, jaggery is made from palmyra juice, while in Malabar it is made chiefly from cocoanut juice. In South Canara, the cocoanut, palmyra and sago palms are all used for this purpose. In the Gódvári, Madras, Malabar and South Canara districts the drawing of sweet or unfermented toddy for the manufacture of jaggery, or for use as a beverage, is permitted only under licenses which are issued free of fee. Elsewhere this is allowed without any restriction. Palm-sugar is considered inferior to, and is cheaper than, cane-sugar. It is used largely by the poorer classes of society, but is also used for refining and distillation. The processes adopted in its manufacture also are primitive. The juice intended for this purpose is drawn in lime-coated pots, and it is then boiled and converted into jaggery.

#### (21) SULPHUR AND SULPHURIC ACID.

The following figures show the imports of sulphur and sulphuric acid into Madras Presidency during the five years ending 31st March 1908.

*Bellary District Gazetteer*, page 110.  
*Anantapur District Gazetteer*, page 67.  
*South Arcot District Gazetteer*, page 159.  
*Agricultural Bulletin No. 50.*

It is probable that the area under sugarcane-cultivation is restricted by the difficulty experienced in crushing the cane in bullock mills. A single mill takes about three weeks to crush an acre of cane with the result that canes are either under or over ripe when they are crushed. Experiments with larger iron mills driven by oil engines have proved very successful, and there are four or five now at work in the Presidency. Sugarcane cultivation is scattered in small patches in most districts and these larger mills will deal with 100 acres of cane in a season. Their extended use is very desirable, but it can only be brought about by co-operative enterprise and concentration of the cultivation. These power-driven mills extract a much larger percentage of juice. Experiments made by Dr. Lehmann in Mysore led him to the conclusion that by the use of these power plants the increase in the value of the produce was as much as Rs. 50 per acre.

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*Malabar District Gazetteer*, page 254.  
*South Canara District Manual*, ii, 139.  
*Imperial Gazetteer*, article on Madras Presidency, page 91.

Volume of Sea-borne Trade and Navigation for 1906-1907.

| Year.                | SULPHUR.  |       |            | SULPHURIC ACID. |       |            |
|----------------------|-----------|-------|------------|-----------------|-------|------------|
|                      | Quantity. |       | Value.     | Quantity.       |       | Value.     |
|                      | Tons.     | Cwts. |            | Tons.           | Cwts. |            |
| 1902-1903 ... ..     | 141       | 12    | Rs. 14,767 | 58              | 19    | Rs. 14,085 |
| 1903-1904 ... ..     | 105       | 5     | 12,107     | 111             | 8     | 24,821     |
| 1904-1905 ... ..     | 148       | 9     | 14,178     | 143             | 13    | 32,019     |
| 1905-1906 ... ..     | 285       | 12    | 23,335     | 123             | 16    | 26,919     |
| 1906-1907 ... ..     | 259       | 13    | 22,635     | 85              | 12    | 23,140     |
| Average per year ... | 184       | 6     | 17,394     | 104             | 14    | 24,197     |

G.O., No. 889, Judicial, dated 27th June 1908.

G.O., No. 1536, Judicial, dated 25th September 1905.

Pages 253, 254 and 256 of volume XV-A and page 206 of volume XV of the Census Report for 1901.

Returns of Agricultural Statistics.

Report of the Calcutta Industrial Conference (1906), page 320.

2. Sulphur is chiefly used in this Presidency for the manufacture of gun-powder and fireworks, for blasting, for medical and sanitary purposes, for bleaching cardamoms and as an insecticide by planters. The increase in the quantity of sulphur imported during the last three years, and a corresponding decline in that of sulphuric acid, is due to the manufacture of sulphuric acid by Messrs. Parry & Co. at their Ránpáttai (North Arcot) chemical works and by the Military department in the Córdito factory at Aravankad in the Nilgiris.

#### (22) TOBACCO

*Population supported.*—At the last census, persons employed in the manufacture of tobacco and cigars and snuff were not distinguished from those engaged in selling these products and it is not possible to say how many persons come under each of these heads. The total number of persons subsisting on industries connected with tobacco was, however, returned at 74,339, of whom 28,938 (23,947 males and 4,991 females) were actual workers and 45,401 dependents. Sixty per cent. of the actual workers were found in the six districts of Vizagapatam, Gódvári, Ganjám, Trichinopoly, Coimbatore and Madura.

2. *Agricultural statistics.*—The average annual area under tobacco cultivation during the three years ending 1906-1907 was 133,562 acres; and of this nearly half occurs in the two districts of Guntúr (39,606 acres) and Coimbatore (26,751 acres). Other large tobacco-growing districts are Kurnool (9,755 acres), Gódvári (9,447 acres), Madura (7,697 acres) and Vizagapatam (6,329 acres). The tobacco used in the production of cheroots and cigars chiefly comes from Coimbatore and Salem districts. The area under tobacco cultivation in this Presidency has risen 70 per cent. during the last twenty years.



3. *Tobacco culture and curing.*—There are no accurate statistics of the quantity of tobacco produced each year in the Presidency; and as large quantities of the leaf are consumed locally in the raw state and in the form of snuff and inferior cheroots, no estimate can be formed of the annual yield. It has been computed, however, that an ordinary crop is 600 lb. of cured tobacco per acre. The quantity exported (114 lakhs of lb.), is only 14½ per cent. of the probable total yield according to this calculation.

4. *Large industries.*—The chief centres of tobacco industry are Trichinopoly, Madura, Madras and Cocanada. In the first of these places, cheroots are said to be made by some 5,000 persons (with leaf obtained from Dindigul, Karúr, the Straits Settlements, etc.), in as many as 200 factories; but only 19 of these factories are of any size and none of them employs as many as 50 persons. There are only three factories in the whole Presidency engaged in this industry which employ more than 50 persons. These are—

(1) Messrs. Oakes & Co.'s factory at Guindy near Madras City (250 hands);

(2) Messrs. McDowell & Co.'s factory in Madras City (250 hands); and

(3) Messrs. Spencer & Co.'s factory at Dindigul in the Madura district (943 hands).

5. *Trade statistics.*—The following statement shows the average annual value of the sea-borne trade in tobacco:—

|                         | Exports.              |                              | Imports.                |                                |
|-------------------------|-----------------------|------------------------------|-------------------------|--------------------------------|
|                         | To foreign countries. | To other provinces of India. | From foreign countries. | From other provinces of India. |
| Tobacco, unmanufactured | Rs. 1,82,372          | Rs. 15,02,164                | Rs. 2,82,092            | Rs. 21,708                     |
| Manufactures—           |                       |                              |                         |                                |
| Cigars                  | 5,33,462              | 2,39,077                     | 16,818                  | 7,163                          |
| Cigarettes              | 2,624                 | 19,259                       | 1,00,752                | 15,151                         |
| Others                  |                       |                              |                         |                                |
| Total                   | 7,68,458              | 18,09,499                    | 6,35,520                | 44,022                         |

Most of the raw tobacco goes to the Straits Settlements and Burma; cigars go to the United Kingdom and the Straits Settlements, also to Bengal and Burma. The imported raw tobacco comes chiefly from Holland (35 per cent.), Belgium (21 per cent.), Ceylon (15 per cent.) and the Straits Settlements (13 per cent.). Cigarettes and other manufactured articles come mostly from (or through) the United Kingdom.

Report of the Calcutta Industrial Conference (1906), page 334.

Page 1712 of the Asylum Press Almanac (1907).  
*Trichinopoly District Gazetteer*, page 173.

Statement of Sundry Industries for 1907.

Volume of Sea-borne Trade and Navigation for 1906-1907.

There has recently been a considerable increase in tobacco cultivation in Burma to the detriment of the Cocanada trade.  
A. CHATTERTON.

### (23) WOOD AND TIMBER.

*Population supported.*—Workers in wood and timber comprise (1) wood-cutters and sawyers; (2) carpenters; (3) cart and carriage makers; (4) boat builders and painters; and (5) wood-carvers.

2. *Wood-cutters and sawyers.*—There are only two saw-mills in the Presidency employing 50 hands or over, viz., the Malabar Steam Saw Mills and the Wesleyan Mission Industrial School, Karúr, in which the daily average number of hands employed during the year 1907 was 179 and 127 respectively. Elsewhere sawing is mostly done by hand and 21,539 persons were returned at the last Census as actually engaged in this industry, more than 40 per cent. of this number being in Malabar where the forests belonging to private individuals are being very rapidly exploited. The trees are felled by Mappilla merchants on payment to the owner of a *kuttikanam* or stump-fee, and after being roughly squared are dragged by elephants to the nearest road or river to be carried or floated to the depots on the coast. The wood chiefly exported is sandal which goes in large quantities to Germany. The annual average value of exports of wood to foreign countries during the five years ending 1906-1907 has been as follows:—

|                               | RS.       |
|-------------------------------|-----------|
| Teak .. .. .                  | 65,900    |
| Other timber .. .. .          | 1,74,944  |
| Ebony .. .. .                 | 37,618    |
| Sandal .. .. .                | 8,98,825  |
| Other ornamental wood .. .. . | 10,155    |
| Other kinds of wood .. .. .   | 15        |
| Total .. .. .                 | 11,87,457 |

Statement of Sundry Industries for 1907.

Census Report for 1901, vol. XV-A, page 305.

Census Report for 1901, vol. XV, page 208.

*Malabar District Gazetteer*, page 251.

Volume of Sea-borne Trade and Navigation for 1906-1907.

Census Report for 1901, vol. XV-A, pages 278 and 305.

Volume of Sea-borne Trade and Navigation for 1906-1907.

3. *Carpenters.*—These form the great majority (84 per cent.) of the workers in wood. At the last Census 105,986 males and 3,200 females were returned as actual workers and 198,456 other persons as dependent on them. The village carpenter does all the woodwork connected with house-building, makes the agricultural implements and the bullock carts required by the ryots, and attends to the other simple needs of the village community. A small export trade in furniture exists, mostly to other parts of India, the value of the exports during the five years ending 1906-1907 having averaged Rs. 75,000 per annum. Cabinetware

and furniture to double this value was imported into the Presidency during the same period.

4. *Cart and carriage makers*.—The number of persons engaged in cart and carriage making was thus returned at the last Census :—

Census Report for 1901, vol. XV-A, pages 266 and 267.

|                                                                 | Actual workers. |          | Dependents. | Total. |
|-----------------------------------------------------------------|-----------------|----------|-------------|--------|
|                                                                 | Males.          | Females. |             |        |
| Couch-building factories. { Owners, managers and superior staff | 10              | ...      | 25          | 35     |
| Operatives and other subordinates.                              | 46              | ...      | 175         | 221    |
| Cart and carriage makers ... ..                                 | 316             | ...      | 607         | 923    |
| Painters of carriages, etc. ... ..                              | 287             | 9        | 506         | 782    |
| Total ...                                                       | 639             | 9        | 1,313       | 1,961  |

The largest carriage-making works in the Presidency are in the Madras City, Messrs. Simpson & Co.'s establishment employing 320 hands daily and Messrs. Ally Brothers' works with 100 hands. Carriages of the better class are annually imported to the value of between two and three lakhs, chiefly from the United Kingdom. Carts made in this Presidency were exported, principally to Burma, to the annual value of Rs. 95,000 during the five years ending 1906-1907.

Statement of Sundry Industries for 1907.

5. *Boat builders and painters*.—Three hundred and thirty-nine persons (with 866 dependents) were shown in the Census returns as boat-builders and 21 persons (with 55 dependents) as boat painters. These were apparently concerned in the making and painting of fishing and ferry boats.

Volume of Sea-borne Trade and Navigation 1906-1907.

Census Report for 1901, vol. XV-A, pages 267 and 268.

6. *Wood-carvers*.—Only 22 persons (details in the margin) returned themselves as wood-carvers in the last Census; but these figures are not reliable. At Tirupati in the North Arcot district, mythological figures, carved in red sanders or white wood, are sold as votive emblems to pilgrims who visit the sacred hill. The figures, though rough in finish, are executed in a bold free style. In Travancore very-spirited and well-executed designs are carved on cocoanut shells, and at Karkala in South Canara, young cocoanuts are, in like manner, neatly carved with floral, conventional, and mythological designs. A good deal of carving is also done in the jails, especially the Central Jail, Cannanore. Further information on the subject will be found in Mr. Thurston's Monograph on Wood-carving in Southern India (Government Press, 1903).

*Ibid*, page 272.

|                    |    |
|--------------------|----|
| Ganjām .. ..       | 11 |
| Kistna .. ..       | 3  |
| Madras .. ..       | 2  |
| North Arcot .. ..  | 1  |
| South Canara .. .. | 5  |

*Imperial Gazetteer*, Presidency article, page

(24) Wool.

Table XV of the Census Report for 1901, vol. XV-A, pages 285 and 286.

*Population supported*.—At the Census of 1901, 28,210 persons were returned as subsisting on woollen industries. The detailed statistics are shown below :—

|                                                                                            | Actual workers. |          | Dependents. | Total. |
|--------------------------------------------------------------------------------------------|-----------------|----------|-------------|--------|
|                                                                                            | Males.          | Females. |             |        |
| Carpet weavers ... ..                                                                      | 432             | 120      | 1,043       | 1,595  |
| Shawl weavers ... ..                                                                       | 2               | 1        | 3           | 6      |
| Persons occupied with blankets, woollen cloth and yarn, fur, feathers and natural wool ... | 5,263           | 11,580   | 8,242       | 25,085 |
| Wool carders ... ..                                                                        | 240             | 1,035    | 249         | 1,524  |
| Total ...                                                                                  | 5,937           | 12,736   | 9,537       | 28,210 |

Report of the Madras Exhibition of 1903, page 40; Monograph on Woollen Fabric Industry, page 3.

2. *Breed of sheep*.—The quality of wool obtainable from South Indian sheep is very inferior to that yielded in the north. It is generally coarse, wiry and hairlike, with little gloss, and suitable only for coarse fabrics. The best wool-producing breed of sheep in the Madras Presidency is that of Coimbatore, found also in the Námakkal taluk of Salem, the Perambalur taluk of Trichinopoly and adjoining localities. This breed of sheep is white. The black wool-producing Mysore breed is met with in the Bellary district and parts of Kurnool, but it is not there so good as in its native province, and the wool frequently degenerates into straggling hair. Neither the Madras nor the Nellore breed of sheep furnishes wool or hair fit for textile purposes.

Report of the Madras Exhibition of 1903, page 41.

3. *Clipping and cleaning of wool*.—The clipping of wool from the sheep commences when the animal is six months old, and is repeated twice annually for four years. The process is very roughly performed. A good deal of wool is also obtained from the skins of dead sheep, being then known as churam wool. After clipping the wool has first to be washed. It has then to be resolved from its matted condition into a state fit for spinning. The native method of doing this is termed "bowing," the implement used being shaped like a bow, and the wool is beaten apart by sharp strokes of the catgut forming the string of the bow. This is an extremely slow process, the outturn of a day's labour being only about 10 lb. of bowed wool. After bowing, the wool is spun by a small hand-wheel—this process also being very primitive and ineffective.

4. *Manufactures—Factories*.—There are no woollen mills within the limits of the Presidency; but Messrs Binny & Co. of Madras are the managers of the

Bangalore Woollen, Cotton and Silk Mills Company (Limited) which was started in November 1888. The nominal capital of the Company is Rs. 6 lakhs, and the Mysore Government holds some share in the concern. Ten years ago, it had only 26 looms and 780 spindles for woollen manufacture, but now there are 43 looms and 1,410 spindles. Blankets, horse clothing, rugs and cumblies are made in the mill, 342 persons having been employed on the works during the year 1905.

5. *Manufactures — Hand-work.*—The hand industry of the Presidency resolves itself for all practical purposes into two main heads: (a) carpets and rugs and (b) blankets and cumblies.

6. *Carpets.*—The chief centres of the carpet industry are Ellore and Masulipatam in the Kistna district and Ayyampettai in the Tanjore district. The industry has, however, declined of late years. Mr. H. T. Harris, who visited Ellore not long ago, thus describes its present condition. "No single word of Sir George Birdwood's and Dr. Royle's 'lavish praise can now be applied to the industry. The patterns in use were 'poor, and usually modifications of cheap 'Wilton, Kidderminster and German 'power loom designs. The old patterns 'are still with the weavers, but unfortunately there is no trade demand for 'this fine class of goods, the old dyes 'are being forgotten, and have given 'place to cheap anilines unskillfully 'applied'. Woollen pile carpets are also made in several jails, especially Vellore, the wool being mainly obtained from Mysore, and prepared and dyed in the jail. Further information regarding the carpet-weaving industry of the Presidency will be found in the Monograph on the subject, just being issued.

7. *Blankets and cumblies.*—These are chiefly made in the Anantapur district and in the Kudligi and the Harpanahalli taluks of the Bellary district, the weavers belonging to the shepherd Kuruba caste. The blankets range in price from As. 6 to Rs. 10; and a considerable export trade (annual value about Rs. 6 lakhs) is said to be carried on with many places in Mysore and the Bombay Presidency and even with Ceylon. The processes of manufacture are primitive and clumsy. Woollen blankets and woollen jhools are also made in several central jails, especially Trichinopoly and Bellary, and are supplied to various public departments.

Rice's *Mysore*, i, 539; Financial and Commercial Statistics of British India (1907), page 433.

Monograph on Woollen Fabric Industry, page 3.

Imperial Gazetteer, Madras Presidency article, page 56.

Report of the Madras Exhibition of 1903, page 52.

Bellary District Gazetteer, page 107.

Anantapur District Gazetteer, page 66.

*Shawls.*—Recently the manufacture of woollen shawls on handlooms has been started at the Government Weaving factory at Salem with some success and arrangements have been made to carry on the work on a larger scale. The shawls are of fine quality, the yarn being imported and sell readily at profitable prices, the value of the outturn from a single loom being as much as Rs. 100 per month.

A. CHATTERTON.

Volume of Sea-borne Trade and Navigation for 1906-1907; and volumes of Rail-borne Trade for the three years ending with 1906-1907.

8. *Trade in wool.*—The sea-borne trade in wool is not considerable. During the five years ending with 1906-1907, carpets and rugs of the annual value of over two lakhs were exported mostly to the United Kingdom, while woollen goods to the value of nearly four lakhs were imported thence every year. Manufactured articles are also imported from Mysore to the annual value of about Rs. 5 lakhs. The value of raw wool exported from this Presidency during the last three years is shown below:—

| Year.            | United Kingdom. | Bombay port. | Other places. |
|------------------|-----------------|--------------|---------------|
|                  | Rs.             | Rs.          | Rs.           |
| 1904-1905 ... .. | 79,471          | 1,09,740     | 55,784        |
| 1905-1906 ... .. | 1,03,135        | 1,35,972     | 1,13,747      |
| 1906-1907 ... .. | 2,29,189        | 2,13,009     | 41,082        |
| Average ... ..   | 1,37,232        | 1,52,907     | 70,881        |

#### (25) ELECTRIC POWER.

The following list of localities in this Presidency suitable for the generation of electric power was prepared in 1907 by the Public Works Department:—

Besides the above, water power is available at the locks and falls on the Kistna and Godavari canals for many months of the year, and it is possible this could in the future be profitably utilized for lift irrigation as it is available throughout the cultivation season.

Water power on a considerable scale is made use of near Coonoor to supply the requirements of the Cordite Factory. A small storage reservoir has been constructed and a complete hydro-electric plant installed, the power being transmitted to the factory over a distance of several miles. It is probable that a very large number of similar schemes are feasible if only some use could be found for the power when it is generated.

A. CHATTERTON.

| Serial number. | District.   | Description of locality.                                                              | Distance from nearest town or trade centre.                                                                                        | Discharge in c. ft. per second. |          | Remarks.                                                                                                                                                                                                                                                                                        |
|----------------|-------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |             |                                                                                       |                                                                                                                                    | Maximum.                        | Minimum. |                                                                                                                                                                                                                                                                                                 |
| 1              | Kistna.     | In places between Duida and Someswaram on the Kistna river above the Bezavada anicut. | Neither situated in the vicinity nor connected by easy means of communication with any town or trade centre.                       | No information available.       | -        | It is unlikely that a power scheme in this part of the river can be worked with profit, unless the Kistna Reservoir Project which is now under consideration is executed.                                                                                                                       |
| 2              | Salem.      | Korenkall falls on the Cauvery river.                                                 | Forty miles from Salem the head-quarters of the district.                                                                          | Information not available.      | 96       | 93 c.ft. per second is the minimum recorded at Sivamudram falls. It is believed that 1,000 horsepower can be generated and delivered within 60 miles.                                                                                                                                           |
| 3              | Madura.     | Uthamar anicut.                                                                       | At different places on the Soruliyar river by means of which the waters of the Periyar lake are passed into the Vaigai river.      | 1,250                           | 250      | Minimum subject to special storage arrangements being made. Natural flow not. No continuous flow will be available throughout the year at these anicuts unless a reservoir on the plains, proposed in connection with the question of utilizing the water-power of the Periyar tunnel, is made. |
| 4              | "           | Palayamparavu anicut.                                                                 |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 5              | "           | Chinnamanur anicut.                                                                   |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 6              | "           | Marankottai anicut.                                                                   |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 7              | "           | Saliampatti anicut.                                                                   |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 8              | "           | Kottur anicut.                                                                        |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 9              | "           | Upparapathi anicut.                                                                   |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 10             | "           | Virapandi anicut.                                                                     | At Koruvanth at the head of the Cumbum valley, 69 miles distant from Annamayyakkur, nearest railway station, South Indian Railway. | 1,250                           | 250      | Fall 1,000 ft.— <i>Vide</i> remarks against items 3 to 11 above.                                                                                                                                                                                                                                |
| 11             | "           | Chattapatti anicut.                                                                   |                                                                                                                                    | 1,250                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 12             | "           | Periyar lake tunnel.                                                                  |                                                                                                                                    | 1,110                           | 250      |                                                                                                                                                                                                                                                                                                 |
| 13             | Tinnevely.  | Papanasam falls on the Tambraparni river.                                             | At Papanasam about 6 miles north-west of Ambasamudram, the nearest railway station, South Indian Railway.                          | Information not available.      | -        | Water from these falls is already used for Tinnevely mills.                                                                                                                                                                                                                                     |
| 14             | Coimbatore. | Bhavani falls.                                                                        | Near Thondai, 15 miles above Mettupalayam.                                                                                         | 3,000                           | 40       | 50 ft. fall, 20 ft. vertical and rapids.                                                                                                                                                                                                                                                        |
| 15             | "           | Aliyar.                                                                               | Anamalai hills.                                                                                                                    | 800                             | 6        | Series of cascades of 2,000 ft., 500 ft. easily available. The discharge is only very approximately known.                                                                                                                                                                                      |

2. Item 1 in the list depends on the execution of the Kistna Reservoir Project. The scheme originally submitted by the Madras Government has not been approved by the Government of India and a revised scheme is now under preparation. Items 3 to 12 in the above statement depend on sanction being accorded to the Periyár Power scheme by the Government of India. This has not as yet received the approval of that Government. The Pápanasam falls (item 13) are already utilised. The only remaining items are number (2) the Hogenkull falls in the Salem district; number (14) the Bhaváni falls near Thondai, 15 miles above Méttupálayam in the Coimbatore district; and number (15) the Aliyar falls on the Anamalais.

3. As to the question of electric smelting of iron ores, reference is solicited to page 25 of Major A. J. deLotbiniere's report on the Periyár Power scheme, submitted in June 1904. He then said: "Electric smelting of iron ores has recently made such an advance, that it will only be a matter of a year or two, before the process is used commercially, on a large scale."

4. The Agent, Madras and Southern Mahratta Railway Company, in a letter No. M/4568/7166, dated 23rd June 1908, has made the following suggestion:—

"I also beg to suggest that the Madras Government should obtain from the Government of Canada the reports of the experiments made at Sault St. Marie in the electric smelting of iron and that the Director of Industrial and Technical Enquiries should be directed to report on the practicability of making use of the water-power of falls in the Salem district to generate current for the electric smelting of the iron ores of that district."

As a matter of fact the commercial production of iron or steel in electric furnaces is a long way off, and fuel will always be required to furnish carbon to reduce the iron oxides. For this purpose charcoal can be conveniently used and as the quantity required is only about 5 cwt. per ton of iron produced, it is possible that the Madras forests could yield the quantity required for any possible development of the iron trade with the water power available. Obviously, as a preliminary step, the manufacture of charcoal should be taken up in a scientific manner.

A. CHATTERTON.

5. Circular letter to the Members of the Conference from the Hon'ble Mr. A. G. CARDEW, I.C.S., Secretary to Government, Revenue Department, dated the 21st May 1908, No. 1859-A.

I am directed to enclose a copy of a Resolution of this Government on the subject of an Industrial Conference which it is proposed to hold at Ootacamund in September next and to express the hope of His Excellency the Governor in Council that you will be able to attend and assist the Government with your advice.

2. I am also to ask whether you can favour the Government in advance with any suggestions as to the practical measures which you would recommend to be taken for the promotion of (1) industrial development or (2) of technical education. It would be of great assistance if, for instance, you could indicate in what branches of industry you think that assistance could usefully be rendered to private enterprise by experiments or other action of the Director of Industrial and Technical Enquiries, and similarly in regard to technical education in what subjects and in what manner you think further facilities for such education are required in this Presidency. I am to say that the Government will be grateful for any suggestions on these points whether you are able yourself to attend the Conference or not, and I am particularly to beg that you will send your suggestions to me as soon as possible so that information bearing on them may be collected.

3. The favour of an early reply is requested.



## 6. Replies to the above letter.

(1)

FROM C. B. SIMPSON, Esq., AGENT, MESSRS. BINNY & Co. (LIMITED), MADRAS,  
DATED THE 4TH JUNE 1908.

I am in receipt of your demi-official No. 1859-A of the 21st May, and shall be happy, if I can, to attend the Industrial Conference it is proposed to hold at Ootacamund in September next.

I submit, as requested, suggestions.

So far as the business I am connected with is concerned, we should be glad of men with technical and theoretical knowledge of dyeing, bleaching, finishing, electricity, drawing, and tool using.

We find it exceedingly difficult to get draughtsmen. They will only stay until they can get Government employment, and will not attend work until 10 A.M. If there is urgent work their superior officer the European Engineer has to do it. The Engineer having been at work at 5-45 to see his engines at full speed by 6 o'clock.

The same with chemical assistants. At the Buckingham and Carnatic Mills there are six European Chemists from Leeds University and Bradford Technical College. These gentlemen attend work daily at 6 A.M. and work at least 8 hours daily, when work is heavy they do not hesitate to work longer hours without being asked. We cannot get a native who has learned anything of chemistry to attend before 10 A.M. There is therefore no grade between the European expert and the cooly, a distinct want and an opening for fairly remunerative positions.

These are two instances only of wants we feel, but they go to the root of the difficulty, the student expects Government employment, failing that he will only work Government hours.

Discipline and regularity are as necessary in a factory as in a Government department, and if men are to be employed in private factories they must conform to factory practices and face up to the long hours.

*Tools.*—The teaching of carpenters and iron workers, the theory and practice of sharpening and tempering tools, is much needed. We all know how badly this is done.

*Cotton ginning*—might receive consideration. Indian Cotton Mills prefer the hand-ginned cotton to machine-ginned owing to the smaller injury done to the staple. But hand labour and the old hand or foot gins are becoming inadequate to deal with the rapid marketing now required. With improved communications the tendency is for cotton to be rushed to market, and there is not time to deal with it by old methods.

I do not know to what extent the hand-gin is capable of improvement in quantity of production, but I think its improvement worthy of enquiry.

The damage done to machine-ginned cotton is not the fault of the gin but the neglect of the machine by the gin owner. The owner is not an engineer and he seldom employs a first-class mechanic. Therefore, the training of mechanics and, if possible, of owners in the correct treatment of gins would be of value to the country, to cotton growers and to consumers.

*Wool shearing.*—Great damage is done to the wool (and probably to the sheep) by the shearers being ignorant of shearing. The sheep is unevenly shorn and so an even length of staple is not obtained. The sheep is left with ridges, and the wool is not in a fleece. If the shearer could be taught to use clippers and to shear evenly the value of the raw wool would be very much enhanced.

An easy means of the ryot obtaining suitable clippers would require consideration.

The effect of pasture on wool should also be taught if possible.

*Agricultural implements.*—The manufacture of these, their improvement and preservation in a state of efficiency is, I think, deserving of attention.

*Technical education.*—I consider that all technically educated men should be trained to commence work at 6 A.M. and trained to work actually nine hours at least daily. Factories in England universally start work at 6 A.M. and usually work 54 hours a week. The morning is the best of the day in India being the coolest and the time when men are fresh for physical labour. Technical education can be of no industrial value to men who are ashamed to use their own hands, neither can it benefit the manufacturers of this country if the student expects to join his work at 10 o'clock or four hours after factory work is in full swing.

It is unfortunate for the industries of the country and for private employers that Railway and Government workshops do not commence the working day at 6 A.M.

*Night classes.*—I think that the Government would greatly assist aspiring and deserving men by the Educational Department starting or encouraging night schools in the neighbourhood of large factories. Many capable and intelligent natives who have learned to use their hands with dexterity should be enabled to develop innate powers by having opportunities of learning reading, writing, arithmetic, machine and freehand drawing, measuring, weighing, and the theory of the particular trade in which the worker is employed.

Later simple lectures on electricity with practical demonstrations might be given with explanations of the uses of materials and the risks of short circuiting.

I may perhaps mention that a small beginning with night classes has been made at the Buckingham and Carnatic Mills and the mills would be grateful of assistance from the Educational Department in the form of lectures in the vernacular.

It is only the better educated and better off natives who can avail themselves of the technical schools and they usually have still to learn the use of their hands. The man who has known how to use his hands from childhood is the one requiring assistance and is the man who is calculated to make some return for expenditure. I would therefore have night classes at all technical schools, and I would open night schools or encourage night schools being opened in all manufacturing quarters. Technical schools even with a night class in Nungambakum are almost useless to improve the operatives of Rayapuram, Ootary or Perambur. The Indian workman is good, but he knows nothing of the "reason why," and very little attempt is made to show him.

Pioneers of labour in England have mostly risen from the working classes. The intelligent working man who wants to get on knows exactly what he wants to learn. The student seldom knows what will be of use to him and so spends much time in learning that which is afterwards of small value.

In brief, work should go on at both ends, the educated man should be taught to use his hands and the operative have an opportunity of learning to use his head.

I enclose extract of letter from Mr. H. P. Gibbs, Chief Engineer with the Government of Mysore, extract of letter from Mr. S. Jackson, Chief Chemist of the Buckingham and Carnatic Mills, and list of some of the industries that I think might be developed by technical education in this Presidency.

ENCLOSURES.

A

*Extract of letter from Mr. H. P. GIBBS, Chief Electrical Engineer with the Mysore Government.*

Bangalore, 1st June 1908.

My experience with electrical work has been as you describe.

There are a great many men who are to some extent theoretically posted, but as a rule they are no use whatever practically. When any of our educational people arrange to teach that good positions should only be held by men who are personally expert workmen and hard willing workers they will, in my opinion, have done more good than they have ever yet accomplished.

Up to now so-called technical education has been a last resort for those who fail in all else and has taught but little theory and less practical application.

I would not at present recommend any one for technical education here until he had proved himself a practical workman.

The existing condition is mostly the fault of our educational methods and due to a great extent to the lack of a suitable example on the part of Europeans.

Our railways and public works take youngsters just from school with no practical training and a great many of them never learn to actually do a job themselves. The native finds not unnaturally that theirs is the easiest example to follow and so never becomes any good.

We will not produce good men here until we see that every imported man is actually a thorough master of his work.

## B

*Extract of letter from Mr. S. JACKSON of the Buckingham and Carnatic Mills.*

*Madras, 2nd June 1908.*

*Technical Education (Night Classes).*—Technical education has not the same meaning to every one. As I understand it, before a student can take proper advantage of education at a Technical College he must have had a scientific education and before this a good general education.

This means that students who attend a Technical College in Madras should really be Graduates of the University.

I doubt if the prospects of graduates who might take up technical work would be attractive enough. There is nothing attractive about Factory life or long hours; unless the pay is likely to be magnificent, it would still mean that Government service or law or teaching would offer greater attractions than Technology. I think it will be wise to be very circumspect when discussing the advantage of "Technical education." If it isn't going to be an advantage to the man who goes in for it better leave it alone.

Science Graduates, I understand, start on about Rs. 40 per month and possibly rise to Rs. 150–200 as headmaster, the average not getting more than Rs. 75.

Well, would they have better prospects if instead of going through a course of training at a Teachers' College they took up a course in technical subjects? I doubt it, comparing two men of equal ability; and teaching is supposed to be the worst paid of the lot.

As far as the ordinary cooly workman is concerned, it seems to me that the improvement in this class must largely depend on the gradual improvement of the rising generation.

The ordinary workman I have to deal with is lacking in the rudiments of education, is more often clumsy and careless than not. Perhaps night classes might work good, the idea is worth trying, but I do not think it would be much use attempting to teach him more than the most elementary education, and how much education of any sort he could take in after working for eleven hours in a factory is problematical.

More extensive elementary education for the rising generation caught young seems to me to be the safest starting point so far as workmen are concerned.

It appears to me that a better educated class of men will be required to take advantage of any instruction given. Take for instance the question of cotton-ginning. Educate the owner of the gin or of the cotton so that he can see for himself that he is damaging the cotton and consequently losing money. If he hasn't enough education to see this, I don't see that any "Technical" instruction will do him much good, while if he has enough education to see things for himself he will himself seek means to put things right.

India is probably an agricultural country more than anything else, agricultural industries ought to have first place, surely there must be scope in this direction yet. I believe the Agricultural College at Saidapet was a lamentable failure. A technical college might easily share the same fate.

## C

SUBJECTS for technical education that might benefit the industries of the Presidency—

*Acids.*—The manufacture of sulphuric and other acids.

*Bricks.*—The manufacture of building, and fire bricks.

*Chemical analysis.*—of indigo, jaggery, ores, fertilisers.

*Cotton.*—Ginning, spinning, sizing, weaving, bleaching, dyeing, finishing.

*Electricity.*—The domestic and industrial use of.

*Hides and skins.*—Skinning, drying, pickling, tanning, dyeing, preserving leather.

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*Hosiery.*—Manufacture of — in cotton, silk and wool.

*Jute.*—The preparation, spinning and weaving of.

*Metals.*—The casting of iron, brass and other metals.

*Oils.*—The extraction and use of seed oils.

*Paints.*—The manufacture and mixing of — for various uses.

*Paper.*—The manufacture of.

*Ropes.*—The manufacture of — from various fibres.

*Sill.*—The preparation of chlorine from — for bleaching and sanitary purposes.

*Soap.*—The manufacture of.

*Sugar.*—The manufacture of.

*Tiles.*—The manufacture of.

*Tools.*—The manufacture, shaping, sharpening and tampering.

*Turkey Red Oil.*—The preparation of — from castor-oil for alizarine red dyeing.

*Wood.*—The preservation of.

*Wool.*—The shearing, spinning, weaving and dyeing of.

(2)

FROM C. B. SIMPSON, Esq., MESSRS. BINNY & Co. (LIMITED), MADRAS,  
DATED THE 13TH JULY 1908.

I would like to draw your attention to the training Europeans undergo who qualify for the positions enumerated in your demi-official. Your headings I would group as follows with the respective training:—

*Dyeworks, Chemists.*

General education at school and college until 17, from 17 to 20 at a Technical University or College such as Leeds or Bradford. Twenty onwards, employment in a dyeworks as assistant until opening occurs for an independent charge.

*Factory Engineers.*

General education until 14, probably attaining to 7th standard (English Code).

Fourteen to 17, unskilled work in machine shop with occasional chances of doing a little skilled work. Pay 7-6 to 12-6.

Seventeen to 21, skilled work in machine shop. 12-6 to £1 per week.

Technical education from 14 to 21 in a night school learning mathematics, machine drawing, theory of the construction of boilers, the steam engine and other prime-movers, elementary electricity, electric lighting, electric power and transmission.

Twenty-one outfitting work and setting up machinery, pay £1-8-0 to £2 per week, until vacancy occurs as foreman or other independent charge. Pay £2 to £3 per week.

*Textile Factories.*

*Carders,*  
*Spinners,*  
*Weaving Masters,*  
*Hosiery Masters,* } at school till 14 probably attaining 7th standard (English Code).

Fourteen to 17, in factory doing unskilled work with chances of doing skilled work attending night classes at a technical institute, learning mathematics, machine drawing and construction, and elementary science. Pay 7-6 to 10 per week.

Seventeen to 21, still doing subordinate work but of a skilled character, and completing night school courses, learning designing of textile fabrics, theory of carding, spinning and weaving. Pay 17 to £1-4-0.

From 21, an assistant to an overlooker, pay £1-4-0 to £1-10-0, until a vacancy occurs for independent charge of a section of a department or of a department itself. Pay £1-10-0 to £2-10-0 per week.

The above courses mean a long and arduous training involving regularity, discipline, self-control and, in time, the exercise of authority; but one that it would be difficult and repugnant for an Indian student or caste man to follow, as much of the work in the early years would be considered cooly work here.

Europeans who come to India for work in factories are picked men from many applicants, who have undergone the training I have roughly outlined, and who pass a physical examination before engagement so that the native aspirant would require considerable grit and physique to outfit him for competition if he has to be trained on the same lines.

If you are seeking to equip technically men of some means who will embark on factory enterprises themselves, it seems to me that you have a very small field to work on. If, on the other hand, you wish to interest in factory life the man with only a fair general education, you will have to impress on him that advancement means a long training, long hours, hard work and salaries for the average man of from Rs. 75 to Rs. 200 a month, and that even these salaries will only be paid to men who have proved themselves competent to lead, organise and control labour.

The average student on completing his school education seeks and prefers a Government appointment carrying a small salary but with a life of comparative ease and the prospect of a pension. The struggle for a living in the case of the industrial man will only be beginning when his education and training are finished and the hard work and competition will continue for life. The native realises that improved pay and position means more poor relatives to support which damps ambition.

As it seems to be the object of Government to find scope for the better class, I would suggest for factory training a general education until 14/15, a three years' technical course until 17/18 and then a  $\frac{3}{4}$  year's apprenticeship (without articles) in a factory.

The Technical Institute should contain tools and machinery and the student attend work on the machinery section at 6 A.M. and be made to use his hands, and do all the labour work required.

Apart from factories, I think that the growing wealth and needs of the people will gradually find sufficient scope for technically trained chemists, engineers and electricians, who would require a more special training; after completing their college course it would be desirable that engineers and electricians should have three years' manual training in workshops, such as Perambur Locomotive Works, followed by a technical education at a Technical College or the Engineering College, but on this question you will be able to get better information than I can give, as my experience is confined to factories.

There appear to be at least four distinct general headings for Government assistance which should not be confused.

#### *Engineers (and with modifications chemists).*

1. A general education to Matriculation standard, after passing the University Matriculation, two years at a first-grade college taking the University Intermediate course in English, Vernacular, Mathematics, Physics, Chemistry, afterwards passing the University Intermediate examination.

The passing of the Intermediate examination to be the qualification for eventual admission to a technical course of two-three years. But prior to the technical course I would advocate as essential a two-three years' apprenticeship in a workshop such as Perambur Locomotive Works.

#### *Factory Overlookers.*

2. For the technical training for factory work of the student who has attained to, say, the Seventh Standard (English Code), I would suggest a theoretical and, so far as is possible, a practical training for three years at an institute before joining a factory.

#### *Factory Workers.*

3. The primary education and elementary theoretical education of the working-man who at present forms a part of a machine without understanding it.

#### *Villagers.*

4. The teaching of unskilled and uneducated men and women cottage industries. This form of industry has been advocated by the Chamber of Commerce.

In this direction much has been done for the hand-loom weavers. I think something might be done for the cotton ginner.

Efforts might also be made to introduce hand woollen spinning and weaving, an industry that flourishes in Davangere in Mysore Province.

There is a growing industry and import trade in socks, vests, cardigan jackets and caps, many of these might be easily and cheaply knitted by hand in villages.

Again when a particular wood is suitable for a particular purpose, say the hub of a bullock cart, the local people might be taught to cut and turn roughly to size and send to a central market to which the other parts would find their way much in the way that the various units of a chair are made in different villages of Oxfordshire and Buckinghamshire.

I am strongly of opinion that the ordinary working operative referred to in 3 should be given an opportunity of advancing himself and I sincerely trust that, whatever else may be done, some means will be found to benefit him. The cost will be small as mechanical appliances will not be required to any great extent.

I have made enquiries in Bombay where natives seem able to take up better positions in factories than the natives of Madras seem capable of, but the result leads me to the same conclusion, that is, that a training in an institute will not enable a man to assume responsibility unless he has had practical work in a factory.

(3)

FROM T. F. EMBURY, Esq., MANAGER, WESLEYAN MISSION INDUSTRIAL SCHOOL, KARUR, DATED THE 9TH JUNE 1908.

I have the honour to acknowledge receipt of yours of May 21st, demi-official letter No. 1859-A.

I shall have much pleasure in attending the Industrial Conference at Ootacamund in September next.

I believe the work at the industrial schools of this country would be materially helped and much better results obtained were it possible for maistries to receive such training as would fit them for the posts they hold: training in systematic methods of imparting instruction to students. In carpentry, for instance:

(1) Methods of preparation of wood by saw and plane.

(2) Systematic and economic methods of setting out of work—

(a) On rods.

(b) On the wood itself.

(3) The theories which underlie the construction of mortises, tenons, dovetails, etc.

2. Students should spend some time in technical classes where the theoretical part of trades should be expounded and studied.

3. On the West Coast of Africa there are working amongst the native workmen European carpenters, smiths, etc., and if it were possible to have in Indian industrial schools a qualified European mechanic whose special business it would be to supervise all work in hand, I believe much good would result.

(4)

FROM W. S. HADAWAY, Esq., SUPERINTENDENT, SCHOOL OF ARTS, MADRAS, DATED THE 13TH JUNE 1908.

I have answered the G.O., No. 1421, regarding the Industrial Conference, officially, and I am writing to tell you that I am prepared to give any further particulars or enlarge any scheme suggested if you wish it, before the Conference. I am convinced that until a new department is created, directly responsible to Government, that no good will ever come of technical education here, at any rate so far



as art schools are concerned. No artist capable of conducting an art school properly would consider it worth his while to be under the restrictions and rules which very properly are made for schools of general education. The feeling that any good which may be done in an art school is in spite of the rules, rather than because of Government help, is not the state of mind which conduces to the production of good work. The head should know and feel that he will be helped in every way in every experiment which he deems right to try and it is because of this feeling that so much good work has been done in art schools at home. I have the subject very much at heart for I see so many possibilities for doing good work, but under the conditions which now prevail it seems if not absolutely impossible at any rate hardly worth while if one has to fight for everything they get.

*Letter*—from W. S. HADAWAY, Esq., Superintendent, School of Arts, Madras.

*To*—the Secretary to Government, Revenue Department.

*Dated*—the 11th June 1908.

*No.*—774.

In answer to G.O., No. 1421 (Revenue Department), dated 20th May 1908, I have the honour to make the following suggestions.

In considering a scheme of Technical education for this Presidency, the experience of other countries in which systems of such education are established may with advantage be drawn upon. I am taking "Technical education" to include not only trade schools and engineering colleges, but any school in which the theory or practice of any art or trade is taught. Drawing classes and "Sloyd" classes may for the moment be passed over, so far as they form merely a part of ordinary education. In establishing Technical education it is notable that the cause of it has been to supply a direct need for trained workmen in practically every instance.

As examples may be cited Germany with its system of science and engineering schools, Austria with its highly developed agricultural schools, and the United States of America and Canada, with both scientific and agricultural schools. In each case the need existed previously. Until a definite need exists and there is a likelihood of employ for the student on the completion of his course, it is useless to establish schools which may turn out highly qualified workmen with no positions for them to fill.

Of the need for trained workmen in engineering, scientific or agricultural pursuits, I am not competent to speak, but in my own department, that of schools devoted to artistic teaching (including all crafts in which design and ornament form a part), there is surely a need of adequately trained workmen.

The artistic workmen of this country are able, apparently with little effort, to attain great skill in the manipulation of their tools, at an early age, and so long as they confine themselves to copying fine old examples of metal work, jewellery or wood carving, etc., they seldom go far wrong, but directly any new work comes their way, the results leave, from an artistic point of view, very much to be desired.

They seem devoid of artistic taste, that is, a proper judgment of proportion and of placing of ornament. When one considers the extremely limited range of object required for native household use, this can scarcely be wondered at, but as the demand for these objects will probably never increase to any great extent and there is always a market for works of art in other countries (and, I believe, a growing demand here), it seems desirable that the Schools of Art should train their workmen to know and appreciate what is required elsewhere. To take a definite instance of how the native workmen may profit by their skill, I would point to the quite recent and very successful experiments in making carved furniture and fittings conducted by an American Architect (Mr. Lockwood de Forest) in the Bombay Presidency.

Many museums of Europe, and private collections as well, have cherished examples of furniture made for western use by Indian workmen. Under Portuguese and Dutch direction most beautiful carved furniture was once made, but now it is next to impossible to get really good carved furniture. The skill and the splendid materials are all at hand but the initiative and the knowledge required is lacking.

I have suggested only what might be done in furniture making, but metalwork, jewellery and lacquerwork could also be developed on similar lines.

Unlike the demand which must exist before an Engineer or Agricultural student is logically trained, the art student must first produce his work of art and find his market afterwards. I am firmly convinced that the market will come with the production of the object.

In the matter of schools for teaching artistic work, no good can come of a school purely theoretical in its scope, that is, a school of "design" or drawing merely. Unless the art taught is directly applicable to some definite craft, the school would be much better not to be established, or if established, it should be closed.

Teaching art for "its own sake" is much on the same level as teaching the making of wheels without any regard for their use afterwards.

The teaching of the painting of pictures according to European methods is impossible, as there are no teachers to be procured. It is an art which would take some hundreds of years to develop properly and even then its real value would be very questionable.

Drawing, which is necessary in every artistic craft, should be taught in all art schools to every pupil for a part of each day, but directly a pupil begins to learn to represent somewhat adequately the object he is drawing, his work should be directed toward patterns or drawings bearing on the craft he intends to pursue.

The teaching of perspective drawing and geometrical drawing, except its rudiments, and drawing from the ordinary models, cones, cubes, etc., should be discouraged. It has very little use which can be directly applied by the craftsman in his work.

Schools for artistic workmen might be established in centres in which artistic work is already being done (but in inferior ways) as, for instance, in places where hand-printed cottons are made. A school which sought to improve methods and produce workers and designers whose object was to preserve the best traditions of the craft would be of great use. Madras was once famous for its printed and painted cottons but now the only work procurable is very inferior compared to the work produced in the past.

Efforts are now being made by the Victoria Technical Institute to improve this sort of work and with fairly good results; but much more could be done if a good collection of old work could be got together and by its means pupils instructed in the possibilities of this art.

Embroidery is another suitable subject which is capable of great improvement. Skilful workmen are available as teachers of the actual technique but the patterns and models employed are execrable.

Carpet-weaving might also be greatly developed and this being an occupation which requires very little outlay to start is very suitable for those who wish to work by themselves or in a small way.

Good carpets are always in demand so long as the patterns are suitable and the dyes used are purely vegetable.

These are but a few suggestions, but other arts as well should receive attention.

The sort of schools which, I believe, would be of most use would be established on what may be called the "workshop principle," that is, they should be assemblies of skilled workmen able and willing to teach pupils, and in excess of the actual number required to teach, so that finished works of arts might be made while the teaching was actually going on.

The students who, in fact, would be apprentices, should be paid for their work after the first six months by small stipends increasing from year to year. This would enable them to help in their own maintenance during their study in the school, and need not be any charge on Government, as the work produced by them should be at least as much as the stipend they receive.



The only essential differences between the schools I propose and an ordinary shop would be that theory and principles applicable to the special artistic work undertaken would be taught in the school, and that the work should be entirely controlled by the headmaster who would only take commissions and orders, the execution of which would further the school work.

The success of such schools would depend, in a great measure, on the abilities of the headmaster and the careful selection of the workmen, but this is only to be expected and every facility should be allowed to the headmaster to develop the school according to his own ideas.

The splendid system of Art and Craft schools in England is mainly due to the efforts of individual masters who have not been hampered in any way by unnecessary rules and regulations. Although there are naturally proper rules laid down for the conduct of such schools, great latitude is allowed to individual teachers so that each school has a distinct character of its own.

No technical education system can be properly conducted on the lines of general education; and examinations, so far as art schools are concerned, are quite useless and a wholly unnecessary nuisance. I would strongly advise their complete abolition.

If a new department for Technical education were established, it should be under two heads, one which controlled the scientific, engineering and agricultural schools, and another to control the art schools.

In the art school department, each school should derive the benefits from its own work and schools which were not found to be successful or useful should be closed.

The School of Arts, Madras, could be the general controlling school for the Presidency and while other schools would specialize more according to the arts practised in the districts in which they were established, the head school should be allowed to experiment toward the better development of any art which needed encouragement.

The Central Museum would be doing useful work if loan collections from it were sent from time to time to different schools throughout the Presidency, and the Victoria Technical Institute could form a depository and sales room in Madras for the work turned out in the different schools.

(5)

FROM W. S. HADAWAY, Esq., SUPERINTENDENT, SCHOOL OF ARTS, MADRAS,  
DATED THE 23RD JULY 1908.

In my first note sent to you in regard to the Industrial Conference, I had, to a certain extent, taken it for granted that a new department was about to be created and that my school would be put under the direction of this new department. Since then, however, I have received information from the Director of Public Instruction that Government is prepared to adopt his suggestions in regard to the reorganization of the school, and also I have consulted with Mr. Chatterton and agreed with him on the following points:—

That the School of Arts is to be run on the lines accepted by Government, that is, as an Educational institution and not as a sort of "Art Workshop";

Industries in which artistic considerations play a part (such as wood-carving, ornamental metal-work, lacquerwork, carpet-weaving, etc.) not to come within the province of the new Industrial Department;

The School of Arts not to concern itself with teaching ordinary trades such as blacksmithing, carpentry, etc.; and

That the Government Technical Examinations should be abolished.

These are the points on which Mr. Chatterton has told me that some definite agreement would be of value before the Conference takes place; so I send them to you on his suggestion, and in complete agreement with him.

I did not wish to have you infer from my first notes that I wanted control of any educational scheme except the artistic part of it, but I must still insist that if the art industries of the Presidency are to be improved, only an artist is capable of effecting the improvement.

(6)

FROM MESSRS. T. STANES & Co., AGENTS AND SECRETARIES, COIMBATORE  
SPINNING AND WEAVING COMPANY, LIMITED, DATED THE 15TH JUNE 1908.

In reply to your letter demi-official No. 1859-A of the 21st of May, we have the honour to state that our Mr. R. Stanes will be prepared to attend the Industrial Conference to be held in September next, and we thank you for the copy of Resolution of Government on this subject.

With reference to the second paragraph in your letter, we do not at present see our way to make any suggestion regarding industrial development; but with reference to technical education, we should be glad to know whether arrangements cannot be made in the Madras Presidency for training in mechanical engineering, so that students wishing to go in for such training might be able to obtain certificates qualifying them as engineers of the 1st, 2nd and 3rd class as in Bombay. We are not aware that this is possible in Madras. Now that the Boiler Act has come into force in the Madras Presidency, we think it most desirable that certificates for engine-drivers and engineers should be obtained in the Presidency.

(7)

FROM N. PRIESTLEY, Esq., AGENT, SOUTH INDIAN RAILWAY, DATED THE  
20TH JUNE 1908.

I circulated your demi-official letter No. 1859-A of the 21st May 1908, among my heads of departments and enclose copies of notes written by them.

2. On receipt of these, I held a meeting of all the officers on the 18th instant to consider what could be done to further the objects the Madras Government had in view. The discussion was long and interesting, but it was felt generally that more information was wanted before useful advice could be given, and the following resolutions were passed:—

*Resolved—(a)* That Government should ascertain through their Educational department what subjects are now taught in the schools of the Presidency, and having obtained such information, Government should refer such subjects to the different departments of business throughout the Presidency and ascertain their opinion as to whether such subjects are sufficient or what are still wanting.

*(b)* That Government should be asked to supply us with the result of their survey of existing industries, and of their investigations as to the possibility of creating new industries. We would then be in a position to offer criticism from the point of view of our own particular requirements.

3. I don't know on what date it is proposed to hold the Industrial Conference. In September the Traffic Manager and I have to go to Simla for a Railway Conference, but if I cannot attend the Industrial Conference I shall be very glad to depute an officer to do so.

4. As you are aware, as large employers of labour, we furnish the Presidency with a many-sided technical school on a very extensive scale, since the bulk of our employees have to be trained by ourselves. We recognise that to expect finished workmen to be turned out of the schools would involve the State in a greater outlay than is possible in present conditions. But I think that not only might we, but the people also might, be helped if they were taught the rudiments of subjects which are likely to prove useful to themselves and their employers in the professions they are intended to follow. For example, a man destined to be a mechanic might be taught the rudiments of geometrical drawing which would enable him to perform his work with a greater degree of intelligence than a man who did not possess this knowledge and to that extent help him to turn out better work.

5. The subject is one which in any case is fraught with many difficulties, and not the least of these is the one mentioned by His Excellency in his address last February at Tanjore. Hand work cannot compete with machine work. To instal the latter, capital is wanted, and that it seems almost impossible to get in the country from among the people of the country.

6. If, having educated the people into good craftsmen, the country cannot or will not find openings for them, we have done no good. It seems necessary therefore to consider how employment is to be found for the superior craftsman *pari passu* with the efforts made to improve his knowledge.

## ENCLOSURES.

1

Letter—from the Chief Engineer, South Indian Railway, Trichinopoly.  
To—the Agent, South Indian Railway.  
Dated—the 18th June 1908.

[Your letter No. A.T. 2847-1 of the 1st instant.]

With reference to your above forwarding a copy of G.O., No. 1421, dated 20th May 1908, it does not appear that any useful purpose can ultimately be served by a series of haphazard experiments in any particular industry or by indiscriminate suggestions as to the betterment of any industry that one happens to be personally interested in. What is required rather is a radical improvement in all the industries and manufactures, and this can only be brought about by a systematic plan of campaign which would take the education to the villages themselves and which should be founded strictly on the survey which was contemplated in the Government Order under review. It is to be regretted that the result of this survey is not now before us as criticism of a positive nature could then have been made.

2. Education, elementary and higher, as it is supplied in India, must of necessity be imperfect and the condition of the country it has called forth is very much analogous to the conditions produced by the same imperfect and incomplete means in Russia. It would seem therefore that better results could be obtained and the general prosperity of the country improved if the methods and curricula now prevailing were stopped almost altogether and a system of technical education introduced as being more suitable for the state of society and the betterment of the nation, and as the question of the promotion of industrial development depends on the facilities afforded for the acquisition of such an education, let us investigate how this can be brought about.

3. In the middle part of the 18th century Rousseau produced a startling effect throughout Europe by his theory of education and such theory was the outcome of the false civilisation that he saw around him. The burthen of his teaching albeit not an ideal one was Nature. In brief it was not to worry children with learning and precepts beyond such as lead them to do no harm to those around them, to develop their body by judicious athletic exercises and to train their faculties by the observance of Nature. From the ages of 12 to 15 the child was to be taught and to practise some handicraft.

4. Now the conditions in India seem to be ideally suitable for the carrying out of a scheme based on such a theory if it could be practically evolved. As the general rule, children up to the ages which would correspond 12 to 15 in Europe are the result of the survival of the fittest and one's own experience of those of the artisan class at that age leads one to assert as a fact that they are bright, open and candid little fellows and willing workers and very much more intelligent and self-reliant than many of their elders. I have in my mind's eye several such children whom I have met and known. At this age then they are in a fit condition to be taught and trained technically whatever their caste may be.

5. The work produced out here may be likened to a copy of the work of a master which, although technically correct, lacks the soul which breathes in the original. The most apparent thing that strikes one in the work of the artisan in India is that, however like it may be to the European article, it lacks that internal quality of lasting which makes all the difference. One need only think of such examples as the boots and clothes one buys in the bazaar. The difference is not only one of cost and material, but it is due to the want of education on the subject at the critical time between boyhood and manhood of the artisan when he would be capable and susceptible of receiving instruction on the point.

6. Now as to bringing some practical scheme into operation—

In the G.O., No. 1421, under review, the creation of a department to make a survey of existing industries and to investigate the possibility of creating new ones was proposed. With the result of such a survey before them, it should be possible to divide up the Presidency into groups for the furtherance of technical education and to carry the education to the villages themselves instead of bringing the students to the centres. Such a scheme would include paying attention

to sanitary principles in villages, instructions in gymnastics and athletics and everything which would induce a healthy mind in a healthy body. Natives are only too fond of sport as it is and hence a remarkable aptitude for games so that this should not be a difficult matter, but I would make this a part of the education. At the age when he should receive his instruction the technical adviser would come in. In such a way it seems to me a contented and useful community would spring up, a better class of manufactures and products arise and they would find their own market and value in a very short time and bring about in the simplest way that industrial development which is so much to be desired and *a fortiori* the abolition of the present system of imperfect education which fosters bad manners and the sedition.

2

Letter—from the Locomotive and Carriage Superintendent, Negapatam.  
To—the Agent, South Indian Railway.  
Dated—the 15th June 1908.  
No.—1897-1.

[Your letter No. A.T. 2847-1 of 1st instant.]

I have been so busy lately and Mr. Reynolds has just returned from leave and finds his hands so full that we have not been able to give the above subject due consideration.

2. Mr. Reynolds will be present at the meeting on the 18th at Trichinopoly and will be glad to then learn in what manner he can personally assist the movement.

3. I am afraid that at present I have not any great ideas on the subject not having had the time or the opportunities to study same. And it is a big subject with a railway like ours, covering such a large extent of country each district of which has its various different industries some of which may be flourishing, some of which may be languishing or defunct. It seems to me that each district requires treating on its own merits.

4. With regard to Negapatam there is no local industry that I am aware of on a large scale. The population is employed chiefly by the railway and by the shipping firms, the remainder are in petty mercantile business. There is no local produce on land, but it is just possible that more use could be made of the produce of the sea by deep sea-trawling and forwarding the fish to inland towns by rail, if a demand could be created for same. Greater shipping facilities would create more business, and would be a boon to Negapatam which rather than be a cradle of industries will be a port for export of them to other countries.

5. With regard to other districts we must find out what the local industries are, their present condition and whether they can be vitalised and improved. This, as far as I can see, can only be done by local enquiry.

3

Letter—from the Traffic Manager, Trichinopoly.  
To—the Agent, South Indian Railway.  
Dated—the 16th June 1908.  
No.—A.J. 460-16.

[Your No. A.T. 2847-1 of 1st June 1908.]

*Agricultural and Industrial Schools.*—It is suggested that there should be agricultural schools from which candidates may pass examinations and be open to employment in the several estates of the Courts of Wards under Government control and on Tea, Coffee and Rubber estates or that agriculture should be a branch of the education in existing schools.

2. Under present conditions people who learn carpentry, smithery, painting, tinkering, etc., are not sure of getting sufficiently remunerative employment to make it worth their while to take up these handicrafts and it is suggested that, if schools were opened and the Government and Railways and other large corporations would employ in their shops and works only those who hold Government certificates, it would be encouraging to many people to take up the study of these crafts.

3. There is a great deal of land which can be turned to advantage by people who have a little money to invest but do not belong to the agricultural classes. This land is at present lying idle because the villagers do not take it up for want of knowledge or funds or because the procedure for obtaining land is not as elastic as it should be; at present a ryot who is in possession of an adjacent property has the first claim and if any one else requires land, no matter how enterprising he may be, he is often shut out under the Darkhast rules in favour of the man near the spot who is often useless for the purpose of developing the land. I know of a case in which an application for land has been outstanding with the Collectors of Tanjore and Trichinopoly for over a year. Some quicker method of obtaining land seems necessary.

4. It is possible that the fact that there is no separate agricultural and industrial department of Government has something to do with these delays as everything has, it is alleged, to be referred to the Revenue Board who are unable with their other business to devote to agricultural and industrial movements that exclusive attention that they require.

5. *Mills*.—It is stated that there are a large number of spinning but few weaving mills in this Presidency and that, if more weaving mills were opened, there would be an ample market.

6. The present oil hand-presses are old-fashioned and a greater and quicker outturn would be possible with improved oil presses, but oil is not exported in large quantity so that there is no incentive under present conditions to improve oil presses, but if candle and soap factories were started in this country, there would in consequence be a larger demand for oil. At present soap and candles are largely imported from Europe.

4

Letter—from the Chief Auditor, South Indian Railway Company.  
To—the Agent, South Indian Railway.  
Dated—the 15th June 1908.  
No.—C.R. 2460.

[Your letter No. A.T. 2847-1 of 1st instant.]

I am afraid this is a subject about which I know very little, and I cannot therefore suggest any "practical measures" likely to promote or develop the industrial resources of the Presidency. I am, however, of opinion that the following industries are capable of expansion:—

*Mining*.—The iron ores of Salem are reported to be very valuable and if with up-to-date furnaces and the utilization of the energy of falling water as a substitute for fuel, and conversion into electricity, the experiment seems worth it. An expert might be employed to prospect the country for manganese and other valuable deposits and also to make borings for coal and water.

*Glass*.—Experiments have been made in Central India by private enterprise to manufacture glass, but, I understand, without much success. Government help might make the enterprise successful.

*Gingelly and other oils*.—At present very little machinery is used in the process of extraction; by the introduction of suitable machinery the industry would probably improve.

*Manufacture of hemp from alce fibre*.—This industry appears to be in its infancy, and it requires an impetus in the shape of experiments carried out at Government expense.

*Tinning fruits*.—There is a factory in Portuguese India where mangoes are tinned and exported to Europe. The business has proved a success, and there appears to be room in the country for more industries of this description.

*Technical education*.—It would seem necessary to attach more importance to this subject during a boys' school course, and schools more efficient for instruction in this branch are required.

5

Note by the General Storekeeper, dated 9th June 1908.

*Industrial development*.—Except in Madras, where the industries (the manufacture of aluminium utensils and the chrome tanning process of treating leather) are carried on in the heart of a large city and under European supervision, Government's efforts in this direction do not appear to have met with any very marked degree of success.

(i) I think, however, that much might be done for the encouragement of indigenous industries, such as weaving, pottery and brass and copper work by the fostering of local rivalry.

(ii) This could best be effected by the inauguration of annual, biennial or triennial exhibitions in a few of the larger towns in each district.

(iii) To hold these exhibitions at only a few of the larger centres in the Presidency would, I fear, be futile, in that the exhibits are, in such cases, necessarily sent in from great distances, the personal element is wanting, and the probability is that, in the vast majority of instances, the men most interested, i.e., the artisans, hear no more of the matter and remain in ignorance as to what measure of success their efforts have met with.

(iv) When, however, village competes with village, community with community, and individual with individual, the personal element is introduced and a spirit of local rivalry, the true secret of progress, is at once established, and it seems to me possible that herein lies the solution to the revival of indigenous industries, now so steadily on the wane all over the country.

(v) In each district, therefore, I would inaugurate, in suitable localities, exhibitions.

(vi) By granting free conveyance both to themselves and to their exhibits, I would encourage exhibitors to attend these exhibitions.

(vii) They would thus be given an opportunity of seeing their handiwork in competition with that of others, and of noting and discussing its merits or demerits.

(viii) I would award prizes, not to a class or community, but to individual exhibitors. The latter, therefore, would, on their return to their homes, possess some tangible proof of their success, and emulation would thus be fostered.

(ix) In cases of exceptional excellence or enterprise, or success during a succession of years, I would supplement these prizes by special rewards, such as the grant of land or partial remission of, or exemption from, taxation; for awards such as these could not but act as powerful incentives to progress and enterprise.

(x) Concurrently with these exhibitions I would inaugurate, on similar lines, agricultural exhibitions and cattle and horse shows, and so encourage the agricultural development of the country.

(xi) What is required, in short, is to bring home to the artisan and ryot, and, so, to the country as a whole, that excellence in workmanship, material, live-stock or produce will be suitably rewarded and that the expenditure of time, energy and money will not have been in vain.

2. *Technical education*.—Here, again, Government's efforts do not appear to have met with any great measure of success. Schools are clamoured for, but where facilities are afforded, as in the case of the school at Madura, they are not taken advantage of, nor do I think that they will be, so long as the present craze for "higher" education and clerical employment lasts.

(i) His Excellency the Governor, during his recent tour in the Tanjore district, was repeatedly addressed on this subject, and his invariable reply was to the effect that where 90 per cent. of the population was a rural one, he did not consider that technical education amongst the masses was going to be advanced by the introduction of a few schools in the larger towns, and that to open out and pass men through these schools would be a mistake in the absence of any guarantee that capital would be forthcoming wherewith to inaugurate industries wherein the men could be employed.

(ii) This, I take it, is the whole crux of the matter, but would it not be possible, as a preliminary measure, to introduce, as adjuncts to all the principal colleges and schools throughout the Presidency, practical and commercial classes where the rudiments of knowledge in these branches could be acquired?

(iii) Were this done and attendance at these classes made compulsory, it would not be long before any special aptitude that the pupils possessed was discovered.

(iv) They could then be specialised in the subject or subjects in which they excelled, and, eventually, drafted into some central technical institute for a final course and finish.

(v) In the case of pupils who, say, within a year of their entertainment, displayed no marked predisposition in this direction the tuition could be discontinued.

(vi) An arrangement such as this would have the effect of keeping within bounds the numbers attending, and passing out of, the technical institutes, for, of course, none but those who possess special aptitude for some particular subject would be allowed to enter them, and, with the gradual development of the country and its resources, employment could, doubtless, always be found for the comparatively limited number of students who would qualify under these conditions.

3. I fear that neither of the two schemes which I have outlined could be introduced without a considerable expenditure of money, but then I can conceive of no scheme in which this drawback would not exist.

A. H. CHRISTIE,  
General Storekeeper.

6

Note by the Electrical and Signalling Engineer, dated 17th June 1908.

I am afraid I do not know much about the subject from a wide point of view. As a Works Manager I can say that the Indian artisan can turn out as neat and accurate work when properly supervised and with good models to guide him as any workman in Europe. I once took with me to England a couple of Railway block instruments made in an Indian Railway workshop and showed them to a well-known manufacturing firm in England. The gentlemen to whom I showed the instruments expressed great astonishment that such good work could be turned out in India by native labour. The instruments in point of finish and accuracy compared excellently with similar instruments made by the firm.

Blacksmiths, fitters, brass workers can do excellent work and at a cheap rate. The difficulty is in India to find a wide market for the results of their industry. Railways can absorb a good deal of this work, but the market ought to be much larger in order to give employment to an appreciable percentage of the working population.



Unfortunately the wants of the average Native are very few and if a market is to be found in this country it should be for something that everybody wants. Every Native wears cotton fabric of some sort, and it would seem at first sight as if here was a market which India could supply. Cotton is grown in the country. Native labour is cheap, but in spite of these natural advantages India has to go to Europe for its manufactured fabrics. Apparently some attempt has been made in this Presidency to improve the hand-loom. Could not this policy be persevered in in the hopes of better success? Later on the hand-loom might be worked by oil or alcohol engines—if the latter, the fuel (alcohol) could be produced locally. I do not think the factory system as worked in England would be suitable to this country. Instead of large factories manufacturing for a large area, it would appear better to have smaller factories working for small areas.

I recommend that much be done in the way of lecturing and in other ways of disseminating information of what other people have done in developing local industries. I have always found the Native artisan an excellent copyist and perhaps this inherited proclivity extends throughout the Indian social scale; if so advantage could be taken thereof in the manner suggested.

(8)

FROM THE AGENT, MADRAS AND SOUTHERN MAHRATTA RAILWAY COMPANY,  
LIMITED, MADRAS SECTION, DATED THE 23RD JUNE 1908.

I beg to suggest that attention might profitably be given to improvements in the following industries at the Industrial Conference to be held at Ootacamund:—

- Manufacture of paints.
- Manufacture of paint and varnish brushes.
- Preparation and finishing of leather for upholstering purposes.
- Manufacture of India-rubber goods.
- Manufacture of fire-clay and fire-bricks.

I also beg to suggest that the Madras Government should obtain from the Government of Canada the reports of the experiments made at Sault St. Marie in the electric smelting of iron and that the Director of Industrial and Technical Enquiries should be directed to report on the practicability of making use of the water-power of falls in the Salem district to generate current for the electric smelting of the iron ores of that district.

(9)

FROM H. KUHNER, ESQ., AGENT AND MANAGER, BASEL MISSION INDUSTRIAL  
ESTABLISHMENTS, CALICUT, DATED THE 24TH JUNE 1908.

With reference to your office letter No. 1859-A of 21st ultimo, I have the honour to make the following suggestions by which, in my opinion, Industries and Industrial Training could be usefully developed in the Malabar district. In doing so I intend to mention such branches only which would be the natural outcome of the agricultural products and by which the largest number of people would find employment and profit. Apart from them various other new industries might be investigated and experimented with.

The following are the industries, which might be experimented with or aided by Government and which would bring a large return to the district:—

- (1) Coir-industry (the better class of coir-mats).
- (2) Jute-industry.
- (3) Plantain-flower industry.
- (4) Plantain-fibre industry.

Further I understand that in case shipping facilities would be provided for in Malabar, the cocoanut-oil industry would naturally develop to a much larger extent. By this, the much needed oil-cake could be retained in the country for cattles and along with this branch the cask-making would naturally develop.

Another branch, which Government might well investigate and develop is the fish-manure industry, by which, fish-manure could be exported to foreign countries which is quite impossible at present.

#### *Industrial and Technical Education.*

I understand that Government is willing to assist existing industries by giving a theoretical training to workmen, etc., and I wish to make the following suggestions which would be sufficient for the present to further the existing industries in Malabar.

An Industrial school should be started in Calicut, in which the following elementary lessons may be taught in vernacular:—

- (1) General drawing.
- (2) Special drawing according to various branches represented.
- (3) Practical geometry.
- (4) Modelling.
- (5) Teaching and demonstrating the various branches.
- (6) The making of estimates and plans.

The necessary implements must be provided for to demonstrate whatever is taught in the lessons.

Such Industrial schools should on no account be allowed to be run on commercial lines as—

(1) In such case workmen would be engaged to do the work and pupils would little profit.

(2) Such schools with commercial pressure would necessarily interfere with the already existing industries and would, in many cases, be ruinous to them.

In Calicut, such an Industrial school could be added to the existing Commercial school, which would be advantageous and cheap.

(10)

FROM THE HON'BLE MR. A. J. YORKE, MESSRS. PARRY & Co., DATED  
THE 25TH JUNE 1908.

In further reply to your letter of 21st May (D.O., No. 1859-A), I beg to put forward the following suggestions of practical measures that might, I think, with advantage, be taken for developing certain industries in this Presidency.

I confine my remarks to those industries of which I have actual knowledge, either of the working or of the need for their products, in India.

I would first refer to the sugar industry. It obviously deserves attention seeing that though the country has ample sugar producing capacity and even exports a fair quantity of jaggery or inferior raw sugar, it at the same time annually imports several crores worth of better class sugar. In 1905-1906 the import of white sugar was nearly 8 crores of rupees in value and the statistics show that the demand for it has steadily grown. So the question arises—what prevents the local industry from meeting the local demand of this quality? The answer is that as yet the supply of raw material is insufficient whether of cane for making white sugar direct from it, or of jaggery suitable for refining purposes.

Taking first the question of cane supply, the problem is essentially an agricultural one, as on present yields per acre the crop barely pays the ryot as compared with other crops. As shown by the Director of Commercial Intelligence in his pamphlet published last year on "Sugar in India," the yield of cane sugar per acre in different countries is as follows:—

|                                  |
|----------------------------------|
| 1 to 1.3 tons per acre in India. |
| 1.8 to 2.4 „ „ in Egypt.         |
| 2 to 3 „ „ in West Indies.       |
| 3 to 4 „ „ in Java.              |
| Over 4 „ „ in Hawaii.            |

The cane brought to our Nellocoopam Factory last year showed a yield of, say, 1.22 tons sugar per acre, so confirming the above estimate of Indian cane yield and goes to show that no improvement of machinery, no improvement of manufacturing methods, will enable India to compete with the outside world in white sugar until her agricultural methods are improved. Even if we could by some super-human means make our sugar for nothing and give the ryot the saving thus effected, it would not give him half as much money as he would get by doubling his crop which the above statistics of other countries show can easily be done.



I gladly recognise that the Government Agricultural Farms, established in recent years in various districts in this Presidency, are steps towards meeting the need referred to, but I would urge that attention should be more especially focused upon cane since in it there would appear to be more room for improvement than in other crops in India. As a first practical measure then for the improvement of the sugar industry, I suggest that the Agricultural Department should have a cane specialist from Java or Hawaii to systematically look after cane nurseries where special varieties can be carefully grown, selected, distributed to cultivators and their subsequent fate followed. Experiments should be made not only to improve the suitability of imported canes, but also to improve local varieties by selection and to demonstrate the efficacy of different methods of manuring in different soils of this Presidency.

I would here like to record a note of satisfaction at the success of Mr. Chatterton's oil-engine pumping experiments. They may have a special value from a cane manufacturing point of view by permitting the extension of the cane planting season and the consequent lengthening of the harvest period, an essential for cane sugar working on any large scale. It may also be practicable in connection with the oil-engines required for such pumping to develop, in places distant from any central cane mill, improved crushing and evaporating plants (small enough for any well-to-do ryot to instal) where improved jaggery or raw sugar could be made of a quality suitable for refining instead of the common cane jaggery at present made which is for the most part unsuitable for refining. The reason of this unsuitability is that owing to the large glucose content of such jaggery it when refined yields an undue proportion of molasses and that molasses under the existing abkari regulations of this Presidency is not allowed to enjoy that full value as a spirit base which it intrinsically has. Consequently among the distillers an artificially low price rules for molasses and a corresponding high price rules for inferior jaggery to the direct encouragement of the production of the latter and the discouragement of the manufacture of white sugar. Needless to say in making sugar, molasses is the great by-product and on the price realised for it may turn the profit or loss of a season's working.

In these circumstances I suggest as a second practical measure for the improvement of the sugar industry in this Presidency that Government remove the differentiation introduced ten years ago against molasses as compared with jaggery as a base for spirit and thus give back to refiners the wider market for their molasses which they used to enjoy. Then it should be possible to develop the wider production of refinable raw sugar throughout the country. But unless this is done, i.e., unless a fair field is allowed for molasses, even improved agricultural yield per acre could not lead to very greatly increased growth of cane since the demand for it for jaggery purposes only is limited and is not likely to increase as against the growing taste for white sugar already referred to. For white sugar of course the market is world wide as therefore is the demand for materials suitable for making it.

As a third and last practical measure to foster the sugar industry, I suggest that Palm Tree Tapping Regulations which the recent Abkari Committee recognised as hampering the industry be reconsidered by Government with a view to encourage this source of sugar supply. Here again I am glad to be able to acknowledge a less stringent enforcement of the tree-tapping regulations than at one time was the case but there is still room for further relaxation.

I would now refer to the chemical industry.

The main difficulties hindering progress in it are the cost of packages and of transport.

Sulphuric acid may be called the base of the industry and the manufacture of it on a scale large enough to be economical is practically prevented by the necessity found for transporting it in this climate either in acid proof jars or glass carboys, while it is impossible to obtain either of these descriptions of vessels at a reasonable cost in this country. I suggest as a practical measure to promote the development of this industry that the Director of Industrial and Technical Enquiries make exhaustive experiments as to the possibility of making cheaply in this country :—

- (a) Acid proof jars.
- (b) Glass carboys.

Probably other pottery and other glass work would have to be undertaken to secure economy and there should be a market for both.

As regards transport of chemicals, the Railway Regulations require a very heavy form of package (jars packed in wooden cases containing whiting or some such absorbent) making the gross weight of the acid so packed double its nett weight and on that gross weight the high tariff for dangerous goods is levied. The result is that it is impossible to rail acid any considerable distance without finding sea-borne acid under-selling that made in the country.

I therefore suggest as a second practical measure to develop this industry in India that Government lend its aid towards obtaining more favourable rates than now charged for the carriage of acid by rail.

The development of the chemical industry in India and all it means cannot be expected to appeal much to the Traffic Department of Railways when they are asked for reduced rates of carriage, but Government if it saw fit could doubtless get a broad view taken in the interests of the country generally.

Closely connected with chemicals is the fertilizer industry and here too the assistance of Government might usefully be given in securing specially low rates for fertilizers by rail. Potentially the value to railways is untold of the benefits to be derived from the better crops resulting from sufficient manure. Such extra traffic would come of course not only from the crops themselves but also from extra tonnage of farm necessities and luxuries to be bought with the crop proceeds.

Here again however unless Government impress such a view on the Railway authorities they are apt to overlook it and consider only the immediate profits to be derived from higher rates of freight on manure traffic.

I would like to suggest to the Government the course that was followed some years ago by Portugal in this matter of fertilizers. The Government there with the view of fostering agriculture and of rendering Portugal self-supporting in regard to wheat paid for a number of years 60 per cent. of the railage on manures destined for the soil. A voucher covering 60 per cent. of the freight was granted on formal application to the Agricultural Department and on the undertaking that the consignment would be applied to the soil. As a result in a few years from small beginnings the use of chemical manures increased by leaps and bounds until Government having secured its object gradually reduced its payment of railage, and now, I believe, pays nothing while the country I understand not only grows enough wheat for itself but in good years is able to export it. A further consequence is the universal appreciation of fertilizers in Portugal and an established industry in them there.

As regards technical education, I am not prepared to say much. My previous remarks about acid-proof pottery and glass however indicate the need of workers trained in those directions and in connection with chemicals we find great difficulty in obtaining competent plumbers in this country. Plumbing appears to be an almost unknown art here and labour of this kind has to be imported at an expense which is a heavy charge on working chemicals in India. In sugar there is no difficulty in getting hands with the technical knowledge required for factory purposes.

(11)

FROM THE HON'BLE MR. A. J. YORKE, CHAIRMAN, MADRAS CHAMBER OF COMMERCE, DATED THE 4TH JULY 1908.

I have the honour to acknowledge receipt of your D.O. letter No. 1859-A, dated the 21st May 1908, forwarding copy of a resolution of the Madras Government on the subject of an Industrial Conference to be held at Ootacamund in September next, and inviting the Chamber (1) to depute a representative to attend the Conference, and (2) to favour Government with suggestions as to any practical measures it would recommend for the promotion of industrial development or of technical education.

2. In reply I beg to say that the Chamber, which has deputed me as its representative at the Conference, will be glad to give Government every assistance in its power towards devising a means for improving the industrial position of the Presidency.

The opportunity of laying before Government in an uncontroversial way the difficulties encountered by different industries should be of great value if Government will seriously endeavour to give their powerful assistance in each instance so far as practicable. If any difficulties at first sight apparent to Government in the way of so doing are stated and discussed, a way out of them will possibly be found, or at least the position will be cleared up and misapprehensions as between Government and the industrial public avoided.

3. At the same time, the Chamber fears that the limits within which Government can promote industry in the Presidency are not wide, unless by the adoption of far-reaching steps such as the introduction of a protective tariff, which, by enhancing profits, would quickly attract capital, as proved by experience in all countries where it has been tried. But such a method of stimulating Indian industry is no doubt outside the scope of the Conference, so the Chamber will not discuss it.

4. Speaking generally, the Chamber believes that industrial business can best be managed by business men, and is therefore of opinion that any general policy of Government experiments in connection with established industries is to be deprecated. It anticipates that they would have results altogether incommensurate with the expenditure involved, and might largely tend to discourage private enterprise, which must fear to attempt expansion side by side with the State-aided competition entailed by such experiments, whose limits could not be gauged by private individuals in any trade concerned. The reply that Government will always be ready to retire from such work does not altogether meet this point, since Government could only do so by the sale of their installation. Government's experiments, if on a small scale, would have had little commercial value; if on a large scale, the private individual would have either to face continued State-aided competition or have to provide funds on a scale which he might not be able to afford to buy it out—an unfair position to put him in.

5. In these circumstances, the Chamber thinks that Government can best assist in developing existing local industries in the following ways:—

(a) By devoting greatly increased attention to the improvement of agriculture, on which essentially the main industries of this Presidency, with its indifferent mineral resources, must probably ever be based.

In this connection, the Chamber recognises that good work has already been done both by the Agricultural Farms and by Mr. Chatterton's water-boring and pumping experiments, but it advocates a great development of the farms and the prosecution of their work on systematic lines in a thorough way, with even more regard to publicity and perhaps less regard to the financial results of each farm than has hitherto been customary.

(b) By the investigation with the object of removing any difficulties at present experienced by existing industries and recognised as standing in the way of proposed industries, especially such difficulties as arise from regulations either of Government proper or of semi-Government institutions like railways.

6. As regards the promotion of new industries, the Chamber does not wish to advocate Government embarking on a manufacturing scale with public funds where commercial men fear to venture their own money, so it would suggest that the

Mother-of-pearl buttons, bone buttons, horn buttons, glass pearls, beads, straw braid, carpets, matches, earthenware, accurate silk spinning, stone cutting, gold thread, etc.

Europe (as per list in the margin), worked either entirely by hand or by the aid of small and simple machines. Possibly some of these might be successfully introduced in India, but the question would of course require careful consideration.

7. As regards technical education, the Chamber has little to add to what Mr. C. B. Simpson has already written to you on the subject. As, however, the matter may have a quasi-political interest to Government, the Chamber would point out that in industry there is no racial question, as such, whatever. If industrial managers can get any given work done as well by an Indian as by a European, the former, if

cheaper, as he always could be, would certainly get preferential employment. But commercial enterprises are not conducted as schools, and if the efficiency of any given man is not obvious, time is not wasted in finding out why he is not efficient but his work is given elsewhere, even at a higher wage.

8. Up to a point, the Indian is an excellent, cheap and reliable employee. Beyond it, he fails to come up to modern industrial requirements. The Chamber is not prepared to dogmatise as to the causes of that failure or as to the educational or other remedies possible for it, but the personal experience of several of its members in connection with many factories throughout India leaves no practical room for doubt of the fact mentioned.

(12)

FROM M.R.RY. DIWAN BAHADUR K. KRISHNASWAMI RAO GARU, C.I.E.,  
PRESIDENT, THE NATIONAL FUND AND INDUSTRIAL ASSOCIATION, MADRAS,  
DATED THE 16TH JULY 1908.

With reference to the requisition contained in the concluding sentence of the second paragraph of your letter, I beg to submit herein enclosed a paper setting forth the general views and suggestions of the National Fund and Industrial Association on the points indicated in your letter. I think that I am right in presuming that in addressing me as the President of the Association, the Government intended that I should place before them the views and suggestions of the Association. Accordingly a meeting of the Managing Board was convened on the 19th June last and the points indicated in your letter and in the G.O., No. 1421, dated 20th May 1908, were considered. The result of their deliberations is set out in the enclosed paper.

ENCLOSURE.

*Views and Suggestions of the National Fund and Industrial Association, Madras,  
on points indicated in G.O., No. 1421, dated 20th May 1908.*

*College of Technology.*—The opening of one first-rate college of technology for this Presidency, similar to those existing in Europe and America, is absolutely necessary. The provision made for the supply of trained Indians by means of scholarships granted by Government and private bodies for technical education in foreign countries is most inadequate to satisfy the needs of the country. The expenses of technical education and training in foreign countries are so prohibitive that it would be never possible for private individuals to give to their children technical and industrial education in Europe or America, especially in the face of the fact that there is no organised and well-paid industrial service like the civil and medical services, with an assured income and prospects. Technical education in an Indian College will be less costly and more popular and better adapted to the circumstances of the country. The consequences of failure on the part of students of an Indian institution will not be so serious as in the case of students sent to foreign countries.

If financial considerations stand in the way of providing instruction in all technical subjects, a beginning may be made with instruction and training in *textile and leather industries in all their branches*. Arrangements to be made for teaching of any industry must be full and up-to-date and should leave nothing to be desired in way of library, laboratory, workshop, museum, etc.

Industrial and Commercial classes are, as a rule, backward in availing themselves of the opportunities given for special education in higher branches of their professional work. Intelligent youths among them should be induced by the grant of scholarships to receive instruction in suitable technical subjects in the college.

*Hand-loom.*—The improvement of the hand-loom weaving industry is most urgent. Several demonstrations recently held in various parts of India have established beyond doubt that with the use of fly-shuttle looms, Indian weavers could increase their production by at least 50 per cent. The number of weavers who actually witnessed these demonstrations is insignificant. In the present state of the community, it is necessary to carry the demonstrations to their homes. The Association understands that the Government of Bengal have organised small parties consisting of two maistris and one carpenter to visit weaving centres and teach the local weavers and carpenters how to work with fly-shuttle looms and how to make and mend looms. The introduction of a like scheme in this Presidency will be a great boon to the weaving community. The fly-shuttle frame looms are not likely to be popular owing to their heavy cost. Pit-looms with fly-shuttle arrangements are likely to find ready acceptance on account of their comparative cheapness. The introduction of the latter should receive the early consideration of Government. The National Fund and Industrial Association is arranging to carry out this scheme in a few selected centres, but its funds and resources are limited and its efforts must therefore be confined to a very small area.



*Education of Industrial classes.*—Illiteracy is the rule among the weaving and other industrial classes. Unless primary education is made compulsory among them, their material progress would not be perceptible. The Association therefore urges the compulsory education of the industrial classes up to the primary standard at least.

Special evening classes should also be started in different towns and big villages. Their object ought to be not so much to teach new industries but to enable artisans to carry on their trades with better knowledge and skill so that they may place better articles on the market. Such classes should also be organised for imparting commercial and agricultural education in the vernacular.

*Vernacular high schools.*—It is our conviction that, if the country is to make any real progress, vernacular high schools should be started in each taluk, giving instruction in the vernacular of the district. It is only then that we can hope that general knowledge including elementary scientific knowledge will spread throughout the country and a sure foundation will be laid for industrial progress.

*Co-operative Credit Societies and loans to weavers and other industrial classes.*—The Registrar of Co-operative Credit Societies should be instructed to use his special endeavours to organise co-operative credit societies among the weavers and other industrial classes. Loans for the purchase of improved hand-looms and implements should be specially encouraged by the reduction of the rate of interest payable on them and by allowing a good number of easy instalments for their repayment as in the case of agricultural loans.

*General measures for the promotion of Indian Industries.*—Although Indians are very earnest to start new industries, they hesitate to do so, lest their productions may find no regular sale owing to the keen competition of foreign articles. Several small industries such as manufacture of buttons, biscuits, soaps, matches, candles, etc., recently started in India are not able to sustain themselves, as importers are believed to sell their articles much cheaper than Indian productions with the result that the latter is driven from the market. The Association thinks that whenever the Government find that any Indian industry is really suffering from foreign competition, they should impose reasonable amount of protective duties on the imports of the production of such industry. It is generally believed that some of the foreign importers are using Indian names for their articles with a view to pass them as Indian productions. If such objectionable practice does really exist, the Government should take steps to stop it. To encourage Indian industries, the duty levied on the machinery imported for their special use must be abolished as early as practicable.

(13)

FROM M.R.BY. DIWAN BAHADUR P. RAJARATNA MUDALIYAR

AVARGAL, C.I.E., DATED THE 24TH JULY 1908.

In reply to your demi-official letter of the 21st May last, I beg to forward a note containing a few suggestions as to the best means of promoting (1) Industrial development and (2) Technical education in this Presidency.

ENCLOSURE.

*Note on Industrial Development and Technical Education.*

The most effective means of carrying out the objects of Government in regard to the promotion of (1) Industrial development and (2) Technical education is to establish a thoroughly equipped institute of technology for conducting researches and experiments, on the most approved methods, in certain specified branches of industry in which, in the opinion of Government and its advisers, improvements are possible and could be carried out with advantage. The Madras Government has already broken ground to some extent in this direction, as witness the experiment in connection with the aluminium industry, and now with chrome-tanning of leather. After three years of experiment, the success of the aluminium industry was so clearly demonstrated, that a private company readily took over the business, with the machinery and plant, at a very fair valuation. I feel sure that the same result will attend the chrome-tanning experiment, probably before the end of another year or two. Already a small company has been formed in Coimbatore which has started some work. I think the time has now arrived for Government to take a bolder step and establish a first-class research institute, on the lines indicated below, for conducting experiments and effecting improvements in other branches of industry which offer fair prospects of success.

The institute should be equipped with the latest machinery and appliances, a chemical laboratory and a staff of the most experienced specialists. It should be

formed into a separate department, under the direct control of Government, with a Secretary specially selected for the purpose and occupying the same position as the Chief Engineer in the Public Works Department. The present arrangement, under which the Director of Technical and Industrial Enquiries is subordinated partly to the Board of Revenue and partly to the Director of Public Instruction, would be out of place in any comprehensive scheme of industrial development and technical education such as is now under contemplation.

For the present, the investigation and experiment might be extended to the following items. If funds do not permit, the first three items might be taken up at once and the others later on. Of course, any items that are included in the programme of the Tata Research Institute at Bangalore should be excluded:—

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| (1) Textiles, in all its branches. | (4) Sugar.                        |
| (2) Tanning.                       | (5) Metals, hardware and cutlery. |
| (3) Oil-seeds.                     | (6) Gold and silver thread.       |

A few explanatory remarks under each head are appended—

(1) *Textiles.*—This will include cotton, silk and woollen industry, dyeing, bleaching, etc. According to the scheme proposed, each branch will have a separate expert, one or two qualified to carry out improvements in fly-shuttle hand-looms and other appliances suited to the requirements of the country, and in the processes of reeling, winding, warping and sizing; one for experiments in dyeing and another in bleaching. In all these directions, there is undoubted scope for improvements, and no expense should be grudged to carry them out. The Government of Bombay has done much to assist Mr. Churchill in bringing out an excellent hand-loom, but this is at present only suited for weaving cloths of lower counts. If it could be improved, as Mr. Churchill hopes to do, to suit cloths of even 80 to 100 counts, it would revolutionise the factory and hand-loom industry in this country. The aim of the institute should be to achieve similar results.

In the processes of dyeing and bleaching, there is also a vast field for investigation by chemists. The old indigenous dyes are being displaced by the chief artificial products of Europe. Twelve years ago, the value of the export trade in indigo amounted to 140.21 lakhs. Since the introduction of aniline and alizarine dyes and synthetic indigo, this trade has declined to 16½ lakhs, and this in spite of the fact that the artificial dyes are fugitive in colour. Experiment should be made to find out how far the manufacture of the natural dye could be improved and cheapened and whether the artificial dyes could be made locally.

Cotton is an important crop in this Presidency, covering an area of over one and a half million acres, excluding zamindaris. In 1906-1907, it rose to 1.74 millions. An enormous quantity of the raw staple is exported annually to foreign countries, chiefly to Japan, Belgium and the United Kingdom. For the five years ending 1905-1906, the average exports amounted to 716,300 cwt. valued at over 202.85 lakhs. In 1907-1908, owing to the high prices of American and Egyptian cotton, the exports rose to over a million cwt., valued at 339 lakhs. At present the Presidency is in the anomalous position of exporting its raw produce to other countries to the value of nearly 270 lakhs annually (average of seven years), and at the same time importing twist and yarn to the value of 90 to 100 lakhs and piece-goods to the value of over 260 lakhs. It is true that Indian cotton is inferior to the American and Egyptian staples, but it is sufficiently good to suit the requirements of more than three-fourths of the population who use only the coarser cloths. The problem for the research expert is how to reduce the cost of local manufacture and thus develop the local industry. Given improved appliances and expert assistance, the problem should not be difficult of solution, especially with the cheap labour available in the country. It should not be forgotten that the Government is doing all it can to improve the quality of the cotton grown in the country, and if, as is hoped, the experiments which are being conducted in all the provinces, notably in Bombay-Sindh, prove successful, the cotton industry will be greatly benefited. Some of the mill-owners have suggested to me that if the Indian mills are to succeed, the excise duty now levied on the mill products should be removed. The question deserves consideration at the Conference. Their removal is urged to be all the more



necessary, seeing that China, which is the largest consumer of the yarn and cloths manufactured in the Indian mills has begun to develop her enormous industrial resources and will be able in a few years to drive the Indian products out of her markets. Japan will also become a formidable rival of India. The value of the trade with the Far East averaged 14.74 lakhs in cotton twist and yarn for the five years ending 1905-1906, and nearly 77 lakhs in piece-goods. Much of this trade would be lost to this Presidency if the industrial development that has been set on foot in China succeeds, as it is certain to do, in the near future.

Independently of the experiments to be carried on in the institute, there are several other directions in which improvements could be effected at once in the textile industry. The "All-Indian Weaving Competition" that was recently held at the premises of the School of Arts has shown beyond doubt that, except in the case of solid bordered cloths, the Madras fly-shuttle hand-looms are capable of turning out at least double the quantity of cloth that could be woven on the ordinary country loom, and that the desired improvement could be effected by attaching the fly-shuttle-slay to the existing pit-looms, at a cost not exceeding Rs. 10 per loom. It was also found that there are several labour-saving appliances for pirn winding, warping, etc., which could be introduced with advantage. I would strongly urge that Government should establish at least three or four additional weaving factories on the model of that established at Salem, and appoint a number of trained itinerant instructors to visit different centres and bring home to the weavers, by practical demonstrations, the use of the fly-shuttle looms and other appliances. The Bengal Government has taken some action in this direction, but the prospects of success in this Presidency seem to be greater, as, according to Mr. J. G. Cunningham, I.C.S., who was deputed by that Government to be present at the competition, we are far ahead of that province in fly-shuttle weaving and in warping and sizing. An annual outlay of under two lakhs for three or four years would probably be sufficient to give effect to the above proposals, which, if properly carried out, would confer incalculable benefits upon the weaving community.

The success of the measure will depend to a large extent upon the *personnel* of the superior officers and assistants who may be employed for the purpose. It will be necessary also to establish co-operative societies amongst the weaving community, who are generally poor, and to offer some inducements, at the outset, such as the gift of looms, warping machines, etc., grant of rewards, medals, or titles, to weavers who might assist in the extension of the improved hand-looms, etc. These are, however, matters of detail which need not be discussed in this note. The National Fund and Industrial Association has just sanctioned the entertainment of half a dozen weaving instructors and as many weavers to demonstrate the use of fly-shuttle pit-looms, in a few selected centres, but the funds of the association are limited and no great result can be achieved by these small efforts. It must rest with Government to take the lead and carry out a comprehensive scheme.

(2) *Tanning*.—Though the processes of tanning hides and skins followed in Madras are pronounced to be generally superior to those followed in other provinces, there is still unquestionably vast room for improvement. The quantity of raw hides and skins exported from the Presidency averaged 56,849 cwt. for the five years ending 1905-1906, valued at 54.59 lakhs, and rose to 84,680 cwt., valued at over 93.51 lakhs in 1906-1907. In 1907-1908, however, the exports fell to 52,110 cwt., valued at 58.43 lakhs, owing to fall in prices of raw skins caused by the American financial crisis and the accumulation of stocks, especially in that country. The consumers of the raw produce are the United States of America which impose prohibitive duties on dressed and tanned skins exported from this country, while no duties are levied on our own exports. The result is, the local industry is seriously handicapped and apparently no remedy is possible which will not involve International complications. The aim of the institute should be to improve the processes of manufacture on such lines as would secure for the prepared articles fresh markets where no such prohibitive duties are imposed and at the same time increase their local consumption. Cawnpore is apparently doing some good work in the latter direction. It is probable that if chrome-tanning in India turns out as successful as it has been in America, the exports of raw skins on the present scale would be considerably reduced.

(3) *Oil-seeds*.—The normal area under oil-seeds (excluding zamindaris) exceeds two million acres. The quantity of seeds of all kinds exported from the Presidency has increased within the past seven years from 1½ million cwt. to nearly 2½ millions and the value from 106.80 lakhs to 176.52 lakhs.

The most important item is groundnut (earthnut), while castor and jinjili seeds also bulk largely in the returns. Of late, cotton seeds have also begun to be exported largely (*vide* statement annexed):—

| Seeds.    | Average of five years ending 1905-1906. |           | 1906-1907. |           | 1907-1908. |           |
|-----------|-----------------------------------------|-----------|------------|-----------|------------|-----------|
|           | CWT.                                    | RS.       | CWT.       | RS.       | CWT.       | RS.       |
| Groundnut | 1,290,283                               | 80,99,526 | 1,850,096  | 90,14,087 | 1,218,092  | 98,33,497 |
| Castor    | 262,308                                 | 18,71,153 | 321,777    | 23,57,081 | 611,619    | 47,68,613 |
| Jinjili   | 202,850                                 | 13,86,004 | 60,715     | 5,21,441  | 181,532    | 16,71,733 |
| Cotton    | 71,756                                  | 1,82,613  | 127,549    | 3,74,035  | 294,571    | 8,50,963  |

The figures speak for themselves. Not only is a very important industry lost to the Presidency, but a large extent of cultivated land is deprived of thousands of tons of rich fertilising manure and the cattle of a large amount of nutritious food. It should not be difficult, I think, with the aid of modern appliances, to extract the oil in this country, and export it if necessary, and retain the cakes, etc., for the enrichment of the soil and the sustenance of the cattle. Within the past few years, the exports of cotton seeds have more than quadrupled. This is an important staple food for the fine cattle of the black-cotton soil tracts in the Presidency, and their condition is likely to be seriously affected if the exports go on unchecked, especially as no artificial food is available to supply its place. It is impossible to expect private enterprise to do all that is necessary to develop this important industry, and it seems to me imperative that Government should take the initiative and pave the way for private enterprise to step in. I understand that some attempts had been made by private firms to extract oil from groundnut but without success.

(4) *Sugar*.—In a paper I read in September 1906 when presiding at a meeting of the South Indian Association, Mylapore, I discussed at some length the critical position of the Indian sugar industry, caused by imports of subsidised beet-sugar from Germany and other countries, and pointed out the remedies that should be adopted to protect it against unfair foreign competition. I beg to invite the attention of Government to this paper more especially as some of the suggestions therein made are applicable to most other indigenous industries which are in a languishing condition. In this Presidency, in addition to the unfair competition of cheap beet-sugar, the cane-growers had to face another difficulty, caused by the attack of fungus disease which led to the abandonment of a large area of cane cultivation. The Government, however, promptly came to the rescue and opened an experimental farm at Samalkot and another at Palur, at which seed canes imported from Mauritius, Bourbon and other places were cultivated and their cuttings widely distributed to the ryots. The disease has thus been practically eradicated and the cane area has been brought up to the level of what it was ten years ago. Excluding zamindaris, the normal area under sugar is 123,200 acres. In 1907-1908, it rose to 130,800 acres, of which 58,500 acres were under sugarcane. Mr. Panduranga Mudaliyar of Cuddalore, who has devoted some attention to the subject, reported that, with improved methods of manufacture of cane sugar, the profit from each acre of cane will be not less than Rs. 200. Taking it at only half the amount, the profits from cane cultivation alone would average about 60 lakhs a year. Every endeavour should, therefore, be made to improve the process of sugar manufacture, as every rupee thus spent will go to enrich the cultivator. For some years past, the Government of the United Provinces has been carrying out experiments in the manufacture of cane sugar which, thanks to Mr. Hadi, have been found to be fairly successful. There is, however, still room for further improvement which it behoves the Government to undertake, with the aid of special experts and up-to-date machinery, attached to the institute. In the meantime, two or three factories for the manufacture of sugar on Mr. Hadi's system

should be established in some of the more important sugarcane-growing districts, to serve as object lessons to the cane-growers. The cost need not exceed three-quarters of a lakh for each factory, and there are strong grounds for believing that, if successfully worked as they should be, the factories would be taken over by the ryots in less than two or three years, without any serious loss to the Government. The Director of Agriculture and the District Agricultural Associations of Gódvári and Salem recently sent some men to the United Provinces to learn Mr. Hadi's improved process and these have since returned and will be available for starting a few factories at once on a small scale to begin with. The Indian ryot is naturally reluctant to take the initiative in any new venture, but once demonstrate to him that a particular improvement will pay and is not beyond his means, he will soon adopt it. I have given some instances of this, in the paper referred to above, from my experience in the Bellary district, in regard to the use of the iron roller mills and the Swedish ploughs. One Mr. Jordan, who happened to see me about the end of 1906 with proposals for starting sugar factories, has since been advertising the formation of a joint stock company in Vizagapatam with a share capital of two lakhs. I am not sure if work has been started.

(5) *Metals, Hardware and Cutlery.*—Within the past eight years the imports of metal have increased from an average of 800,000 cwt., valued at nearly 74 lakhs, to over one million cwt., valued at 106.64 lakhs in 1907-1908. Iron accounts for over two-thirds and steel for nearly a fourth of the quantity imported. There has been a steady advance in the manufacture of these articles during the past 10 or 15 years, but as yet the local foundries and workshops do not turn out first-class articles. Considering the enormous amount of brass, copper and other vessels used by all classes of the people, and the great demand that has sprung up for agricultural and other implements, for locks, trunks, iron safes, etc., there is much scope for improvement in the processes of manufacture. Last year, agricultural and other implements were imported to the value of 4.20 lakhs, cutlery over one lakh, enamelled ironware over three lakhs. Many of these articles could be made locally as likewise cutlery, and iron tanks which are imported to a large extent.

(6) *Gold and silver thread.*—This is another item which, I think, affords scope for experiment at the hands of Government experts. The imports exceeded 31 lakhs last year, showing an increase of nearly 11 lakhs over the figures of the preceding year. A private firm has just established a factory in Madras for making this thread, under the supervision of a Frenchman, and it remains to be seen how far the enterprise will prove successful. The proprietors of the factory have not even an elementary knowledge of the trade and are entirely at the mercy of the so-called expert.\* With a view to send a student to France to learn this trade, the National Fund and Industrial Association endeavoured last year to obtain information through the British Consular-General at Lyons, but received no reply. Many a capitalist is deterred from fear of failure, through want of expert advice, from undertaking new ventures. The proposed institute might provide the necessary advice in such cases, if the services of the experts are made available to the public.

In addition to the items mentioned above, it has been suggested to me that experiments might also be conducted to find out the possibilities of establishing a profitable industry in the manufacture of pottery, glass, paper, umbrellas, candle, soap, matches and pencils. No doubt some of these industries could be developed so as to afford employment to a large number of people, but I have not been able to collect any useful information on these points and am, therefore, not in a position to offer any definite suggestions. During the time of Mr. Havell considerable attention was paid to the manufacture of pottery, in the School of Arts, and the articles found a ready sale, but after the departure of that officer, the manufacture was given up, apparently because it did not pay. As regards glass-making, I am not aware of any attempts having been made in this Presidency, though some profitable trade is being carried on in Northern India. One Mr. Wagle of Calcutta spent some years in England and learnt the process of manufacture. He passed through Madras three years ago in search of work. Having failed to secure help, he has, I hear, accepted

\* N.B.—I have since been told that he has left and that a French lady who was working as his assistant is in charge.

some appointment under Government. Materials for the manufacture of glass bangles are to be found in some districts of the Presidency, but I do not think they are obtainable in sufficiently large quantities for establishing a profitable trade.

Paper manufacture has long been practised in several districts, but the paper was of very inferior description, and the industry died a natural death. I believe that materials for making good paper (such as gunnies, wood pulp, etc.), could be had in abundance, and it should be possible to develop this industry with fair prospects of success. I understand that a paper mill was started some years ago by the Travancore Government, but that it had to be closed, the machinery and plant being sold for a very low price. I am making enquiries as to the cause of the failure. Umbrellas are imported to an enormous extent, but the trade is a small one commercially, and I do not think that Government initiative is necessary to foster it.

In regard to matches and pencils, I think it would be useful to cause careful investigation to be made by Mr. Alfred Chatterton and publish the result for the benefit of the trading community. No research or experiment regarding it seems necessary. I understand that a young man named K. Narayana Rao in the Vizagapatam district has set up some plant in Anakapalle at a cost of Rs. 20,000 for the manufacture of pencils. He saw me a year ago and appeared to me to have devoted much attention to the study of the subject, but he has no funds and shareholders are chary of investing their money, though the capital required is not large.

N.B.—The Hon'ble Mr. V. Krishnaswami Aiyar, after reading this note, informed me that the plant has now been set up and that work will be commenced before long.

I am unable to give even a rough estimate of the cost of establishing a fully equipped institute such as has been suggested above. Probably an outlay of about 20 lakhs in the way of buildings, laboratory and equipment and an annual expenditure of about three lakhs on establishment and working expenses for five years would meet the requirements of this Presidency. The whole amount need not be laid out at once, but may be spread over three or four years.

It might be urged that many of the industries mentioned above ought to be taken up by private bodies, without the intervention of Government. The fact that private enterprise has done very little towards industrial development during the past thirty years seems to be a sufficient answer to the argument. There is a want of co-operation and mutual confidence, not to say want of capital, which makes it hopeless to expect private enterprise to do all that is necessary to develop the industrial resources of the country. A vast amount of expert knowledge and expensive machinery are required for developing many of our industries and the initiative must, therefore, be taken by Government. Other nations have had a long start and it is difficult to compete on equal terms without such initial aids. That has been the position even in more advanced countries in Europe.

In the foregoing remarks, I have not touched upon the subject of agriculture, the most important of our industries, as Government has already established a properly equipped college not only for imparting sound agricultural instruction and training, but also for conducting researches and experiments. The Government has also made arrangements for employing boring parties for testing the existence of sub-soil springs and for the installation of oil-engine pumps for raising water for irrigation purposes. I would merely venture to suggest that the number of boring parties might be increased as men qualified to conduct these operations become available and that in the matter of oil-engine installations, special concessions might be granted, both in regard to the levy of water-rate and also in the granting of loans, at low rates of interest, for the purchase of the engines and pumps. In a note I submitted to the Hon'ble Mr. Gabriel Stokes in 1906, I suggested that, in the Deccan districts, a number of small oil-engine pumps capable of irrigating 30 to 40 acres might be set up at the cost of Government on the banks of several rivers which contain perennial springs and water supplied free of charge to the ryots for three or four years. I feel sure that at the end of that period the ryots would take over the engines at a reasonable valuation. This course might advantageously be adopted in other districts also. As regards loans to be granted for the purchase of these engines, I would recommend the reduction of the rate of interest to 4 per cent. if not to  $3\frac{1}{2}$  per cent., and the recovery of the loan in fifteen to twenty annual instalments. Two or three sets of improved agricultural implements should be supplied to each district.



and men trained at the Government farm should be deputed to conduct periodical demonstrations to show their working and use. Where the success of any improvement is fully established, there should be no hesitation in spending money towards extending it to the utmost possible limit.

There is one other point on which I would venture to offer a few remarks. It is the imposition of a reasonable amount of protective tariff to give a fair start to some of our industries which cannot otherwise be revived. Such protective duties are imposed by every country in Europe, England alone excepted, and by the United States of America. Even in free trade England, there is a large body of opinion growing up in favour of protection as against States which do not adopt free trade principles. It is unnecessary to enter into any lengthened discussion on this delicate question, but I feel satisfied that without some amount of protective duty many of our industries which possess great possibilities of development must continue to suffer from unfair competition from countries where free trade principles are not recognised. Germany, for instance, not only resorts to prohibitory duties, but also grants large bounties in certain cases to bolster up her own industries and flood the Indian markets with her own products. America imposes heavy prohibitory duties on imports of dressed and tanned skins, and Japan has even raised her tariffs against Indian indigo though she allows the imports of "the synthetic indigo of Germany and the natural product of Java" on more favourable conditions "under the most favoured nation clause." It is a curious fact that while "indigo is so heavily taxed both in Japan and other countries as a natural dye," "the synthetic indigo is admitted on lighter terms as a chemical product."

I now come to the question of technical education.

There is a very strong desire amongst the leading gentlemen in and outside the Presidency, in favour of establishing one or more technological colleges; in each Province, for giving sound technical education to the youths of the country. Such colleges are to be found all over Europe and America and even in young Japan, and no one can deny the necessity for establishing similar colleges in this vast Empire. Owing to financial exigencies and other causes, the matter has been long delayed, but now that the subject has been taken up in earnest, it seems to me that, under existing conditions, it would be a sounder policy to begin from the bottom, rather than from the top; that is to say to start technical education, combined with hand and eye training in our primary and secondary schools, before establishing first-grade technological colleges. Such colleges might with advantage follow, not precede, the establishment of Research and Experimental Institutes such as has been sketched above. For the efficient working of this institute, a number of assistants and foremen and maistries will have to be employed who will be undergoing practical instruction and training in particular branches of industries under the guidance of experts specially appointed for the purpose. As the experiment in each branch progresses and its success is assured, classes for technical instruction and training in that industry should be started as an adjunct to that branch and in this way, the institute will gradually be provided with a fully equipped college for imparting technical education, combined with practical training, in such branches of industry as may be pronounced by experts, to be certain to prove successful.

The national fund and industrial association sent a few students to Japan to learn some special trade. Two men have returned after learning the manufacture of soap, glass and matches, but it has been found impossible to start these industries in the absence of positive evidence as to the success of the undertaking. The same result would follow if technological colleges are started before it is definitely determined by research and experiment what industries could be improved and successfully worked. When the institute suggested above has done its work for some years, technological colleges could be started on well-defined lines and with the best prospects of success.

Pending the development of a high class institute as contemplated above, I would recommend the establishment of half a dozen technical and industrial institutes on the model of the Victoria Jubilee Technical Institute in Bombay. The trustees of Pachaiyappa's Charities have lately established, out of Chengalvaraya Naicker's

estate, a somewhat less ambitious institute, but worked on similar lines, for training students in mechanical engineering, combined with workshop practice. The syllabus adopted in this infant institution and the work done during the past two years will be found in the prospectus issued for the year 1909. Much useful work could be done by establishing similar, but better equipped institutes, at convenient centres, one for each group of two or three districts in the Presidency. These small institutions, with the workshops attached to them, will provide the means not only for training students in handling various descriptions of machinery and carrying out the necessary repairs, but also for giving training to the artisan classes and others in metal and smithy work, carpentry, etc., and making them better workmen. In the working of oil-engines which are coming into extensive use (there are already over a hundred installations in the Presidency), in carrying out boring operations, in making and repairing improved agricultural implements, locks, trunks, iron safes, etc., in supplying better tools, including hand lathes, etc., the institutes and workshops will afford immense facilities for developing our handicrafts. The men trained in the institute will also be available for giving technical instruction in all elementary and secondary schools and even in high schools, into which it might be introduced. These institutes might be gradually increased in number as the demand for technical education and training increases, until each district is provided with one or two such institutions, with branches in the taluks on a smaller scale. Though intended primarily for teaching and training, the institutes and workshops should be worked on commercial lines, so that they might at least pay their working expenses in the course of a year or two.

I understand that the Bombay Victoria Jubilee Technical Institute cost some \* lakhs in the shape of capital outlay in buildings and equipment, and that the establishment charges amount to Rs. \* annually. I think, however, that so large

an outlay is not required in this Presidency where, owing to the small number of mills at work, the demand for trained mechanical engineering students is limited. I would, therefore, recommend that for the present it would be sufficient to allot half a lakh of rupees for each institute, both for buildings and equipment, and an annual expenditure of about Rs. 12,000 on establishment. There should be one expert mechanical engineer (a European) on Rs. 500—100—800 to superintend the working of the six institutes, which might be placed in charge of competent men on Rs. 20—20—300 with qualified assistants on smaller pay.

In the primary and secondary schools also, small workshops should be provided for giving some manual training to the boys. They should be supplied with foot lathes, and improved tools, which need not cost more than five or six hundred rupees. Drawing, carpenter's and blacksmith's work should be taught and also weaving where the weaver population is fairly large.

In carrying out the above suggestions or such of them as may commend themselves to Government, the existing institutions and workshops, whether maintained by Government or by private agencies, might be utilised as far as possible.

(14)

FROM THE HON'BLE MR. J. N. ATKINSON, C.S.I., I.C.S., PRESIDENT, VICTORIA TECHNICAL INSTITUTE, DATED THE 24TH JULY 1908.

I have the honour to acknowledge receipt of your demi-official No. 1859-A, dated the 21st May 1908, in which enclosing copy of the Resolution of Government on the subject of an Industrial Conference which it is proposed to hold at Ootacamund in September next, you convey to me an invitation to attend and assist the Government with my advice. It is probable that I shall be absent from India in September, and it seems unnecessary that the Victoria Technical Institute should be represented by anybody besides the three members of its Council, Messrs. Thurston, Chatterton and Hadaway who have received separate invitations to the Conference.



2. In paragraph 2 of your letter you ask whether I can make any suggestions as to practical measures to be taken for the promotion of—

- (1) industrial development or
- (2) of technical education.

It will perhaps be of assistance if I describe the action that the Victoria Technical Institute is itself taking in regard to these two matters.

The objects of the Institute, as described in its Memorandum of Association, are—

“to impart or to assist in imparting instruction to persons of either sex in the scientific or artistic principles which underlie the industrial and commercial occupations of the people (including especially handicrafts, manufactures, and agricultural labour) as well as instruction in the manual and other practice involved in the application of such principles and to assist persons of either sex who are engaged in artistic, industrial or commercial occupations and such object may be carried out by any or all of the following means, that is to say, (a) establishing technical libraries, museums, colleges, schools, classes or workshops in Madras and throughout the Presidency of Madras; (b) making grants-in-aid of such technical libraries, museums, colleges, schools, classes or workshops as may be affiliated to the Institute in Madras and throughout the Presidency of Madras; (c) training teachers of technical subjects for the whole of the Presidency of Madras or granting aid to teachers trained in affiliated or independent institutions; (d) holding examinations in Technology and granting certificates of competency to those that satisfy the prescribed tests; (e) giving grants-in-aid to managers or teachers of technical schools, classes or workshops; and giving scholarships, grants or prizes to pupils of the same; (f) buying and selling, or selling on commission, articles produced by handicraftsmen or otherwise; (g) purchasing, taking on lease or in exchange, hiring, or otherwise acquiring any immovable or movable property and any rights or privileges that the Council may think necessary for the purposes of the Institute and in particular any land, buildings, machinery, easements and plant; (h) investing the moneys of the Institute not immediately required upon such securities or otherwise in such manner as may be in accordance with the regulations of the Institute; (i) doing all such other lawful things as are incidental or conducive to the attainment of the aforesaid objects or any of them.”

3. The programme set out in the above extract is very comprehensive, and owing to insufficiency of funds the Institute has hitherto been able to undertake only a few of the various objects enumerated. Further, having regard to its comparatively scanty resources the Council has thought it advisable to confine the Institute's efforts for the present to assisting those classes of industries which may be distinguished as artistic.

4. The Council of the Institute recognises that two principal causes of the present insignificance of the artistic handicrafts in this Presidency are—

- (1) the inability of the workers to invest sufficient capital in their business; and
- (2) their ignorance of how to find a market for their wares.

With few exceptions, these men live entirely from hand to mouth; they cannot afford to wait for purchasers; they manufacture only to order and only on receipt of advances for goods ordered; they are scattered in remote villages, living in obscurity and isolation without co-operation, ignorant of what is meant by organization of labour, of modern improvements in technique, of the changing demands of fashion, and of the supreme necessity of advertising; and thus, while they are unable to look for customers, would-be purchasers have no means of ascertaining where they can buy the goods they want.

5. The Victoria Technical Institute is endeavouring to supply these defects. It has made extended enquiries throughout the whole Presidency with the object of discovering every form of indigenous art industry which still exists, and to every industry so found it extends its help, first by ordering goods on advances or otherwise, and secondly by providing a place where products may be exposed for sale. The Institute is handicapped at present by having no habitation of its own, but the

completion of the Victoria Memorial Hall will put it in possession of a show-room in which it is hoped will be brought together and offered for sale specimens of every description of art work produced in Southern India. In this way the Institute will assist both the handicraftsmen and the purchasing public, providing a market for the former and for the latter, a place where they can readily obtain any articles they may desire to purchase. The operations of the Institute in this direction are already very extensive, embracing a score of industries at quite thirty different centres, scattered throughout the Presidency, and in Travancore, and giving employment to some hundreds of workmen. But the experience already gained shows that there is almost unlimited scope for the further extension of the Institute's work.

6. One of the more immediate requirements is to engage the services of thoroughly competent travellers whose duty it would be to visit the art workers in their homes, to instruct them in the kind of goods required, to point out defects in design, technique, etc., to supply them with the best designs and models and generally to give them that practical assistance and encouragement which at the present time they almost entirely lack. Subsequently it will probably be necessary to employ travellers to visit Europe and America and to introduce and, as far as possible, popularise the products of the Madras art workers in the richer countries of the West.

7. The above is a brief description of what the Victoria Technical Institute is doing and what it hopes to do in the immediate future for the encouragement of art industries, and it is interesting to note that the producers seem to appreciate the efforts that are being made in their service as evidenced by their readiness to execute the orders placed with them by the Institute and to accept suggestions for improvement of their workmanship.

8. I hesitate to say that the same methods which seem to promise success in the case of artistic industries could be generally applied to those which subserve only the every-day necessities of life—industrial work proper as distinguished from artistic work. But since it seems clear that the immediate object should be to encourage existing indigenous industries rather than to endeavour to introduce new and exotic ones, and since the indigenous industries are without exception on a small scale and in the hands of small men, I cannot help thinking that one principal direction towards which the Government may, with advantage, turn their efforts would be, if such a course be feasible, the stimulation of a demand for industrial products by bringing purchasers into relation with producers. There appears to be no reasonable prospect of obtaining a market for the every-day industrial products of this Presidency beyond its own confines; though I would hazard a hope that some even of these, the hand-loom and metal industries, for example, are susceptible of being given an artistic impress which would attract European purchasers. Within the limits of the Presidency, however, the demand is very great and the object should be, by whatever means, to cheapen production, so that articles of indigenous manufacture may compete on more even terms with foreign products. As to this we have only a very imperfect knowledge of the conditions prevailing in this Presidency, and much may be done by the improvement of methods of manufacture and of distribution, and by fostering organization and co-operation of labour to lower the price of industrial products.

9. It will be seen from the extract given in paragraph 2 above that instruction is placed in the forefront of the Victoria Technical Institute's programme; but recognising that education must follow and cannot create a demand, at any rate in the conditions at present obtaining in India, and that for men possessed of technical education the present demand is extremely small, the Institute has for the present restricted its educational efforts to training a very few of those who have given practical proof of their capacity to acquire and to make use of improved dexterity. Practical assistance of the sort described in paragraphs 5—8 would be of infinitely greater importance to the industrial development of the country than any elaborate scheme of technical education. If the result of any such scheme be to turn out a large number of persons who have acquired a merely theoretical knowledge of the principles of industrial manufacture and who would find no openings for employment, the end is likely to be embarrassing and possibly dangerous. For a limited number of experts in such subjects as weaving, dyeing, metallurgy and chemistry there is ample field for

employment; but to imagine that the industries of this country will be extended or improved by the mere turning out of an army of pupils from technical schools and institutes is a dangerous fallacy.

10. Much in the same way as the Victoria Technical Institute proposes to employ one or more travellers to assist art workers with advice and encouragement, Government might do much to help the industrial workers of the country by training and employing a number of men to assist them in the way suggested in paragraph 6 above. But until capital is forthcoming for the financing of industries, until business methods and instincts have developed and until manufacture has been so cheapened as to enable indigenous products to compete with those of foreign origin, it does not seem that we can expect any large development of manufacture in the country. There will then no doubt be a demand of persons possessing a training in the technique of foreign manufactures. But as supply must be regulated by demand, at the present time the outturn of students from technical schools should be strictly limited.

(15)

FROM THE HON'BLE MR. P. THEAGARAYA CHETTI GARU,  
DATED THE 31ST JULY 1903.

In response to the request of the Government to send suggestions as to the practical measures to be taken for the promotion of (1) Industrial development, (2) of Technical education, I beg to offer the following suggestions:—

#### *Industrial Development.*

*Textile Industry.*—This industry affects a large portion of the population next only to agriculture and is in the most languishing condition. As a cottage industry it gives work to millions, who suffer most in times of famine and in times of plenty eke out a very poor living. Of late this subject is receiving the attention of both the Government and the people and their combined efforts have proved that at present with fly-shuttle looms the weaver can turn out double the quantity of his usual output. This is not enough. Cottage looms must be improved still further to bring the turn out at least four times more than their present output to make it succeed against cheap imported fabrics. The preparatory processes are at present very laborious, costing more than weaving itself and it is here also the hand of improvement must be directed. Reeling, warping, sizing and beaming will have to be improved considerably and made much cheaper before the weaver can stand on his legs. The hand-made fabrics may be much more durable and much more artistic than the machine-made imported goods, but with the heavier cost of the former it is not possible to succeed in a commercial point of view. It is therefore necessary to make such improvements in both the preparatory processes and in weaving itself to bring down the cost of making very nearly equal to the machine-made goods. Mr. Churchill has exhibited a loom in the late "All India Weaving Competition", which, if perfected, might make an excellent factory loom for coarse counts. What is wanted is an improved pit-loom at a small cost within the reach of the poor weaver together with cheap machinery for preliminary processes. To obtain these results an experienced weaver and mechanic will be required to study the looms of the country, to make experiments with them and to introduce improvements. A second man with good experience in cotton mills for warping, sizing, etc., and a third with good training in preparing dobbies, jacquards, etc., to introduce into the country looms are also required. An honorarium of good round sum may be offered for a loom satisfying all the conditions required for a good cottage loom and another sum may be offered for machines required for preparatory processes, so that experiments might go on from different directions.

Next in importance to weaving is dyeing. An improvement in this art is absolutely necessary at present especially to check the inroads of aniline dyes. The indigenous dyes which improved by time and use have completely given place to the foreign dyes, the cost of mordanting and dyeing being prohibitive, and unless the cost is made infinitely cheaper and labour much reduced there is no chance of its survival at all. A trained dyer with special knowledge of chemistry will be required to make special study of all indigenous vegetable and mineral dyes, to introduce cheap

and durable dyes, etc. He might in the beginning study and make experiments and eventually establish a dye-house with modern mechanical appliances and make it a successful concern and can be handed over to a company. A dye-house of the kind said above will first serve as a research institute and then as a training school and a business place. It will require some capital but the Government will not be the loser by it.

Bleaching, finishing and printing also require attention but they may be put off for the present. If factory looms such as Hattersley's or Churchill's are a success for manual labour or if small weaving factories worked by steam power come into existence, shirtings, mulls and dhories can successfully be turned out when bleaching, etc., will be required. A set of machinery with one or two trained men to manage for one or two years will quite do for the purpose. A factory may be established for the purpose and after a short time may be handed over to a company.

Spinning yarn is one of the most important items in the textile industry. In my younger days every house had a spinning wheel or cherika and all ladies in a family spun yarn. This source of income to the families has completely gone and in my opinion it ought to be revived and that as early as possible. The old spinning wheel and preparation of cotton for spinning is out of question for the present days. Some kind of machinery, miniature copies of spinning machinery of cotton spinning mills, suitable for female labour, will easily be invented if substantial honorarium is offered.

I append a printed copy of my speech at the Conference held in connection with All India Weaving Competition which contains my views and suggestions as to how weaving industry can be improved.

*Chemicals.*—The importance of chemicals in arts and manufactures need not be mentioned. With raw products abundant in the country it is not a very difficult matter to manufacture different kinds of acids, etc. A practical chemist engaged in some big chemical industry at home may be entertained for two or three years and a factory may easily be established. To make this industry a success pottery and glass manufactory is essential.

*Tanning.*—At present Government chrome-tannery is working. It requires Sumac tanning to go along with it to make Morocco and Roan leather. Japanning and colouring may be done in a large scale. A small additional building and a tanner will be required for two years to make them successful and complete tanning business.

*Pressing oil from oil-seeds and manufacturing candles and soap.*—This industry appears to be very important from an economical side. At present oil-seeds and punnak are exported in such quantities that the cake, which is a great nourisher of soil, is lost to the country. Export of cotton seed, which was nothing five years back, has within the last five years assumed a very large proportion, and if it is not checked good bullocks in the northern and southern districts will soon disappear for want of the nourishing cotton seed.

These are some of the industries which may be taken on hand by the Government as a beginning and be worked out in the course of a few years. Each may be worked on the lines of a factory with experienced specialists as heads, equipped with the latest machinery and appliances. They will serve as research institute as well as training schools, and in course of a few years they will turn out successful factories when they can be handed over to private companies or individuals, whoever come forward to take, without interfering with trade. These factories will serve as object lessons to open the eyes of capitalists. To carry out the above programme I think a grant of one lakh of rupees a year for three years together with a grant of 20 lakhs for capital distributed for three years for the necessary sites, buildings and machinery, will be necessary. The Government need not be anxious for the capital laid out, three-fourths of it at least will be recovered in the course of a few years.

#### *Technical Education.*

As to the question of technical education there is a very strong desire amongst the educated classes of this Presidency in favour of establishing technical schools and giving sound technical education to their youths. In a letter addressed to the



Government of Madras, dated the 1st April 1908, the Council of Native Education say: "To benefit the children of the above classes of people a certain number of technical schools should be established in each district in connection with large elementary schools in specially selected villages up to the VII standard, that after the VII standard boys should spend half their time at literary subjects and half at industrial subjects." What I would propose is that in every school out of six school hours boys should have general education for four hours and the remaining two hours must be devoted to manual training, and every school must have a workshop attached to it. Boys trained for manual labour with their alphabet up to the middle school standard will be able to handle ordinary implements, etc., and be inclined to take to any work. Technical schools must be attached to high schools where boys must get training in some industry or other.

In conclusion I am glad to say that I will be present at the proposed Industrial Conference in the middle of September next at Ootacamund.

(16)

FROM F. J. E. SPRING, Esq., C.I.E., CHAIRMAN, PORT TRUST BOARD,  
MADRAS, DATED THE 31ST JULY 1908.

In G.O., No. 1421, Revenue, dated the 20th May 1908, I and others were named for invitation to attend a Conference for considering the best method of further developing the usual work commenced by Mr. A. Chatterton, the Director of Industrial and Technical Inquiries, Madras. In the Revenue Secretary's demi-official letter No. 1859-A, dated the 21st May 1908, I have been asked for suggestions in advance as to the practical measures which may be taken for the promotion of (1) industrial development, or (2) of technical education. The letter asks for suggestions as to the particular branches of industry in which assistance could usefully be rendered to private enterprise by experiment or other action of the Director of Industrial and Technical Inquiries, and similarly in regard to technical education, in what subjects and in what manner further facilities for such education are required in this Presidency.

2. As a non-educationalist, I find it exceedingly difficult to say what further facilities are required, because I practically know nothing about what is now being done, and any advice I may have to offer may be rendered valueless in the eyes of Government by my being convicted of an error of statement, or of reference, by the educational experts, to whom all that is now being done is perfectly familiar. Again, as regards further experiment, it is not easy for one who has not been in the current with Mr. Chatterton, and who knows only in the most casual manner what he has been doing, to make suggestions of any value.

3. But I have broad general ideas of my own, and have nursed them for many years without much chance of giving public expression to them, and the present seems a good opportunity for doing so, even though I am perfectly well aware that they run a great risk of being characterised as of too vague and general a nature for practical action to be taken on them. However, that is nothing to me. I shall be content if I set people thinking, and if, ten or twenty years hence, the general character of the education which we offer to the people shall have developed somewhat in the direction in which, in my judgment, it ought to have developed ten or twenty years ago.

4. I do not say that the educational system now practically universally in use—i.e., a purely literary system of education—was not all right enough when it was first introduced half a century ago. For the Administration needed large numbers of employees with a fair knowledge of English, and there were not nearly enough of such men to supply the demand. I do not know how it is now-a-days, but I remember quite well, in the Punjab, 38 years ago, how the Irrigation Engineer, or indeed the Deputy Commissioner of the District, used to sit surrounded by his five to twenty "munshis" squatting on the ground, speaking nothing but Urdu, and all documents read out were in Urdu or Punjabi and had orders passed on them in the vernacular. Indeed, when a tahsildar came to pay a visit of ceremony, he usually knew no other language than his own. I am far from insisting that this was a bad state of things, but whether good or bad it had to go, and it has gone, and in order

to replace it by our modern system it became necessary to give a fairly good education in the English language to as large a number of young Indians as practicable, in order that they might not only fill posts in the public service worthily, but might be fit to practise in one or other of the so-called learned professions.—Law and Medicine.

5. But from my point of view—and I wish it to be understood clearly, that I am far from insisting that my point of view is the only one, or the only right one—the Educational authorities made a great error in their failure to recognise, several years ago, perhaps ten, perhaps twenty years ago, that the time had already arrived when the supply of fairly well-educated young Indians for the needs of the public service was safely assured and might be left to take care of itself, and that to go on turning out far more of them, equipped in the sealed pattern manner, than could possibly find any sort of employment, instead of devising an alternative system of education better adapted to the altered conditions of the country, was a bad mistake under the circumstances. The circumstances I refer to are that India, by that time, had arrived at the stage of needing industrial development at the hands of her own sons—true *Swadeshi* development—but was no more able to find from amongst the High School and University students the better kind of employee needed by every successful industry than, twenty or thirty years before, Government had been able to lay its hands on men equipped suitably for the ordinary Civil and Judicial administration of the country.

6. I suppose that outside and beyond the idea of providing a large number of young men from whom candidates for the public service and for the learned professions might be drawn, there was the idea that by diffusing a wide knowledge of English, the valuable information on all conceivable subjects that lies open to those who can read the English language would be made widely available to young Indians. But have we not here an instance of lack of imagination? For, the youth who has failed to secure employment is not the one who is likely to read and study English books on industrial subjects in order that, with luck and opportunity, he may perchance better his position. For, first of all, such books will usually be far beyond his means; secondly, he will find it difficult if not impossible to learn even the names of them; and thirdly, he will scarcely know English well enough to profit by the study of such books if lighted on. Practically, there is no vernacular literature concerning itself with industrialism, as far as I know, worth the paper it is written on, and there has been no organized attempt on anything like a large scale to provide vernacular translations of English scientific books. Indeed, I suppose the most enlightened votaries of *Swadeshi* will agree at once, on a little consideration, that in view of the scores of different vernaculars and the infinite difficulties connected with translation of technical terms and nomenclature, there is no alternative to English if a new educational policy is to arm young men with the knowledge of underlying scientific principles, on a scale adequate to ensure their commanding the trust and respect of capitalists desirous of opening new industries.

7. I have an utter disbelief, at this stage, in our pushing on with the technical education of mere artisans. That will come later. What we want now is that the education of the better classes, conducted in English, shall be on such lines as, first, shall not absolutely cut off a youth who follows those lines from all hope of employment in the public service if he should see fit to prefer this to a career of industrialism, and, second, shall at least give him a chance, if there are any industrial instincts in him, of finding out that he possesses them.

8. If I hand, say, a kodak camera—the illustration is on my table as I write, and so I use it—to an average Englishman educated on the regulation, classical and English lines, he will probably think vaguely that such things are made somewhere, perhaps by machinery, but for him they are merely things to be bought in shops. I can only suppose that if I lay the same thing before the average B.A. of Madras University, he will think very much on the same lines, only adding mentally that low-caste working people have to do with these practical matters, but educated men have to do with the results, on paper, and in general with paper and ink and with words, whether in print or vocal. I want that our average B.A., on seeing, say, a camera, shall, like the average Englishman or American of the practical, industrial sort, say within himself: "This is a thing that is made in hundreds and in thousands, and



the making of it, and of, say, Singer's sewing machines and Yost's type-writers, gives employment to thousands of hard-working artisans; and why shouldn't I superintend the organization and direction of such labour and so keep the reward of their and my industry in my own *desh*, instead of leaving it to the foreigner, and why shouldn't I be so educated, or at least insist on my son being so educated, that not only shall I, or he, be qualified for the guidance of the industrial development contemplated, but shall also attract the confidence of our friend the goldsmith and banker over the way, so that he may feel safe in financing our enterprise?" But the goldsmith and banker is a very shrewd old gentleman, and he knows perfectly well that Mr. Ramalinga Aiyar or Mr. Coopposamy (Chetty, as now educated, would in a very short time "make ducks and drakes" (as we say) of his hard-earned money.

9. Long before they learn to make type-writers, kodaks and sewing machines, our disciples of *Swadeshi* might at least make umbrellas, paper, matches, buttons, sugar, glass, and a thousand other things which they now pay foreigners to make for them, to the tune of crores of rupees annually—and this *not* because the people of India *cannot* make such things, but because the so-called educated classes, all through their years of development in boyhood, have sedulously had their attention turned away from everything of a practical, industrial nature by us, their guides, who ought to have known better.

10. I want the Government of the country and the Educational Department to rise to the occasion, and after first finding out, as they can easily do, how the difficulty is met in Europe and America, to launch out on a very extensive development of the new education in India *at any cost, in reason*. For, it will pay in the long run, in the development of the wealth of the country in a thousand ways and in its better capacity for sparing more taxation for the needs of the new policy. There is no use telling me that the people have not got it in them. They have it in them right enough, but latent, for lack of EDUCATION—in the true philological sense of that much abused word.

11. I insist that the time has now come—indeed arrived many years ago—for a wise Government, possessing with God's help a little imagination, to recognise the compelling urgency of the need for an indigenous, industrial development, and in hundreds of high schools, to afford to the better classes at least the chance of discovering any latent taste that may lie in them, undeveloped only for lack of opportunity, in the direction of industrial production. As well expect the present sort of schools and colleges to furnish the necessary raw human material as to have expected the schools and colleges of monastic origin and tradition of the England of the eighteenth century to afford leaders in the textile, transportation and numerous other gigantic industries which, on the initiative of a few untutored geniuses of the Watt, Stephenson, Arkwright and Hargraves type, have utterly transformed the conditions of life in the civilized world in the last one hundred years, and thereby have enormously increased the sum of human comfort.

12. In an early stage of his evolution, man shares with the lower animals the disability of being unable to contribute in any other way than through the labour of his muscles to the well-being of himself and of those dependent on him for their support. In a later stage of development, certain masterful men are found to force other and less masterful men to support them by the labour of the latter's muscles. That is, slaves labour while masters live and look on in a state of comparative rest and freedom from sweat. Later again—and this undoubtedly is a higher stage of evolution than the slave stage—men are found to have trained a few of the lower animals to exert their muscles on their behalf, while they themselves rest and look on, or at least confine their exertions to the animals' guidance. Later again—indeed very late in the history of his development—man learns how to cause inanimate things, instead of animals or men, to do his work for him. Needless to say, this last method of working—viz., the direction and guidance into the service of men of the great inanimate forces of nature—connotes a far higher state of civilization and of development than that attained in any of the earlier stages. For if that part of man which already, in the course of his evolution, has risen superior to the corresponding part of his living fellows, the beasts, birds, fishes, insects, etc., viz., if his thinking apparatus is to develop for the better on evolutionary lines, it is as well that he should not be hampered by having to wear out not only his body,

but also the thinking part of his Ego, in muscular exertion, for the mere sake of keeping himself alive. To keep himself alive and to make life worth while, man has certain elementary needs, amongst which may be reckoned a modicum of food, of warmth, of shelter, and of enjoyment, and in order to secure these for himself and for his dependants, and of the best quality obtainable, so that his and their happiness may approach the attainable maximum, it is necessary—apart from high-handed ruffianism—that he should either exert himself, or get other men to exert themselves for him, or train beasts to exert themselves for him, or, best of all, that he should so dispose of inanimate things that they may exert themselves on his behalf. He cannot well lie under a tree and expect the fruit to drop into his mouth or the ravens of heaven to feed him. Speaking generally, the more exertion he succeeds in exercising, or in causing to be exercised on his behalf, provided he has the intelligence to guide it in right directions, the greater will be the degree of comfort and happiness that he will succeed in securing for himself and his dependants.

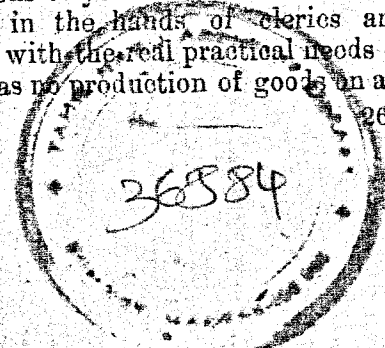
13. It was not many centuries ago that Europe, in the course of her development, reached the stage of compelling some few of the inanimate forces of nature to work for her. Indeed it is almost within the memory of men still living that, except for a few water wheels and a few wind-mills—and in another direction except for ships driven by the wind—there was but little to be seen even in Europe of the utilization by men of the forces of nature. But now-a-days, the function of the average working man of Europe and America is to stand by and direct the great natural forces, so that they may work for him while he acts as their brain; and in this way each man is able to guide the turning out of tens or hundreds of times more work than was possible in the old days, and yet with no more fatigue of his own muscles than he endured when his outturn was far smaller.

14. This not being a Politico-Economical essay, I need not stay to point out how wealth follows increased production—wealth being understood as meaning not the multiplication of money in the narrow sense, but of those things that conduce to greater comfort, convenience, and happiness. At present, India, amongst countries, is very low down in the scale of wealth and this, by those of her sons who are articulate, is ascribed to many causes. I have said that this is not a Politico-Economical essay, and I may say also that it is not a Political essay. We have had a surfeit of Politics and our fill of Political Economy, and by this time the Body Politic might have been in better health had we devoted more of our attention to industrial, instead of to political, development—that is, to the development of our ability to substitute the agency of the great forces of nature for mere human and animal muscular agency in the production of wealth and of those things which conduce to human comfort.

15. But it is no use to hope for any such development in the present educational condition of the country. For what do we see? We see a vast mass of intelligent but illiterate, hardworking folks, chiefly engaged in agriculture, but as years go on, in larger and larger numbers devoting themselves to other industries under the guidance of a limited number of practical foreigners. Alongside of them, but looking down on them for the most part with contempt, we see a smaller mass—perhaps one or two per cent. of the whole—who have availed themselves of such benefits as are ascribable to an English education. But the education in question has omitted to lay sufficient stress upon the fact—and we Westerns know it to be a fact—that the weal of a nation lies in her industrialism. Our educationalists have taught history—or tried to teach it—literature, mathematics, and philosophy to masses of men whose fore-bears, when we others were dressed in woad, had already clothed themselves in philosophy and mysticism, and who since then have thought and dreamt of little else—with the result that, taken in the mass, they are a poverty-stricken, short-lived, and from our vigorous Western point of view an uncomfortable and suffering, though patient, race of men.

16. During countless ages the Western world, as still does the Eastern to a great extent, jogged along quite content that production should be carried on by the labour of men and of animals. For hundreds of years the education of Europe was of a literary, two-dimensional character, in the hands of clerics and scholiasts unacquainted to an almost incredible degree with the real practical needs of the world. All this time Europe remained poor, there was no production of goods in anything that

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would now be considered a commercial scale, it took hard labour to earn a new blanket or a pair of shoes. But somewhere more or less a hundred years ago, a number of strenuous, three-dimensional, practical men sprang up, and from then until now the practical man has been brushing the unpractical schoolmaster aside and taking the direction of the country's industrialism and education more and more into his own hands with the result that we now see teeming western populations of working folks enjoying comforts and conveniences that their fathers never dreamt of, and a splendid distribution of comparative well-being in Europe and America to which the masses in the East are still utter strangers. It must be a revelation to those who have not studied the subject to find how England, Germany, America and other up-to-date countries have supplied themselves with schools and colleges magnificently equipped so that men of the wealthy and educated class may learn such practical science as, later, may help them to control factories, transportation and industries generally. We can scarcely say that in India we have even the germs of any such thing, and it is a fact that what little we have of it is not, to any adequate extent, availed of by the classes whom we might expect to see interested in the direction and guidance of masses of skilled but uneducated working folks. Indeed we may well ask: What measurable influence can Sibpur, Rurki, Madras and Poona Colleges, and a few more minor places of practical education, have on the industrial development of a population ten times that of England?

17. I have already said that the new education, if adopted, will demand a heavy burden of taxation. But we are incapable of drawing wise conclusions from reliable premises if we fail to see that any such outlay cannot but be repaid in the few years which are spanned by the life of a generation of men. However, we few Europeans can do little more than throw out hints. The thing will fail of accomplishment unless it be taken up in real earnest by the leaders of public opinion amongst the Indians themselves of all classes, as the true road to real *Swadeshi* and self-achievement. A great deal of rubbish is talked about the burden and hardship of taxation. Taxation involves no loss to a country as a whole, so long as either the money does not leave the country or else leaves it in exchange for full value. Taxation expended on school-houses, the paying of masters, prizes, books, and apparatus made in India is no more money lost to the country than his 2-foot rule is lost to a carpenter when he takes it out of one pocket to measure his work and puts it into another. Our *Swadeshi* industrialists—when they find time to turn from politics to industrialism—will, I hope, come to the conclusion that the new education, even if more costly than the old, cannot but bear fruit an hundredfold in the regeneration and the greater happiness of their race.

18. My contention—and I speak after some 20 years of study and consideration of this subject, and 38 years' intimate knowledge of Indians of the working as well as of the educated classes—is that for people like the natives of India, whose thoughts have run for thousands of years on two-dimensional lines, a two-dimensional education is an education which fails in one of the elements most vital to the needs of the country, and that it is necessary that the minds of a far larger proportion of students than have that advantage at present should be educated on three-dimensional lines. Under the present educational system in use practically universally throughout India ideas are conveyed to the brain of the student through the medium of his eyes and ears. But my view is that the only suitable education, for a race that has got into the mental condition of the literate masses of India, is a three-dimensional education which shall avail itself also of the sense of touch, and shall aim at conveying ideas of length, breadth, and height, as well as of weight, strength and chemical qualities, and so shall offer to the youth who has it in him to develop industrially at least a chance of recognising that he has it in him. We Western industrialists all know how a love of handicraft and of practical machinery came to us, not out of books, but through the chance of using tools and of watching machinery at work. The average young Indian of the literate class—say, the son of a *vakil*, *tahsildar*, or office writer—has a vague idea that all that sort of thing is the business of persons in a lower walk of life, illiterate, half-naked, and despised by him and his kind. Such being the case, how are we to expect the wealthy men of a community to combine and put their money into industrial enterprise—other than agriculture—when they are perfectly well aware that the young men of their own class are in a state of abject

ignorance of anything of the sort, and that how easy soever it may be to get together a score or a hundred or many hundreds of clever artisans, it is practically impossible to find young men, of their own race and of the educated class, fit to handle and to supervise such labour when collected.

19. I have seen fit to use the unusual terms "two-dimensional" and "three-dimensional" education, and it may be considered necessary that I should define them. By the term two-dimensional education, I mean education as ordinarily conducted in this country, with the aid of the eye and of the ear, whether by the aid of black marks in the plane of the paper, or by the voice of the teacher who conveys to his pupils what he hopes will be correct ideas. By three-dimensional education, I mean the above, aided by the sense of touch added to those of seeing and hearing, ideas being conveyed to the mind of the learner by the practical handling, shaping, breaking, analysing and measuring of materials. The man educated on three-dimensional principles thinks in the solid and in the concrete. He thinks of actual things and of their qualities, instead of merely of words, whether voiced, printed or written.

20. And yet, in common estimation, the man who has had a two-dimensional training is considered—and I fear even by the officials of Government is usually considered—to be the more useful man of the two, and a native candidate for a *tahsildarship* who can explain a reference to the Constitutions of Clarendon and can follow a line of argument from Herbert Spencer's philosophy is more likely to obtain employment in the public service than his brother, a student of the Madras College of Engineering, who has been taught the principles of the flow of water and in a scientific way has had practical demonstration of the strength of materials. I may say here that I honestly fear that to the average educationalist of the English public schoolmaster type, as well as to the average Civil official, these sayings may seem meaningless and to savour of insane ravings. But I know what I mean, and if any one fails to understand my meaning, may I be permitted to suggest that his lack of comprehension may perhaps be ascribable to the two-dimensional character of his up-bringing.

21. In the adequate extension of indigenous industrialism, by the aid of indigenous capital and under indigenous control and management, lies the only hope of an appreciable enhancement of India's wealth and of an improvement in the material comfort and prosperity of the mass of her people. But there can be no extension of industrialism on modern lines—that is, on lines where the muscular labour of men or animals is replaced by the great forces of inanimate nature controlled by men's brains—until the upper classes, and more particularly those of them who have had an English education, begin to apply themselves to the practical handling of practical things. For the uneducated masses, however well skilled manually, are incompetent in the absence of educated guidance, to organise industries on a scale adequate to enable them to undersell the products of western countries. However, we have yet to see what the Tata Institute at Bangalore is going to do. I am told that the Tata Iron works near Sini in Bengal are to engage about 100 technically-skilled Americans in order to make a start.

22. Nobody can be more conscious than I am that the treatment which I am offering to our patient is not a treatment which is going to make any appreciable change for the better in his condition in a year or two or perhaps even in ten years. But I refuse altogether to accept it as believable that a patch of sticking plaster is going to cure a long-standing case of diabetes. The underlying causes of the evil must be sought for diligently and the remedy applied in good time. In my belief, the proximate cause of India's present failure to adopt industrialism on a scale anything like adequate to alleviate the poverty of her population is that her upper classes stand coldly apart from all interest in such development, partly or chiefly because of their pathetic belief that we are even now offering them the kind of education that has made us Western nations great and wealthy. There was a time, a few decades ago, when Indian students would almost certainly have availed themselves gladly of any kind of education that we might have offered to them. But our Educational Department has preferred to press on their notice the works of Shakespeare and of Mill instead of those of our modern scientists—as if India hadn't for long and dreary ages had a surfeit of poetry and philosophy. Education in India



must change its character radically if ever it is going to help the educated classes to guide, direct and govern the labour of future mills and factories, as in the Western World they are directed by the better educated.

23. I do not hesitate to say—and I say it straight in the faces of the limited number of Indians who have been educated in all our Engineering Colleges—that if we Europeans, to a man, were to leave India to-morrow, and even if—an unthinkable contingency—the entire country were not immediately plunged into “anarchy and bloody chaos”, there would not be a single line of railway in running order or a single mill working fifteen years after the date of our departure. I mean, of course, if, in the meanwhile, neither any other Europeans nor the Japanese nor even the Chinese had stepped in. I am absolutely convinced in my own mind, from extensive practical experience, that every engine, every signal, and every piece of apparatus on every railway would gradually, one by one, cease to functionise through sheer slovenliness, disorderliness, and want of the ‘stitch in time’ and for lack of general ‘bundobust’. Here and there a good clear-headed man might hold out for a bit longer and keep things going for a while, but at what we Europeans consider an early age, 45 or 50, he would break down physically or mentally and the country at his back would have omitted to train any one to fill his place. And yet scattered everywhere all over the country there might be found thousands of excellent workmen—excellent, that is to say, under good and orderly management. But good and orderly management of workmen is impossible unless the Manager is himself an educated and orderly man, with an adequate knowledge of underlying principles and ability at least to read and study the best and latest practice. Up to the present, with comparatively few exceptions, the classes in India who are prepared to avail themselves of English education, stand apart from everything savouring of industrial education—not that we have offered them very much of it, or encouraged them to avail themselves of what there is of it—preferring to run after the will-o'-the-wisp of literary, so called, education, and the many thousands of petty and the few hundreds of well-paid Government appointments to which, in their wisdom, our rulers have practically closed all educational doors except the literary door.

24. In dealing broadly with a large subject, I have endeavoured to steer clear of making suggestions in regard to minor points; but I here break through the rule I have laid down for myself just to say that Government would be wise to offer a larger proportion of its ordinary civil appointments to men who have passed through well-equipped Technical Colleges, like the Madras College of Engineering, provided always of course that the candidate for employment had an adequate knowledge of English and of so much law as is necessary to begin with. At present, such colleges cannot turn out more than enough men for the requirements of the Public Works Department. But instead of a dozen of such colleges all over India, there ought to be a hundred, and there ought to be not less than a thousand high schools so equipped that a boy with manual-industrial instincts shall have at least a chance of ascertaining that he has such instincts, and that it is his ardent desire to pass on to one of the higher technical colleges, as the average European or American boy finds it so easy to do if he feels that way.

25. I have referred to the very reasonable disinclination of Indian capitalists to put money into industrial enterprises in view of their recognition of the fact that there is at present no adequate supply of skilled, orderly and educated Indian control for such enterprises—control which just makes all the differences whether the crowd of skilled working men shall be a disorderly mob or an industrial army marching to success. The subject of the necessary association of the capitalist and banker with the industrialist has been handled most ably and illuminatively by His Highness the Gaekwar of Baroda in a speech made on July 12th on the occasion of the inauguration of the new Bank of Baroda at Baroda. I may be permitted to quote from His Highness' interesting speech as published in the *Madras Mail* of July 25th, 1908, and to say: Happy is the people who have the good fortune to live under so enlightened a ruler. His Highness said:—

“If industrialism is ever to obtain a strong footing in this country,—and after all the first object for which every enlightened patriot of India is striving to-day is for the development of indigenous industries on a scale commensurate

“with the enormous demand of the country and on a scientific basis sufficiently effective to ward off foreign competition—if ever the languishing industries of India are to be revived, I say, a preliminary step, or at least a concomitant step, must be the reorganisation of our methods of finance, so as to centralise the countless dribblets of capital into powerful reservoirs where its outlet can be controlled and directed into productive channels. The genius of the Indian peoples is not primarily scientific or industrial, and the competition of the West with its scientific and highly centralised organisation of capital and machinery has long since driven from the field the ancient crude methods of our forefathers, never to revive to any appreciable degree or for any great length of time. The obvious moral is that India, following the noble example of Japan, must set herself diligently to the mastery of Western science and Western methods and matters of finance and industries.

“I am perfectly aware that this is not a new gospel; and yet, as it forms, in my opinion, the keynote of future progress, its constant reiteration must go on until even the man of the street comprehends. No reactionary sentiment of mere reverence for the past will save India from the unrelenting pressure of foreign competition; no amount of emotional patriotism can drag us out of the slough of economic dependence. We must set our faces as a nation grimly and patiently to master the methods and the implements that have mastered us. It is science against faith and science will win. I reiterate, therefore, gentlemen, that the organisation of such institutions as the Bank of Baroda has a deep significance beyond mere considerations of present expediency. The business aspect of the project has been eloquently presented by Diwan Bahadur Ambalal and Hon'ble Sir Vithaldas, and it is not my purpose to trench upon the ground which they have covered so well. But I desire to call your attention to certain larger aspects of the general movement, of which this bank is but one of the manifestations. I refer to the economic movement known as Swadeshism.

“Swadeshism covers, to be sure, a great variety of activities and is capable of a great variety of definitions, but to my mind, it is essentially a recognition of our national weakness in matters scientific and industrial and a determined effort to mend. To acquire economic freedom is the end and aim of Swadeshism. And this can only be done by mastering the technique of Western industrialism. Industrialism, broadly speaking, is the application of scientific invention to the production and distribution of all the articles required by society to satisfy its wants. Inherent in the system and inextricably bound up with it are the scientific methods of finance to which I have already alluded. Industrialism needs for its purposes the joint-stock bank and the exchange no less imperatively than the machine and the waterfall. So that in my use of the word industrialism, I shall be understood to mean not only machinery, the product of scientific invention, but also banking and the other agencies of credit, the product of scientific organisation.

“What then is the significance of industrialism in modern society, and what results would flow from its widespread introduction into India? This is, no doubt, a large subject and one that is fraught with many difficulties in its elucidation. But as it is possible that some of us have not realised why and how industrialism is justified in the social economy, and what are its bearings, economic, political and cultural, I shall attempt, without going into a lengthy dissertation on the subject, to make a brief analysis of its effects on Western society. Commerce in the olden days, until a century and a half ago in fact, was limited to the products of agriculture, the hunt, and the handicrafts. Merchants there were who understood the value of organisation and the reproductive functions of capital. But it was not until the introduction of machinery in the processes of production and the widespread application of credit in the organisation of industries that rapid progress became possible. The ownership of the implements of production—factories and machinery—passed inevitably, it is true, from the handicraftsman to the capitalist. And it is sometimes questioned whether the process has been accomplished with any lasting good to the working masses. Certainly in many individual cases it could be shown that the workman has suffered in the loss of that independence from overlordship, which is sometimes extolled as the blessing of the humble cottager who labours at his own handloom. But I am convinced that it is easy to



"exaggerate the so-called independence which the workman enjoys under a handicraft organisation of manufactures. Assuredly the mere fact that the handicraftsman performs his daily task with his wife and children to assist him is no proof of real independence. As a matter of fact, the workman's hours of labour are generally longer and his liberty of movement much less than under industrialism. The test comes when we inquire which system leads, on the whole, to the higher standard of living, the larger opportunity for the education of children, and the slow but steady development of the individual personality of the workman.

"I think that no one who has critically compared the condition of our handicraftsman of India, working from day to day and from century to century for the minimum of subsistence, with the condition of the factory labourer of the West, begrimed it may be with soot, but nevertheless on the whole well-fed and well-housed, can fail to realise the economic and social advantages of industrialism. Industrial organisation brings to the help of the labourer not alone the machine. This might not in itself be an unmixed good, for too often the workman tends to become the mere mechanic, the slave of his iron implement. But the overwhelming advantage to the workman and to all society of industrialism becomes at once apparent when we consider the diversity of pursuits which it brings, and the tremendous accumulation of wealth. We hear much in the West of the injustice of large private fortunes, and certainly there is much truth in these allegations against capitalism. Nevertheless, the substantial truth is, as any one may discover who carefully studies the subject, that under industrialism private fortunes are growing ever larger, a larger proportion of the population is acquiring wealth, and the whole mass of people is lifted up to a higher standard of living. Private accumulations of wealth are justified, as also the competitive basis on which they exist, if it can be shown that the general welfare is enhanced thereby. Great fortunes under the industrial system consist not in treasure privately hoarded, but in stocks, bonds, and securities, and these are merely representatives of factories, rail-roads, mines, and other agencies of production and distribution, through which the labourer of all grades obtains his employment and his wages. The private fortune of modern times is therefore only nominally private and all the wealth of an industrial society belongs in a very real sense to the whole people.

"What interest, what dividends it may be asked, does society draw from these possessions? In the first place, as I have already pointed out, society at large, including the humblest labourer, draws a larger wage and lives on a better plane, than would be possible under the old handicrafts organisation of manufactures. In the second place, the accumulation of wealth makes possible the shifting of food-stuffs in tremendous volume from place to place and continent to continent, so that famine and starvation are comparatively unknown. In the third place, the agencies of culture, such as schools and colleges, libraries, museums, hospitals, galleries, etc., are increased *ad infinitum*, until they are brought within the reach of every class of society, even the lowest. The door of opportunity opens for the individual member as wealth is increased and disseminated throughout the community. The gist of the whole matter is this, that with the development of the industrial system mankind has learned to throw a large part of his burden on the machine. During working hours the productivity of the whole mass is increased a hundredfold. During sleep the interest on capital goes on piling up. So wealth is produced automatically. Society at large reaps the benefit, notwithstanding the apparent injustice of so much luxury for the rich, while the masses are forced to work for daily bread. The masses will always work. The problem of every society is how to make the conditions of work as wholesome as possible and to enlarge the field for individual development.

"It will thus be seen that the industrial problem has many bearings other than those which are economic in the narrow sense of that word. With the growth of industrialism in India is sure to come an enlarged outlook and an increased capacity of the whole social organism for things political, educational and ethical.

"With the growth of industrialism, craftiness and chicanery are bound to give way to an increasing straightforwardness of dealing between man and man. Numerous writers have borne testimony to the fact that the influence of science and

"industrialism in the Western World has lifted the people to a higher standard of commercial morality than formerly existed. No more convincing evidence of this fact could be adduced than the respect in which British integrity in commercial relations is held in this country. Furthermore, with the increase of private wealth which industrialism brings, is sure to come increased facilities for the spread of education and culture among the masses. With wealth and education comes increasing capacity for political affairs. It is an ancient truism that the good administrator must be a sound business man.

"It is my profound conviction, therefore, gentlemen, that the line of least resistance in the progress of India at this time lies in the hard study and consistent application of the paraphernalia of industrialism to Indian conditions. Only in this manner can we fit ourselves for the larger demands of statesmanship. And only in this way can we as a people expect ever to enter the haven of economic independence. As the West owes its progress of the last couple of centuries to the application of scientific invention to all phases of life, so India must look to the same formula. I do not, in the least, minimise the necessity of reform in the social organism and reform in the political administration, but change in these directions is apt to be slow unless forced from beneath by an ever-increasing sense of industrial independence and economic self-respect, if I may be allowed to use such an expression. It is my duty to impress upon my people again and again that the development of industries and commerce rests primarily upon them. Without individual pluck, perseverance, energy and foresight we are powerless to effect any solid and lasting improvement in the economic condition of the country."

26. I now arrived at the point of putting forward my propositions broadly for acceptance. What I claim is that--

(a) Indian industrialism can never develop on a scale adequate for the needs of the country unless and until it can develop under the superintendence of qualified Indians.

(b) How excellent soever may be the common workmen, they can never work successfully in large numbers unless guided and organised by suitably educated leaders.

(c) These leaders must be Indians, if industrialism is to extend on a scale adequate for the needs of India—that is, on a scale adequate appreciably to raise the wealth of the individuals composing the Indian population. For, it would practically be impossible to employ Europeans, Americans or Japanese in anything like sufficient numbers.

(d) But the Indian Educational Department is making no effort, on anything like an adequate scale, to give an education, suitable to the end in view, to young Indians of the better class, or to place it in their way.

(e) Educated Indians as a class despise and avoid education on industrial lines preferring the literary education which leads to Government employment.

(f) But in the hope of removing this prejudice, Government ought to recognise a three-dimensional education as being at least quite as good as—I claim greatly better than—a two-dimensional education, for equipping a man for its employment in almost any capacity.

(g) It cannot be expected that the few young Indians who possess a latent talent for industrialism will ever find themselves, unless a very large number of them pass through a three-dimensional education.

(h) The average English educationalist can scarcely be expected to know, without special study of an unfamiliar subject, how to set about devising an educational course, on three-dimensional lines, suitable for the present needs of the country. But there are men who do know, and they can be found by going the right way about it.

(i) The wealthy native of India who now either hoards his money, or lends it on usury, or invests it in Government paper, or employs it in the mere merchandise of articles produced in Europe, will not invest in indigenous industrial enterprise until he feels pretty sure that he can engage men, in considerable numbers, who not

only know more than he does about the underlying principles of the intended industry, but have acquainted themselves with its practical operations and give evidence of the possession of qualities necessary for the guidance of large masses of inferior labour.

(j) But at present, he knows that such men are practically not obtainable, or at least that if he gets one and loses him, his enterprise may fail before he gets another, whereas in Europe they are obtainable in thousands.

(k) Finally, if a man is to be a trusted Captain of Industry, he absolutely *must* be STRAIGHT, and must subordinate all other interests to those of his employer. Here again is a problem for the educationalist, but of a different character.

27. I think that this about finishes, what I have to say. I cannot go into details, that is for the specialists among whom I do not pretend to class myself. The above notes are of the roughest, scribbled down in the intervals of very heavy business.

(17)

FROM EDWARD W. ORR, Esq., CHAIRMAN, MADRAS TRADES ASSOCIATION,  
DATED THE 5TH AUGUST 1908.

I have the honour to acknowledge receipt of your D.O. No. 1859-A, dated 21st May 1908, giving cover to G.O., No. 1421, dated 20th idem, on the subject of an Industrial Conference to be held at Ootacamund in September next and requesting suggestions as to any practical measures that the Association would recommend for the promotion of industrial development.

2. My Committee have given the subject their careful consideration and beg to submit the following suggestions for the consideration of Government.

Among the industries which, with local technical knowledge, are capable of great potentialities may be mentioned—

- (a) the preparation of manures.
- (b) the preparation of fibres in which the Presidency abounds, and
- (c) glass-making.

Improvement in the yield of the chief agricultural products by the utilization of mineral substances prepared in the form of manures for the soil is of paramount importance, and intimately connected with the preparation of mineral manures is the subject of the commercial preparation of sulphuric acid.

It has been stated that the magnitude of the industries of any nation may be roughly gauged from that of its sulphuric acid manufacture, and the following quotation from the Agricultural Ledger Series No. 20, Mineral products, page 116, is an encouraging forecast of future development. It runs thus: "The extensive deposits of copper pyrites that exist in India if utilized in the combined production of copper and sulphuric acid and the still further manufacture of the phosphatic deposits into superphosphates should open a highly lucrative field of enterprise."

3. It is true there are already manufacturers of sulphuric acid in the country, but they may all be described as experimental in this way that the acid manufactured is placed on the market at a price which prohibits its use on a commercial scale. The price is regulated, not by the cost of manufacture but by that at which it can be imported. The directions in which Government action could be taken would be to exploit the country for sulphur, and sulphide deposits. At present the manufacturers use imported sulphur whereas in England a cheap supply is insured by manufacturing from pyrites. Acid made from imported sulphur will at all times be too expensive for manufacturing, but cheap supply of sulphuric acid would lay open the whole question of chemical manufacturing.

In a country such as this with a plentiful supply of salt and lime, the possibilities are very great.

4. Glass, paper-making and other industries would follow as a natural sequence. It is believed that at the Cordite Factory nitric acid is manufactured; this will give a by-product of sulphate of soda or potash according to the salt with which they work. With this by-product experiments might be undertaken in the manufacture

of kalali such as caustic and carbonate of soda or potash. These experiments should be carried on with indigenous carbonates such as carbonate of lime or magnesia (magnesite from Salem).

5. Copper ores were at one time extensively worked in the Kurnool, Bellary and Nellore districts where "hills" of copper slag are said to occur to prove the extent of the old workings. The very lead for the chambers required in the manufacture of sulphuric acid may also be mined locally, as lead ores have been found in the districts of Cuddapah, Kurnool and in the Sandur hills in Bellary. Local skill combined with a small capital outlay is all that is wanted to develop an industry which is bound to be profitable.

Crude saltpetre or nitre is also much appreciated as a manure and combined with sulphuric acid is of high manurial value. Some of the restrictions with which the manufacture of saltpetre is hedged in may well be removed for the encouragement of this industry. These restrictions may have been necessary when there was a heavy duty on salt, but now that that duty has been reduced to one rupee a maund some of the more stringent restrictions may well be removed.

6. There is another aspect of this subject which ought to appeal to Government and that is a question of National Insurance—India stands chemically in a very helpless condition. In the event of a European War and India being even temporarily cut off from Home supplies the chemical, pharmaceutical, medical and disinfecting stores of the country would be consumed in less than six months.

*Preparation of fibre.*—Considering the various kinds of fibrous plants in which the country abounds improved methods of preparing and working the same may well form a subject of technical instruction.

*Glass making.*—The manufacture of glass is not a new industry. From time immemorial the manufacture of glass bangles and beads have been carried on and the method employed to-day is as primitive as it ever was.

All the raw materials for its manufacture are at hand in the South Arcot, Trichinopoly and other districts, and all that is required is technical knowledge and improved methods of manufacture to make this a paying industry.

(18)

FROM RAO BAHADUR M. VENKATASWAMI NAYUDU GARU, DATED  
THE 5TH AUGUST 1908.

In compliance with the requisition contained in your demi-official, dated 21st May, I have the honour to submit the following few suggestions which I have put in an abstract form so that the Director of Technical Enquiries may formulate definite proposals for consideration by the Conference:—

(1) *The manufacture of chrome glazed kid* as it is produced to-day from goat skins is an important and rising industry. It is the invention of American skill and brains. Its discovery and development reveal a most interesting and romantic chapter in the annals of commercial progress, nearly three-fourths of the world's output of the glazed kid coming from the United States of America. The term glazed kid is somewhat a misnomer; for the leather is not made from the skins of kids, but from skins of mature goats, the skins of young animals being used in the manufacture of gloves. It is interesting to note the immense quantities of goat skins used in America for this industry and where they all come from. It is stated that over 111,000,000 lbs. of goat skins were imported into the United States of America in 1906, valued at 32,000,000 dollars, equal to about ten crores of rupees, whereas the value of goat skins imported into that country in 1896 was only 10,000,000 dollars, equal to about three crores of rupees. This shows the rapid growth of the industry in a decade. The most important and striking feature of this is that out of 45,050,000 goat skins imported into that country, India heads the list as will be noted from the table of shipments hereunder, and contributes no less than 15,000,000

skins or fully a third of the total quantity. And this is in addition to large quantities shipped to European countries. The number of skins shipped yearly and the exporting countries are as follow :—

|                                |                   |
|--------------------------------|-------------------|
| India .. .. .                  | 15,000,000        |
| Arabia .. .. .                 | 6,000,000         |
| China .. .. .                  | 4,000,000         |
| Europe .. .. .                 | 4,000,000         |
| South America .. .. .          | 3,000,000         |
| West Indies .. .. .            | 3,000,000         |
| Africa .. .. .                 | 2,000,000         |
| Mexico .. .. .                 | 2,000,000         |
| Sundry other countries .. .. . | 6,050,000         |
| <b>Total .. .. .</b>           | <b>45,050,000</b> |

The United States and Canada do not furnish any goat skins as the meat and milk of the animals is not used as food in these countries. Thus it will be seen that 25 per cent. of the world's output of glazed kid is Indian raw material or in other words raw skins going mostly from Calcutta and Madras. Thus it gives a claim to Madras to adopt the industry. The glazed kid, as it is manufactured to-day, has numerous advantages over other kinds of upper leather. It is softer, more durable and cheaper. In addition to this, it is impervious to water and porous; it is generally more healthy and sanitary. If this industry is pioneered and a leather similar to the American glazed kid is produced, it will prove a great success. We have the raw material at hand; we have cheap manual labour, and in addition the saving of freight, packing and other charges on raw material exported. The industry is now being worked on the basis of 20 per cent. profit according to the following formula obtaining in an important glazed kid centre in America :—

|                                                                                                                   | Dr.               | Cr.             |
|-------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|
| The cost of a raw goat skin C and F New York or Philadelphia at the present prevailing price at 2s. 1d. per skin. |                   |                 |
| Cost of one dozen or 12 skins = $2/1 \times 12 =$                                                                 | £. s. d.          |                 |
| Additional charges for clearing warehouse, interest, etc.                                                         | 1 5 0             |                 |
| 41 = 485 cents.                                                                                                   | 1 5 6             |                 |
| £1-5-6 x 485 cents                                                                                                | 618               |                 |
| Add charges for finishing into chrome glazed kid per dozen at 2½ dollars or 250 cents per dozen                   | 250               |                 |
| Cents                                                                                                             | 868               |                 |
| Profit                                                                                                            | 212               |                 |
|                                                                                                                   | say 20 per cent.† |                 |
| Cents                                                                                                             | 1,080             |                 |
|                                                                                                                   |                   | Cents ... 1,080 |

\* These skins are sold by measure and not on weight.

† When the skins are worked in India, the freight, packing, sellers' commission and other export charges which will amount to 10 per cent. will be saved and thus the profit will increase to 30 per cent. And also there is room for saving in the finishing charges when the skins are worked in India.

This profit will increase to 30 per cent. calculating on the saving to be made of fully 10 per cent. for export charges. It should not be omitted to be mentioned here that the whole of the glazed kid produced in the United States is not consumed there, but a portion of it is exported to Europe, Australia, China, Japan and other countries; and this export is becoming steadily larger. The exports for the calendar year 1898 were valued at 249,990 dollars. But in about a decade in the year 1907, the exports are 4,369,587 dollars, a tremendous gain. So it need not be said that we will be carrying coal to Newcastle; for there are other countries where these Indian manufactured glazed kid will find a welcome market.

(2) I would suggest manufacture of sole-leather from Indian cow and buffalo raw hides. The process involved in this manufacture is an elementary one, and with the aid of machinery there is considerable scope for turning out immense quantities of the best sole-leather. We have abundance of hides both in Madras and Calcutta, and superabundance of most valuable varieties of tanning materials in this Presidency.

I should not omit to mention here that Madras tanned skins and hides have a great reputation and command high prices in the European markets, and in fact all over the world. This is mostly due to superior qualities of tanning material, chiefly *Cassia Auriculata* and *Myrabolams* available in abundance in this Presidency. With these important resources and with the aid of machinery and scientific process, a thriving industry can be established. It will be interesting to note what enormous quantity of raw hides, both cow and buffalo, are exported from Calcutta, and half tanned hides from Madras throughout the year, to United Kingdom, continent and America; Calcutta alone has shipped to these countries during the twelve months from the 1st January to 31st December 1907—

|                 |                         |
|-----------------|-------------------------|
|                 | 7,677,382 raw cow hides |
|                 | 1,009,398 buffalo hides |
| <b>Total ..</b> | <b>8,686,780</b>        |

and in the corresponding period in 1906 the exports were—

|                 |                          |
|-----------------|--------------------------|
|                 | 10,525,963 raw cow hides |
|                 | 1,708,239 buffalo hides  |
| <b>Total ..</b> | <b>12,234,202</b>        |

It will thus be seen that there is no lack of raw stuff and tanning agency in our Presidency but only the industry requires to be pioneered and encouraged.

(3) The manufacture of belting is another form of industry which could be developed from the above-mentioned resources with equal success; both these manufactured goods (sole-leather and belting) will have a good market both locally and in foreign countries. The process and preparation of these grades do not involve any uncertainty as to their finish as may be said to do in the case of superior grade of skins such as the manufacture of chrome glazed kid.

(4) Along with these industries hereinabove mentioned I would also suggest manufacturing of tannin extracts. With the abundance of indigenous tanning materials available at our threshold a most economising trade can be developed by scientific methods of preparing extracts; at present our surplus tannin materials cannot be exported to foreign markets owing to their great bulk and consequent heavy freight; but when it is condensed into either concentrated solution or solid extract it becomes far more valuable than it is at present, owing to the high prices obtaining for these tannins in foreign countries. As at present a great deal of this valuable stuff is being wasted in the local and up-country tanneries in the Presidency, where tanners are ignorant as to the percentage of actual tannin contained in the bulk of the raw material they use, so when the system of preparing extracts is taught, a considerable saving can be shown in the cost of goods tanned locally, and thus there is scope for Indian tanners adopting the use of extracts. There are numerous products used for tanning and obtainable in abundance in this Presidency, such as *Cassia Auriculata*, *Myrabolams*, *Cassia Fistula* (konnai), *Terminalia Belerica* (tani kai), *Acacia Arabica* (babul tree bark), *Divi Divi* and various other species (*vide* The Agricultural Ledger, 1902, No. 1).

It may not be out of place here to quote from the recent report of Consul-General William H. Michael at Calcutta on *Tanning Materials of India*. He says :—

“There is a general feeling in India that the tanning materials indigenous to the country are not being utilised to the best advantage, and the subject is being agitated in the press and scientific schools. It is proposed to send sample barks and woods possessing tanning properties to England for analysis to determine their value, and to make extracts for testing purposes in actual tanning.

“It is believed that India can enlarge her leather-tanning operations by use of extracts, which is considered better than the barks, and at the same time establish a large export trade in such extracts. Extracts from the *Acacia Catechu* or cutch, as it is commonly called, is made in Burma, Kumaon and Bombay. The extract itself was at one time called ‘Terra Japonica’ because at first classed as a mineral substance. In 1906 there were 7,318 tons of this tanning and dye commodity



"exported to England. There is a growing demand for Myrabolams in the United States. This is a fruit of the *Terminalia Chebula*, which grows abundantly in parts of India and Burma. Myrabolams are largely consumed in Germany, where the imports have fallen from 19,141 tons in 1904 to 14,744 tons in 1906. There is one factory in India where an excellent extract of Myrabolams is made for the English market. This is at Ranigunge, but in order to meet the demands of the trade there should be a similar factory established in Madras and Bombay. Myrabolam extract is light in colour, and admits of combination with other materials for the manufacture of high-class leather (Hide and Leather, Chicago, 27th June 1908)."

(19)

FROM W. H. JAMES, ESQ., PRINCIPAL, COLLEGE OF ENGINEERING,  
MADRAS, DATED THE 8TH AUGUST 1908.

I forward herewith a short note dealing with the position the college might take in the matter of industrial development.

*Note.*

The subject of *Technical Education* in general can be conveniently dealt with under the following three heads, although it may not be possible to draw sharp lines of distinction between the divisions:—

(a) *Professional Engineering*.—For the training of engineers and their subordinates to enable them to deal efficiently and economically with the design, construction, and maintenance of what may be regarded as purely engineering works.

(b) *Technical*.—Comprising instruction in the special subjects a knowledge of which is necessary to persons who are engaged in the carrying on and development of industrial concerns. Ordinarily it will prove of considerable advantage for such persons to have undergone training in one or other branch under (a), afterwards specialising in the applied sciences more directly connected with the particular industries with which they are concerned. The courses of study to be followed should therefore be arranged to suit the end in view, but this is usually only possible when industries are to some extent established and it is a question of development along the right lines. The mere turning out of would-be technical experts will do little towards the actual establishment of industries. Students trained in Mechanical and Electrical Engineering can, however, readily adapt themselves to general work in which some knowledge of engineering is of advantage; so that with a little special training the services of such men can be made available for technical and industrial work.

(c) *Industrial*.—Covering training in manual dexterity and the actual teaching of handicrafts, with perhaps some elementary instruction in drawing in connection with trades for which it is an advantage or possibly a necessity that the craftsmen should be able to work from sketches or deal with simple designs. Instruction of this sort should obviously be given in the vernacular.

It is evident that (a) and (b) are closely related and can be conveniently dealt with in the same institution, while industrial education can best be developed along its own lines or perhaps one should rather say along the lines peculiar to and in accordance with the traditions pertaining to each particular craft. It would seem convenient, therefore, to regard engineering and technical education as separate and distinct from industrial education although ordinarily the leaders in industrial work will be men who have received the higher training.

In any proposals regarding technical education the College of Engineering, as the only technical institution of importance in the Presidency, must be closely concerned. The college developed from a surveying school established in 1794 for the purpose of educating boys in the "business of practical surveying," and who were intended for appointments as surveyors attached to the Surveyor-General's office in Madras. Its chief function since that date has been the training of men for the Government service (Madras and South India Native States) for departments connected

with engineering and surveying. At present over a hundred students complete their courses each year, and they practically all find employment in the Public Works department, Local Boards and Municipalities, Revenue department, Survey department and Railways. It is clear, therefore, that in any suggestions regarding the part the college might play in other directions there should be no interference with existing arrangements which would in any way tend to prejudicially affect the training of the engineer and subordinate students for whom there is this large demand at present and which is certain to increase in the future as the large schemes now being considered are taken up, and this more particularly bearing in mind the fact that the demand for trained men in other capacities is very limited and can only to a great extent follow the establishment of industries which are now hardly existent.

The scope of the college might, however, very well be enlarged and provision made for technological training in connection with industries closely allied to engineering and applied chemistry. It does not appear to me that any radical changes are required in the constitution of the college, but rather that it should be placed in a position to anticipate and as far as possible be ready to meet any requirements in this connection.

It will be necessary for this purpose to provide liberal but not extravagant laboratories, facilities and equipment, and, what is most essential if a properly trained man is to be turned out, a suitable and competent staff of professors and assistants must be entertained. The main principles being conceded, the first steps would be the broadening and the making more elastic in some respects of the present courses of study and the institution possibly in the near future of courses in metallurgy and applied chemistry.

The services of members of the staff might be made available for the prosecution of technical inquiries so far as they can be pursued with success in laboratories and for advisory purposes in various directions. If this principle is introduced, the length, however, to which it may be carried in the case of any individual member of the college staff must be determined and controlled solely by the Principal of the college, in order that the legitimate interests of the matter of instruction may not suffer. Provided we have efficient assistants to do the bulk of the drawing office, laboratory and elementary teaching work, it would be to the advantage of the college and the students that the senior members of the staff should be to some extent in touch with outside affairs and directly interested in the development of the country. Arrangements of the kind referred to would necessitate considerable additions in number to the staff, and the question of the bringing together of an efficient and adequately paid subordinate staff would have to be considered.

If it is decided that the college shall take an important part in the development in addition to carrying on its present work in connection with professional and scientific engineering, any proposals connected with the suggested removal of the college should be placed on a broad basis and ample space provided for any possible extension that may be required in the future in the way of extra laboratory accommodation and residential quarters for staff and students. For technical work of the kind contemplated the climate also would be a factor of some importance.

The courses of study and arrangements for the training of students would be matters of detail to be worked out in accordance with the main lines of any general scheme which might be adopted by Government, but in regard to certificates to be awarded to successful students the general principle might be enunciated that very great stress should be laid on the actual work done and the promise shown by the student during his college course. While of opinion that the too high value set on the mere possession of degrees has done harm in this country, I would not support altogether the abolition of degrees in engineering and applied science, as, from a scientific point of view, it seems to me that this would be a retrograde step, which would serve no very useful purpose. The college might, as at present, grant diplomas giving particulars of the courses pursued by qualified students, but while not closing the way to University honours I would make the standard of the University examinations such that only men of the highest ability would have any hope of graduating and the degree would then stand for something more than a glorified diploma.

FROM M.R.RY. DIWAN BAHADUR R. RAGHUNATHA RAO AVARGAL,  
DATED THE 14TH AUGUST 1908.

Agriculture and industries are indissolubly connected with one another. All attempts to improve one of them will involve attention to the other.

India is a land of immense resources. There is little that is worth having, which India could not produce. Every climate and every soil is included within India's vast extent.

There is evidence in abundance that goods of the very highest class can be made in India. It requires capital. It cannot be had in single individuals. It requires co-operation. This depends upon mutual trust, which is sadly wanting in India. This want must be removed. But to do this, it will require a long time. A beginning should be made by education. It is a pity that there is so little in India in the way of religious and moral education to effect this mutual confidence. The first thing that should be done is to make a rule that no institution maintained by an individual or by a number of them for the education of the people should receive any aid from public funds if no religious and moral instructions are given in them and if rudimentary principles of agriculture, physical sciences, and of industries are not taught in them.

2. For the development of industries, knowledge of the science is absolutely necessary. Agriculture should produce raw materials in abundance to make trade profitable. To enable the agriculturist to do so, also scientific knowledge is necessary. Every school should be made to impart some knowledge of agriculture, physical sciences, coupled with practical demonstration.

3. Man wants food, then raiment, and then luxuries. Agriculture gives food and supplies cotton for the manufacture of cloth. Mulberry trees supply fruit and material for silk. Fruit trees in general, while producing food, supply us with materials for fuel and building materials; and seeds give us oils. Thus everything starts from agriculture, horticulture, arboriculture, etc. We have more than enough of raw materials, which can, by the aid of science and technical education, produce all that we want and much that we can exchange for money of other countries.

4. Some of the public funds that are spent on purely literary education should be diverted to the spread of agricultural, scientific and technical education. This should be given in all institutions from every primary or village school to the colleges. Our wants are water, the cheap mode of obtaining it, and instruments to make from our raw materials several articles of commerce. Our ordinary picotta, which is becoming dearer as wages advance, has not yet been rendered obsolete by anything else. The huge oil-engines are white elephants to the poor ryots; no cheaper machines have yet been manufactured. On this subject, the Government cannot be too active. Cheap machines have not yet been introduced to extract oils from seeds. Much has, of late, been done to improve weaving. People of moderate means have taken up the subject. With the encouragement afforded by Government, this industry is fairly progressing. Government have already shown its anxiety to patronise local manufactures, but its subordinates have not yet loyally supported the Government.

5. It is believed that Government land and water taxation has been hampering industries. There is some truth in this statement.

6. Fruit industry has enriched many a country. Here it is handicapped. If land contains fruit trees, it is assessed so much per tree, instead of assessing the land. Seeing plantain industry has become paying and profitable, owing to the extension of railways, special tax has been imposed upon plantain-tree cultivation. Such handicapping of industries should be prohibited. There is no doubt that Government would do so if the matter is made known to it.

7. School gardens, which have proved very useful in western countries and Ceylon, should be introduced here. Special facilities should be afforded for making and maintaining orchards.

8. For furthering agriculture and industries we want in villages—

- |                                           |                                      |
|-------------------------------------------|--------------------------------------|
| 1. Carpenter.                             | 10. Goldsmith.                       |
| 2. Blacksmith.                            | 11. Weaver.                          |
| 3. Potter.                                | 12. Accountant.                      |
| 4. Chuekler.                              | 13. Village head.                    |
| 5. Washerman.                             | 14. Wooder.                          |
| 6. Astrologer or teacher or schoolmaster. | 15. Koraver.                         |
| 7. Measurer or cavalgar.                  | 16. Doctor.                          |
| 8. Oil-monger.                            | 17. Water distributor or Neeranikam. |
| 9. Shopkeeper.                            |                                      |

9. There should be a village school supported and superintended by the village community. The master of the school should be appointed by it. He should teach the vernacular and Sanskrit and the three R's, reading, writing and arithmetic. The school may be examined once a year by a Government Educational officer and, if the progress reported be good, Government may reward the teacher by presents of cloth, money, etc. Such an arrangement, while introducing primary national schools without any expense to Government, will, according to the capacity of the schoolmaster, help the progress of agriculture and industries.

10. The village community may seek Government aid in cases in which it is too costly to it and the Government may help it at their discretion.

11. I know that such schoolmasters cannot be now easily procured; but if the matter be left to the village communities, *properly reformed now* within a decade, I think, such a class of men will come into existence. The question of primary education now under the consideration of Government, though a very important one, cannot be satisfactorily solved by Government according to the now prevalent ideas. These would entail an expenditure of public funds which would be prohibitory altogether. Fresh taxation for it is not advisable. By restoring village autonomy or self-government, primary education can be introduced without much or any expenditure to Government, and by providing maintenance to the village servants and artisans named above from the villagers themselves, as they are now maintained to some degree, however irregular it may be, by rules made by them and enforced by Government, agriculture will be protected and industries very much helped.

12. If exhibitions of the products by village artisans and cultivators be held in the village or in its neighbourhood whenever the Collector may visit it without much expense, and if the best products be rewarded moderately by inexpensive cloths and ornaments, industries will spring up and those in dying conditions will be revived in a short time.

13. The great fault of what is now being done is artificiality and expensiveness. For poor countries this method will not do. If necessary, annual exhibitions may be held at the head-quarters of the district and they may be aristocratic. For a group of poor villages, a shandoy, hant or market may be organized and encouraged without any expenditure of public funds. These rural exhibitions are common and known to the people. They only require a little supervision, harmless arrangements, and some sympathy which should be genuine and their supervision should be made by the head of the village community of the place where it is held.

14. My scheme is founded on the following principles: (1) Provide perpetual maintenance to artisans and arrange for their obtaining it without litigation through the village authorities chosen by the villagers; (2) arrange for their education in their respective professions in the village by people themselves among the villagers without much cost and interference of Government servants; (3) reward the best, periodically at their homes, with prizes, certificates, titles, small sums through the head of the district; (4) note their progress unauthoritatively and get the real state reported to Government for their information; (5) assist the villagers with things which they cannot procure themselves, such as good seed, good cotton, silk, wood, machines, their workers, etc., collecting their prime cost from the purchasers and the benefited; (6) don't compel them to dance attendance upon public officials out of their villages, either at their own option or by the procedure of the laws; (7) don't annoy them constantly through revenue officials with varying and petty taxation throughout the year, and take up the villagers' time which should be directed to agriculture; (8) don't spend public funds through public officials for obtaining some

end either not known to the people nor necessary for them, nor useful for their avocations; (9) help people with money and things which they cannot afford to have until they are able to procure them themselves, for instance, schoolmasters, machines their workers, etc.; (10) in every school by whatever name it is called, give instructions, rudimentary, on three R's, mechanics, hydrostatics, chemistry and a little astronomy; (11) there should be school gardens as there are in Ceylon and other countries. There should be a technical institute on a small scale at the head-quarter of every district.

15. To embark on more than this with public funds will not prove very beneficial especially in India. Government may be partial to indigenous products without sacrificing efficiency.

16. One agricultural college, one technical college for various industries, in each Presidency should be maintained at public expense, and those that pass in these colleges should be entitled to get footings in the public service in preference to those unpassed.

17. India is populated thickly, but the large majority of them are poor. They are intelligent, ready to take advantage of paying schemes, provided they are workable by them. European experience though useful is not invariably beneficial to Indians in India; all improvements and beneficial works should be started in the village, conducted by the village community, without much insalutary interference of the authorities.

18. Restore and strengthen village community, and the work of Government will be easy and beneficial to all concerned.

(21)

FROM C. E. BRASIER, Esq., CONSERVATOR OF FORESTS, CENTRAL CIRCLE,  
DATED THE 21ST AUGUST 1903.

I enclose herewith two notes prepared for the Industrial Conference.

I regret not having had time to develop the subjects more owing to constant touring and office work. I shall, however, be able to answer questions on either subject at the Conference or before.

I shall forward two more notes treating with other subjects in a day or two, but these also will necessarily be sketchy.

ENCLOSURE No. 1.

*Brief note giving some information on the possibility of establishing a Paper Mill on the North-East Coast Railway in one of the districts of Ganjam, Vizagapatam, or Gódvári in order to manufacture paper from Bhabar grass (Ischaemum angustifolium) in conjunction with Bimlipatam jute (Hibiscus cannabinus).*

*General rise in the value of wood pulp throughout the world during last eight or ten years.*—The utilization on a large scale of wood pulp for paper manufacture chiefly derived from coniferous trees in Russia, Sweden, Germany and America may be said to have established a revolution in the paper trade and caused the value of paper to fall to a very low figure until low-water mark was reached about eight or ten years ago since when owing to the gradual exhaustion of the natural forests in Russia, the United States and Canada the value of wood pulp and consequently paper has risen every year and is still rising so much so that several American newspapers have had to raise their sale prices owing solely to the rising price of the paper on which they are printed. Also the *Daily Mail* proprietors foreseeing the ultimate exhaustion of the raw material have taken the precaution of buying up an enormous area of natural forest in Canada in order to supply pulp later on for their annually increasing wants when the value of the raw material will render supplies unobtainable at present prices.

It is therefore not unreasonable to assume that other raw materials besides wood pulp utilised for paper-making will have an increasing value in the near future and that people in possession of these sources of supply will reap a rich harvest when the future paper famine, which is certain to come, will have fully developed itself.

It is therefore highly probable that the raw materials now used in India for the manufacture of paper will have an increased value and that the Indian paper trade will rise to position of great importance in the not far distant future. The raw materials now chiefly used in the India paper trade are (1) Bhabar grass *alias* Babuli (*Uriya*) *alias* Sabai, the scientific

name being *Ischaemum angustifolium*, (2) the common jute of Bengal (*Corchorus capsularis*) and (3) rice straw. The Bengal mills derive their supplies of Bhabar grass chiefly from the districts of Singhbhum, Santal Pargannas and Angul and also from the forests of the Central Provinces, while they obtain the jute butts from which the paper is manufactured from the large areas of jute cultivated in Lower Bengal while their supply of straw is also derived from this area.

The Bhabar grass grows extensively in the Northern Circle forests of this Presidency also, notably in the hills of Ganjam, Vizagapatam and Gódvári districts, but all attempts made hitherto to collect it and deliver it in Calcutta at a price which would leave a fair margin of profit have proved a failure owing chiefly to the high railway freight which has to be paid for unbaled grass from Ganjam to Calcutta and to a minor extent to the cost of carriage by road from the hill forests to the railway. Both of these disadvantages would, however, disappear if a paper mill was established in the vicinity of the sources of supply of the raw material, which would necessarily have to be made over to the Company as a monopoly and at a nominal rent for a considerable term of years. Although the true Bengal jute is not available in the districts of Ganjam, Vizagapatam and Gódvári, there exists an excellent substitute utilised for the same purpose as true jute known on the market as Bimlipatam jute and derived from the plant cultivated in the Northern Circars scientifically known as *Hibiscus cannabinus*. There also exists practically all along the line of railway from Ganjam to Calcutta an enormous area of rice lands which would furnish an unlimited supply of rice straw at a very low cost. A possible other advantage of a mill started in Ganjam, say at Russelkonda, would be cheap wood fuel which could probably be delivered at about Rs. 3 per ton.

Further information on this subject can be obtained from the following publications:—

*The Bhabar grass.*

1. The Indian Agriculturist, dated 6th January 1894, pages 6 to 9.
2. " " 21st October 1893, page 536.
3. " " 28th " " 599.
4. " " 3rd February 1894, page 69.
5. " " 2nd December 1895 " 359.
6. " " 1st May 1896 " 137.
7. " " 1st August " 227.
8. " " 1st July 1897, pages 212 and 213.
9. " " 2nd August 1897, page 229.
10. " " 1st September " 281.
11. " " 1st January 1901 " 19.
12. " " 1st June 1902 " 186.
13. " " 1st October 1907 " 320.
14. List of grasses and their uses by J. C. Lisboa, J.P.G.M.C., F.L.S., page 51.
15. Dr. Watt's Dictionary of Economic Products, Vol. IV, pages 526-530.
16. Flora of British India, Vol. VII, page 129.
17. Kew Bulletin, 1888, pages 157-160.
18. Gamble's Manual of Indian Timbers, page 742.
19. The Appendix Series of the Indian Forester, Vol. XIX, 1893.
20. The Indian Forester for February 1903, Vol. XXIX, pages 80 and 81.
21. Fodder grasses of Northern India by J. F. Duthie, B.A., F.L.S., Director, Botanical Department, Northern India.

*Bimlipatam jute (Hibiscus cannabinus).*

22. Agricultural Ledger 1903, No. 11.

*Corchorus sp. (Jute).*

23. Agricultural Ledger, 1896, No. 37.

*Ordinary jute of Bengal.*

24. The Indian Agriculturist, dated 16th June 1894, pages 350-332.
25. " " 1st April 1895, page 125.
26. " " 1st November 1897 " 337.
27. " " 1st March 1899, pages 65 and 66.
28. " " 1st June 1900, page 187.
29. " " 1st February 1902 " 60.
30. " " 1st January 1907 " 27.
31. " " 2nd September " 275.
32. " " 1st October " 307.
33. " " 2nd December " 372.
34. " " 2nd March 1908 " 91.



The Beleric Myrabolam, unlike its near neighbour the true myrabolam which is the fruit of *Terminalia chebula*, has a somewhat variable value on the London market; at times the price has been known to rise to £6 per ton, while at other periods it falls to £4 or less. This variable value, together with the variable nature of ship freights, causes the collection of the product to be a very hazardous and speculative operation, which may result in a fair profit, but which may also result in considerable loss, the result being that the product is generally not now collected at all, but allowed to rot in the forests. The tree is very common in most of the forests of the Presidency far more so than *Terminalia chebula* and therefore a very much larger quantity of its nuts could be collected and at a somewhat lower cost than the true myrabolam. In the Dictionary of Economic Products of India, page 20, Vol. VI (part IV), it is stated that Professor Hummel estimated the value of the fruit at 5s. 8d. per cwt. compared with commercial ground myrabolam at 7s. 6d. per cwt. It would therefore seem to be an essentially favourable product to experiment with, in order to determine whether it would not be possible to manufacture a Tannic Extract from its fruit which would have a local or export market value of sufficiently high a standard to make its collection and manufacture a stable and remunerative industry.

In this connection it may be useful to give some information regarding the establishment of a manufactory in Rangoon for the purpose of making Tannic Extract as given in the Burma Forest Administration Report, although the failure or success of such an experiment in Burma is no criterion to the probable result of a similar manufactory in Madras which proposes to treat products containing higher percentages of Tannic acid than these experimented with in Burma.

“*Burma Forest Administration Report, 1903-1904, page 18.*—The Government Tannin “Factory at Rangoon was opened again on the 1st September 1903 and was worked throughout “the rest of the year. A report on the year’s working is being separately submitted to Govern- “ment. During the period from 1st September 1903 to 30th June 1904, 407 tons of the “material were treated, yielding 148 tons of extract. The materials treated were chiefly “mangrove bark, but 23 tons of pyingado saw dust, 6 tons of the pods of *Caesalpinia digyna* and “small quantities of the barks of *Odina wodier* and *Careya arborea* were also tried. The extract “on analysis gave percentages of pure tannin varying from 52 to 69 per cent. Seventy tons of “the extract were shipped to England and sold through Messrs. Fonear & Co. and 1 ton was sold “locally. The year’s working resulted in a deficit, but this is not to be wondered at considering “the unproductive nature of the expenditure on experiments, supplying samples, etc. No fault “is found with the consistency of the extract or its strength in tannin; its low marked value is “due to the deep colour it imports to leather and experiments are now in progress to reduce the “colour of the extract.

“ *Burma Forest Administration Report, 1904-1905, page 19.*—The Tannin Factory was  
“ worked throughout the year under the immediate supervision of Mr. J. D. Hamilton, Extra  
“ Assistant Conservator. The work was purely of an experimental character with a view of  
“ reducing the colour of the extract from mangrove bark, but no very satisfactory results were  
“ obtained. At the close of the year experiments were commenced with sal bark sent from India,  
“ and extracts were made according to a method recommended by Professor Dunstan, samples of  
“ which have since been sent for analysis and trial to the Imperial Institute. The total quantity  
“ of extracts manufactured during the year was 26 tons. Thirty-five tons of mangrove extract  
“ were disposed of through agents in England at various prices ranging from 9 to 11 shillings  
“ per cwt. which is considerably below the cost of production. A separate report on the working  
“ of the factory is being submitted to Local Government.

“*Burma Forest Administration Report, 1905-1906, pages 11 and 12.*—In the Government Tannin Factory extracts were prepared from the barks of *Shorea robusta* and *Terminalia tomentosa* by Professor Dunstan's method. Seven-pound samples of each were sent to Professor Dunstan, together with seven-pound samples of the same extracts which had not been treated by the decolourising process, and also of extract from the bark of *Rhizophora mucronata*. The results of the Professor's analysis and test have not yet been reported. On the conclusion of these experiments in August 1905 the factory was closed. 530 cwt. at Rs. 5-7-0 and 418 cwt. at Rs. 5-10-0 of the mangrove (*Rhizophora*) extracts were sold to Messrs. Steel Brothers; 611 cwt. at Rs. 4-10-0 were sold to Messrs. Fonear & Co. Besides the above, 5 tons sold in Europe for Messrs. Bullock Brothers fetched Rs. 198, and 68 tons 7 cwt. sold for Messrs. Fonear & Co. realised Rs. 2,650. The prices were below the cost of manufacture which is roughly Rs. 8-8-0 per cwt.

For further information on the product *Beleric myrabolan* and the wattle, etc., see publications given below:—

Trade in "*Terminalia Belerica*" nuts.

1. The Indian Forester, Vol. XXVI, 1900, page 280.
2. The Agricultural Ledger, 1902, No. 1, page 38.
3. Dictionary of Economic Products, pages 18 to 21.

*Wattle bark for Tanning.*

4. The Indian Forester, Vol. XVIII, 1892, pages 405 and 406.
5. " " " " IV, 1878-79, pages 247 to 251.
6. " " " " X, 1884, pages 553 to 560.
7. The Agricultural Ledger, 1902, No. 1, pages 23-25.
8. Gamble's Manual of Indian Timbers, page 302.
9. Dictionary of Economic Products, page 47.

(22)

FROM C. E. BRASIER, Esq., CONSERVATOR OF FORESTS, CENTRAL CIRCLE,  
DATED THE 28TH AUGUST 1908.

I enclose herewith a note on Lac for the Industrial Conference.

ENCLOSURE.

*Note on the possibility of introducing the cultivation of Lac into the forests of the Madras Presidency.*

The Indian trade in shellac is one that is annually increasing in importance. The price is annually rising and the demand is constantly extending, while the demand of the lac-dye, formerly the most important of the two products of the lac insect, is owing to the competition of synthetic dyes gradually dwindling. The production of shellac, therefore, would seem to be an industry eminently suitable for extension. The insect is not unknown in the Madras forests, but is found in less numbers than in the forests of other parts of India. This is probably due to want of knowledge of the successful cultivation of the insect as well as possibly to conditions being not quite so favourable in Madras for its propagation although many of the species of trees which give the best lac are present in the Madras forests and some of them even growing almost gregariously in large extents of country.

Much useful information has been given in volume I, part I, of the "Indian Forest Records" which contains a note on the lac insect (*Tachordia lacca*), its life-history, propagation, and collection by Mr. E. P. Sebbing Stebbing, F.L.S., F.Z.S., F.E.S., of the Imperial Forest Service.

The following is a brief abstract of this information:—

The total export of lac from India to all countries during the fiscal year 1905 amounted to about £2,222,200 and in 1907 to £2,307,100, an increase of £84,900. In the exports of lac the United States stands first, taking more than all other markets combined; the United Kingdom next, followed by Germany. The monograph says—

Lac is a resinous incrustation excreted by a scale insect known as *Tachordia lacca*. The mouth parts of this insect consist of a beak or sucking apparatus combined with a pointed lancet. With this latter the scale pierces the bark of the twig of the tree and then inserts the sucking tube and draws up the sap. The insect may be likened to an animated siphon, since the sap continually sucked up through the beak is, after modification and absorption of some of its products, given out as an excretion at the anal end of the body.

This excretion solidifies on contact with the air, and thus there is gradually formed around the body a "scale" or "cell," popularly known as lac. Were only a single insect present on a branch, the scale would appear as a circular, dome-shaped, reddish excrescence on the surface of the bark. Owing, however, to the production by the female of a very large number of eggs (as many as 1,000), and the habit of the insects, which, indeed, is common to many of the family, of living and feeding gregariously, closely packed together on one twig, the scales or cells coalesce during their formation and result in the production of a continuous incrustation on the twigs, which on collection forms the article of commerce known as stick-lac.

*Shellac and dye stuff—operation of the industry.*—From this stick-lac the product known as “shellac” is manufactured. There is a second substance obtainable from the scales and known to commerce as “lac-dye,” for which formerly there was a considerable demand—a demand which, owing to the introduction of synthetic dyes, has practically disappeared. This product consists for the most part of the material from which the eggs are developed in the body of the female insect. There is still a small export of this lac-dye from India, but the total value for the whole of India is extremely small.

The cultivation and collection of the lac was and practically still is chiefly in the hands of the aboriginal races of the poorer parts of the country, and the methods of propagation and collection still in force are those which were in existence centuries ago. These methods satisfied the demand for the article in the country and, until quite recently, that of the export trade. This latter was developed slowly. It took nearly half a century for the properties of the resin to be fully appreciated in Europe. It was the dye which first made its appearance in Europe, and its export was long limited by the difficulty experienced in extracting the colouring matter and applying it to manufacture at home.

At the beginning of the nineteenth century the exports of lac-dye from India were five or six times more valuable than those of the resin. As showing the progress of the industry and the growing demand for shellac and decrease in utility of the lac-dye between 1868 and 1900, the value of the exports of the former increased from £122,766 to £617,706, while that of the latter decreased from £29,707 to nothing.

The following is one of the latest reports on the lac market in New York taken from the Calcutta paper *Capital*, dated 16th July 1908:—

New York, 15th June 1908.

“The developments of the week have been little less than startling, repeated manifestations of the soaring tendency of the foreign markets having brought local dealers to a realization that the primary situation had struck apace, which the local trade seems to have been quite unprepared for. It is true that assurances of a short ‘bysache’ crop had lent some impression here, but there was a hope that it had been discounted and that a reaction would offer a more advantageous basis to cover. Dealers now see little prospect to replenish except at advancing prices, and this has been well reflected by the keen speculative trading among the houses during the week, all marks and qualities being involved. According to some authorities, the ‘bysache’ crop, from which T. N. and the medium grades of orange are derived, will fall below fifty per cent. of an average yield, and the effect of this condition is likely to be emphasized by the reduction of available stocks. According to cable advices at the close, London was on the basis of 132s. for August, 134s. for October, and 137s. for January-February. The spot position of T. N. in London was said to be at a level that would bring the cost here to about 29½c. Calcutta was also reported to have scored a sharp advance at the close. On spot T. N. was variously quoted at 29 @ 32c., and the lower offers are likely to be out of the market by Monday. A feature in the local market was the stimulating tendency of bleached marks which have been undersold for several weeks owing to the keen competition. Closing quotations were 26 at 28c. for commercial and 32 @ 33c. for bone-dried—*Oil, Paint and Drug Reporter*.”

Other useful information concerning the lac industry and the cultivation of lac is contained in the following two publications:—

(1) Central Provinces Bulletin No. 8.

(2) Assam Agricultural Department Bulletin No. 6—Industrial Series No. 1.

Already some of the merchants in the Cuddapah district appear to be alive to the great possibilities of the industry and one man has taken a lease of a considerable extent of forest at a nominal rate for propagating the insect. It will be observed from Mr. Stebbing's publication referred to above that of all the species of trees upon which the lac insect thrives *Butea Frondosa*, the Palas tree of Bengal, the Porasan tree of the Tamils, is the one with the exception of *Schleichera Trijuga* which produces the best lac. Now in the Uttankarai taluk, Salem district, there are large extents of forest in which the former tree grows almost gregariously, while in the Gódavari forests and those of the Kurnool Nallamalais as well as in other localities (*Schleichera Trijuga*) is not uncommon. Again *Shorea Lacifera* alias *Talura* is not uncommon in the Salem hill forests notably those bordering on Mysore in the Hosur taluk and this tree also produces excellent lac. It may perhaps be asked why, if the cultivation of this product promises so well, the Forest department has done little or nothing in Madras towards its extension; the answer to this very natural query is that the Forest department has not got a sufficient establishment so as to be able to spare even one competent subordinate to take up the study of and experiment in this direction although sanction for extra Rangers over and above the number necessary to fill range vacancies has been asked for and refused. This is therefore an industry which must be left to private enterprise for the present, but Government can and should help it by granting extended leases of certain forests at nominal sums for establishing the industry which would give considerable employment to a large number of people as well as jungle tribes as it does in Assam and the Central Provinces.

FROM M.R.Ry. DIWAN BAHADUR L. A. GOVINDARAGHAVA AIYAR AVARGAL,  
HONORARY SECRETARY, SOUTH INDIAN ASSOCIATION, MADRAS, DATED THE 25TH  
AUGUST 1908.

Your dem-official No. 1859-A., dated 21st May 1908, enclosing a copy of G.O., No. 1421, Revenue, dated 20th May 1908, regarding the Industrial Conference which it is proposed to hold in Ootacamund next month. I am directed by the Committee of the South Indian Association to forward a memorandum of suggestions relating to Industrial development and Technical education in this Presidency.

#### Memorandum.

The first step to be taken in dealing with the subject of industrial development is, as rightly laid down for the new department organised under the direction of Mr. Chatterton, to take stock of existing industries. It does not appear from the papers made available to the public that, during the two years since Mr. Chatterton was appointed Director of Industrial and Technical Enquiries, his attention has been given to this important subject. In 1888 the Government of India desired that “in each Province an industrial survey should be completed.” In this Presidency no industrial survey was, however, undertaken as desired by the Government of India; but the Madras Government had, previously to the Resolution of the Government of India on the subject, ordered Mr. Havell, the then Superintendent of the School of Arts, to report on the condition of industrial arts in the several districts of the Presidency and had obtained from him reports in regard to fifteen districts. “The general result of those reports,” said the Madras Government in its letter to the Government of India on the subject, dated 3rd December 1888, “is to show that such a survey as this Government understand to be suggested by paragraph 25 of the Resolution of the Government of India would be infructuous.” In further dealing with this subject the Government of India, in its letter to Local Governments, dated 20th November 1901, observed “it is necessary that Local Governments and Administrations should ascertain from the Industrial surveys made in accordance with the request made in Home Department letter No. 14-457, dated 2nd November 1888, what are the local industries and manufactures which can be utilised and encouraged. It seems desirable, therefore, that these surveys should be brought up to date.” From the Order, dated 20th May 1908, No. 1421, Revenue Department of the Madras Government, it appears also that the Director of the new Department of Industrial and Technical Enquiries “should make a survey of existing industries and should investigate the possibility of creating new ones.” The Government cannot too prominently draw the attention of the Director to this very important duty, and the Association trusts that Mr. Chatterton will be called upon to make a survey which will be a more complete and more useful one than Mr. Havell's survey which was made more from an artistic than industrial standpoint.

A perusal of Mr. Havell's reports brings out the fact that there are in some of the districts workmen engaged in particular industries, as for instance manufacture of glass bangles and paper, which are useful and are only languishing for want of competent direction or support. Mr. Chatterton may be requested to give his attention to such industries with a view to develop them.

To help the Director of Industrial and Technical Enquiries in his investigations the Association is of opinion that he should be given expert advice whenever he may be in need of it.

The principal industries in this presidency to which the Director may be asked to give his attention with a view to improving them are—

- (1) manufacture of oil from oil-seeds and nuts;
- (2) husking paddy;
- (3) manufacture of refined sugar;
- (4) dyeing;
- (5) tanning; and
- (6) manufacture of gold and silver lace.



From the return of the sea-borne trade of the Madras Presidency for the year 1907-1908 it appears that as much as Rs. 159.25 lakhs worth of oil seeds were exported from the British ports during that year and that the value of the exports of oil-seeds has been steadily increasing during the past seven years. To arrest this large export of oil-seeds and to see that a large quantity of them is pressed into oils in this country so that the by-product, viz., the oil-cake, which is both a manure and a valuable food for cattle may not be lost to the country, is very important. At present the country is dotted with oil mills and presses, and in some localities this industry is carried on on a somewhat large scale also as for instance in Cocanada in the Gódvári district. But the extent to which these mills have been able to produce oils is inconsiderable as will be seen from the following figures of export during the five years ending with 1906-1907 :—

| Oil seeds.      | Average of 5 years ending 1905-1906. | 1906-1907.  |             | 1907-1908. |     |
|-----------------|--------------------------------------|-------------|-------------|------------|-----|
|                 |                                      | Rs.         | Rs.         | Rs.        | Rs. |
| Castor ... ..   | 13,71,158                            | 23,57,081   | 47,68,813   |            |     |
| Cotton ... ..   | 1,83,913                             | 3,74,035    | 8,50,983    |            |     |
| Earthnut ... .. | 80,94,523                            | 93,14,087   | 98,33,437   |            |     |
| Gingelly ... .. | 18,36,604                            | 5,21,441    | 16,71,738   |            |     |
| Total ... ..    | 1,10,39,896                          | 1,31,66,644 | 1,69,24,751 |            |     |

|                     |  | 1902-1903. | 1903-1904. | 1904-1905. | 1905-1906. | 1906-1907. |
|---------------------|--|------------|------------|------------|------------|------------|
|                     |  | Rs.        | Rs.        | Rs.        | Rs.        | Rs.        |
| Castor oil ... ..   |  | 2,92,808   | 1,16,639   | 1,41,768   | 1,33,892   | 1,04,505   |
| Earthnut oil ... .. |  | 22,178     | 22,404     | 32,520     | 3,200      | 2,543      |
| Gingelly oil ... .. |  | 39,268     | 41,183     | 85,871     | 23,761     | 25,472     |
| Total ... ..        |  | 3,53,752   | 2,80,226   | 2,60,176   | 1,60,849   | 1,32,520   |

This important industry requires therefore the careful attention of the Director in order that a suitable mill to extract oils from the principal oil-seeds at a cost which will pay the producers to export the same at a profit may be found and demonstrated to the people.

The following table shows the quantity and value of unhusked rice exported from this country during the five years ending with 1907-1908 :—

| Husking paddy. |  | 1903-1904 |           | 1904-1905 |          | 1905-1906 |          | 1906-1907 |           | 1907-1908 |           |
|----------------|--|-----------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
|                |  | CWTS.     | Rs.       | CWTS.     | Rs.      | CWTS.     | Rs.      | CWTS.     | Rs.       | CWTS.     | Rs.       |
|                |  | 530,475   | 12,02,485 | 411,514   | 9,56,078 | 329,201   | 9,25,096 | 346,644   | 11,18,267 | 355,179   | 12,04,483 |

The country to which the unhusked rice is principally exported is Ceylon. Rice-husking machines and mills of a crude and primitive type are now found scattered almost everywhere, and there are a few factories where rice-husking is carried on on improved methods. In the southern districts of the Presidency the enterprise does not appear to have extended to the same extent as in the Circars. The Director's attention may be drawn to popularising this industry in the southern rice-producing districts.

Manufacture of refined sugar.

|  |  | 1902-1903 |          | 1903-1904 |          | 1904-1905 |           | 1905-1906 |           | 1906-1907 |          |
|--|--|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|----------|
|  |  | CWT.      | Rs.      | CWT.      | Rs.      | CWT.      | Rs.       | CWT.      | Rs.       | CWT.      | Rs.      |
|  |  | 182,992   | 6,95,106 | 186,986   | 7,81,284 | 182,092   | 10,82,291 | 204,492   | 12,33,757 | 152,752   | 6,81,480 |

The quantity and value of imported refined sugar is as shown below :—

| Five years ending— |  | 1905-1906 |        | 1906-1907 |          | 1907-1908 |          |
|--------------------|--|-----------|--------|-----------|----------|-----------|----------|
|                    |  | CWTS.     | Rs.    | CWTS.     | Rs.      | CWTS.     | Rs.      |
|                    |  | 7,268     | 78,909 | 29,398    | 2,75,241 | 50,720    | 5,16,094 |

This Presidency has large areas of land under sugarcane cultivation and vast tracts growing cocoanut, date and palmyr trees, and exports large quantities of unrefined sugar. \*

Of the large quantity of refined sugar imported in 1906-1907 and 1907-1908 as much as 26,226 cwts. in the former year and 30,072 cwts. in the latter was refined beet sugar imported from the free ports of Germany and Austria and Hungary. The value of refined sugar exported from the Presidency was hardly significant, and it seems therefore that the manufacture of refined sugar is an industry which the Government should endeavour to develop. The Director of Industrial and Technical Enquiries may be asked to give his attention to this subject.

The importation of alizarine and aniline dyes is increasing rapidly and the ancient vegetable dyes of the country are being replaced by these cheap fugitive dyes.

The quantity of these dyes imported in 1907-1908 is 1,330,926 lbs. of alizarine and 229,841 lbs. of aniline as against 943,583 lbs. of the former and 173,397 lbs. of the latter in 1906-1907. The export value of vegetable dyes has fallen from Rs. 54,80,252 in 1902-1903 to Rs. 23,13,259 in 1906-1907. The question as to whether there is any possibility of working the more lasting vegetable dyes to compete successfully with the fugitive chemical dyes is one which should be investigated by experiment.

Mr. Chatterton has made the subject of tanning leather a special study with the result that he took up chrome tanning and demonstrated its success. But it does not appear as if chrome tanning would eventually oust vegetable tanned leather out of world's market. The chief objection against vegetable tanning is the time it requires to cure the leather. Whether this curing process cannot be accelerated by any means is a matter which requires investigation, and it is only Government with the resources it can command that can successfully grapple with it.

Manufacture of gold and silver lace is carried on by individual workers on a crude instrument in some localities in the Presidency: but it hardly counts for anything when compared with the quantity of lace imported from France. This is an industry in which there are great possibilities for development and consequently it requires the attention of the Director of Industrial and Technical Enquiries.

|  |  | 1905-1906 |           | 1906-1907 |     | 1907-1908 |     |
|--|--|-----------|-----------|-----------|-----|-----------|-----|
|  |  | Rs.       | Rs.       | Rs.       | Rs. | Rs.       | Rs. |
|  |  | 20,72,693 | 20,11,285 | 31,03,634 |     |           |     |

There are other important industries, such as the manufacture of matches, candles, glass and glassware, paper and enamel ironware which requires the fostering help of Government. With regard to these as well as the other industries enumerated above, the Association begs to suggest that the principle followed in the case of the aluminium industry and chrome tanning may be adopted, viz., the Government starting the industry under expert supervision as a commercial venture and handing it over to private capitalists after its successful working has been sufficiently demonstrated.

The Association also desires to suggest that when private enterprise comes forward to start any of these industries Government should help them by grants or loans of machinery or funds as in the case of installation of oil engines for irrigation purposes. Government should also help them with expert advice free.

In the above remarks the Association has not made any reference to the most important industries which are general to the entire Presidency, viz., agriculture and cotton weaving and spinning. The subject of agriculture has been receiving the attention of the Government for a considerable time past and recently the attention of the public also is being given to it. The useful work which the Coimbatore College of Agriculture and the several experimental farms recently sanctioned by Government will turn out may therefore be watched with interest. So also the subject of improving the hand-loom industry.



Connected as it is with the above two branches of industries mention may be made here of sericulture as an industry towards the development of which it is necessary to make some serious attempts. At present Kollegal in the Coimbatore district is the only place, excluding the Native State of Mysore, where the silk worm is reared as an industry and silk is manufactured. It appears to the Association that there may be other localities in the Presidency where the silk worm can be reared with equal success as in Kollegal and if the localities where at present silk weaving is practised as an industry are found suitable for also rearing the silk worm there is a great possibility of improving the silk trade of the Presidency. This matter therefore requires to be looked into by the Director of Industrial and Technical Enquiries.

The present process of reeling silk from the cocoons appears also to require considerable improvement and the Director may be requested to give his attention to the subject of introducing better processes so that it may be possible to produce a more finished product than what is at present produced in this country.

Coming to the subject of cotton spinning and weaving the Association does not consider it sufficient if the question of improving the hand-loom alone is considered and some satisfactory results in that direction are arrived at.

The area under cotton in this Presidency amounts to nearly 1.75 millions of acres and although figures showing the quantity of yearly output are not available, the extent of the produce may be judged by the quantity of raw cotton exported from this country every year. The value of the exports under this head during the past seven years is shown below :—

| Average of five years ending— | Rs.         |
|-------------------------------|-------------|
| 1905-1906 .. .. .             | 2,02,85,656 |
| 1906-1907 .. .. .             | 2,21,43,742 |
| 1907-1908 .. .. .             | 3,39,10,086 |

Against this large quantity of export of the raw material there has been an import of cotton twist and yarn and cotton piece-goods of the value of over 3.66 crores of rupees. No doubt the cotton produced in this country is not fit to produce higher counts of twist and yarn. But it is quite fit for producing the lower counts of which the clothing of nearly three-fourths of the population is made. But the value of yarn of counts 1 to 50 imported from foreign countries is considerable as shown in the margin. \* The quantity of piece-goods imported is enormous and thus the country is much handicapped in its cotton manufacturing industry. How to fight against this large drain of raw material from the country which goes out only to return to it again in the shape of a more valuable manufactured article and how to enable the country to hold its own against such great odds in its struggle in the race of world's trade are problems which if not now, at least in the near future, must demand attention of those who are responsible for the welfare of the country. It appears to the Association that until in this country mills worked by steam or electric power

|                                       | Average of five years ending with 1905-1906 | 1906-1907. | 1907-1908. |
|---------------------------------------|---------------------------------------------|------------|------------|
|                                       | Rs.                                         | Rs.        | Rs.        |
| Mule and water .. .. .                | 18,25,254                                   | 28,60,255  | 29,12,828  |
| Orange, red and other colours .. .. . | 35,96,370                                   | 41,48,014  | 33,90,492  |
| Total .. .. .                         | 54,21,624                                   | 70,08,269  | 63,03,320  |

are largely brought into existence to compete successfully with the mill industry in the countries which at present drain our raw material no perceptible improvement can be brought about in the advancement of this industry in this country.

The Association considers that this great problem of this country's industrial regeneration depends for its solution on a modification of the present system of general education. That the present system is more literary and therefore unsuited for fitting its recipients for industrial occupations is acknowledged generally now and the attention of both the Government and the thinking section of the public is being now given to the subject of technical education.

The Government of India after much enquiry and consideration came to the conclusion (*vide* its letters to all Local Governments, dated 20th November 1901, Nos. 501-508) that there should be a complete dissociation of technical education from ordinary literary education. The technical or industrial school should be strictly limited to scientific and technical courses. Every endeavour should be made to secure that students before entering industrial schools have been properly grounded in the simple form of education but it is recognised that it may not always be possible to secure that the student when he enters shall already have received due amount of ordinary education. In order to meet the case of such pupils and to secure that they shall not after leaving an industrial school enter the world without any literary education whatever, it may be desirable to arrange for their instruction either in night schools or in special classes. But this education should not be conducted in the technical or industrial school itself. The Government also instituted State scholarships for encouragement of further studies by Indian students in the higher branches of technical education.

The Association begs leave however to submit that the dissociation of technical education should not be dissociated from general education altogether is not conducive to making technical education attractive. The history of the present system of literary education has shown that it has produced in its recipients a sense of false dignity, and what is worse an utter lack of the sense of the dignity of labour. Another painful result has been that young men of hereditary handicraft classes have almost lost that deftness of fingers and facility to handle tools which by the law of heredity the members of that class who had not taken to the present system of education still possess. A system of education in which manual training forms an integral part is therefore necessary. A system like the one referred to in the note prepared by the Home Department of the Government of India in 1886 which "recommended that drawing and introductory science should be studied in all Middle and High Schools: that there should be a practical or 'modern' side in High Schools: and that a 'modern' University Entrance Examination should be adopted" as recommended by the Educational Commission: that special schools in the various departments of arts should be established: that a technical branch to teach and "improve a local industry should be attached in some places to Middle and High Schools and that the whole body of technical institutions should be systematized and placed under Central Colleges to be affiliated to the University", commends itself to the association and it is submitted that a good elementary education in the vernaculars such as is given in the people's schools of Germany or the elementary schools of the United States ought to form the ground work on which any scheme of technical education on a large scale can be built.

Manual training must form a compulsory subject in all elementary schools. These elementary schools must be made available to the resident of every village and manual training must form a compulsory subject. Books dealing with agriculture, Elementary Science and morals must be taught in the vernaculars in these village schools.

At the head-quarters of each taluk there must be a school teaching up to the III form and the instruction herein must be in the vernacular language and some subject relating to manual training such as carving, handling blacksmith's tools, etc., should be taught as a compulsory subject.

At the district head-quarters or some other suitable station in a district there must be a school teaching up to the University Entrance Examination wherein Commercial Geography and Book-keeping industrial subjects must be made optional.

may, in addition to industrial subjects, also form optional subjects, so that a student who leaves off study after going through the course of the University Entrance Examination may be fit for employment in Government offices, Mercantile firms or workshops.

In the University separate faculties to confer degrees in Technological subjects should be created.

In the University separate faculties to grant diplomas and confer degrees in Agriculture, Commerce and other technological subjects must be created.

A Technological College where expert professors should be appointed to give

A Technological College should be established and affiliated to the University.

tories and workshop must be opened at some suitable station in the Presidency to train students for taking University degrees in those branches of knowledge and the same should be affiliated to the University.

In addition to a course of University training like the one roughly indicated

Technical schools dealing with local industries should also be established in every district.

above the Association would suggest that in every district technical schools might be established wherein instruction would

be given in one or more subjects having special reference to local industries.

Where instruction is given in industries which are practised by castes the Association

Members of professional castes should be given special facilities to receive instruction in schools where industries practised by such castes are taught.

tion would suggest that special facilities should be given to members of such castes for admission to studentship in those schools.

Arrangements may also be made with the authorities of the several Railway

Railway authorities should be asked to receive apprentices in their workshops.

Companies to admit apprentices into their workshops for being trained for higher appointments in the professional departments of the Railway administration.

The Association has also one more observation to make in this connection,

The standard of general education for admission into technical colleges may be reduced.

namely, that the standard of general education now insisted upon for candidates seeking admission into institutions training

ing candidates for the professional degrees is needlessly high. The Conference may consider the question whether the standard may not be conveniently lowered.

When the mind of the youth of the country is cultivated in the manner indicated above not only will a taste for industrial occupation be created but men with knowledge enough to apply mechanical and other sciences for the development of industrial works will be available.

In conclusion the Association begs to suggest that, in order to facilitate collection

An economic Board may be formed.

tion of information regarding various industries, to study and digest the same,

and initiate new schemes for industrial development after experiment and verification of information collected, and to disseminate the knowledge thus acquired among the people, a Board consisting of the heads of all technical departments, viz., the Director of Public Instruction, the Director of Agriculture, the Director of Industrial and Technical Enquiries, the Chief Engineer and the Principal of the College of Engineering, the Superintendent of the Museum, the Superintendent of the School of Arts, the Conservator of Forests, besides some non-official gentlemen of technical and general qualifications and representing various industries may be formed under the title the "Madras Economic Board". An "Economic Library" may be attached to the office of the Economic Board where some readers may be appointed to study the books and journals dealing with important subjects of industry and draw the attention of the Board to the same. The Economic Board should diffuse the knowledge so gained by publishing pamphlets and leaflets in the vernacular languages and distributing them freely among the rural population.

FROM C. A. MACKENZIE, Esq., DATED THE 27TH AUGUST 1908.

I have to acknowledge receipt of your letter of 22nd instant enclosing a copy of a Resolution of the Government of Madras on the subject of an Industrial Conference, and beg to express my thanks to His Excellency the Governor in Council for the invitation to attend. It will afford me the greatest pleasure to be present, and to give any assistance in my power, though I must here say that I have had no practical experience in other than planting industries.

In reply to your request to indicate in what branches of industry I think that the assistance of the Director of Industrial and Technical Enquiries might be of use, I would suggest that improved modes of transport of perishable foods, such as fish, fruit, etc., is a subject worthy of enquiry and report. Preservatory chambers, or vans, used for the above purpose, if found suitable, and adopted by the steamship and Railway Companies, would greatly aid in the distribution of these articles of almost universal consumption. In this conjunction information upon the comparative rates of freight in other countries might be valuable.

An industry of great possibilities, provided the raw materials are easily procurable, is the manufacture of sulphuric acid and alkali. Soap, glass and paper factories, sugar refineries, and many metallurgical processes, are all more or less dependent upon one or other of the products of these works. Pyrites is found in considerable quantities in the mines of this Presidency, but I am not aware if it exists in layers or beds as it does in Europe. Information regarding the supply obtainable of this, and of the crude salts, might be useful.

Amongst minor industries to which attention might be given is that of grass or leaf riband plaiting. The hats called Panama hats are made from the flower spathe of a plant (*Carludovica Palmata*) closely allied to the Screw Pine, and very neat bags and mats are made from the latter on the West Coast. It might be possible to instruct the people, already engaged in the latter pursuit, in making the hats so much in use. I recently imported some seeds of the South American plant, but am sorry to say they have not germinated.

Government has, I believe, under consideration the appointment of a scientific officer to assist the various established planting industries, and if this aid is granted I do not know that more is needed.

FROM THE HON'BLE NAWAB SAIYID MUHAMMAD SAHIB BAHADUR, PRESIDENT, THE MUHAMMADAN EDUCATIONAL ASSOCIATION OF SOUTHERN INDIA, MADRAS, DATED THE 29TH AUGUST 1908.

I have the honour to acknowledge with thanks the receipt of G.O., No. 1421, Revenue, dated the 20th May 1908, and to state, with reference to paragraph 5 thereof, that the Muhammadan Educational Association has resolved to depute me as its representative to the Industrial Conference to be held at Ootacamund in September next. I hope, accordingly, to attend its sittings which I understand commence from Monday the 14th idem, and to take part in its deliberations.

2. As regards your demi-official No. 1859-A of the 21st May 1908, asking for any suggestions in advance as to the practical measures which the Association would recommend for the promotion of industrial development or of technical education, I beg to make the following observations.

3. It appears to the Association that the first and the most important step in the direction of promoting technical education would be to open a fully-equipped College of Technology for this Presidency, at a convenient centre. I am aware that at present scholarships are offered both by Government and private bodies to Indian youths for technical education in foreign countries, but their number is so limited and the system is beset with so many difficulties, both financial and otherwise, that a fair supply of trained Indians cannot always be available. By establishing therefore a college in the Presidency, Government will be placing technical education within the easy reach of the people, and persons who are now precluded from proceeding to

Europe or America on account of the prohibitive cost of training in those countries will largely avail themselves of the local institution. To further more popularise the college, some of the scholarships which are now offered to foreign countries might, with advantage, be diverted to it, so as to enable even men without means to grant their children technical training.

4. The Association further begs to recommend that in the event of a college being started as suggested above, or scholarships for training in foreign countries being continued, a sufficient number of scholarships may be reserved for Muhammadan boys, as owing to the poverty-stricken condition of the community in this part of India, it will be impossible to find private individuals to render any appreciable help in the matter.

5. The only industry which in the opinion of the Association calls for immediate attention is the hand-loom weaving industry. The Indian weavers have already shown considerable aptitude for it, and should Government come to their help by organizing demonstrations at various weaving centres with the object of teaching the local weavers how to work with fly-shuttle looms, and the carpenter how to make and repair them, the development of the industry would be very rapid and extensive. Pit looms with fly-shuttle arrangements being less expensive are likely to prove more acceptable and the Association would strongly advocate their early introduction.

6. Another point of importance to which the Association would beg to draw the attention of the Government is that under the revised Grants-in-Aid Code general education is no longer compulsory for industrial classes. The Educational Department must have had its own reasons for recommending the change, but it appears to the Association that the result is likely to prove harmful to boys belonging to backward communities and it therefore trusts that at least in the case of Mussalman schools Government will see fit to order the compulsory education of the industrial classes up to the primary standard.

## 7. Correspondence regarding the improvement of dyeing industry.

*Demi-official*—from the Hon'ble Mr. A. G. CARDEW, I.C.S., Secretary to Government, Revenue Department.

*To*—the Director of Industrial and Technical Inquiries in the Madras Presidency.

*Dated*—Ootacamund, the 4th June 1908.

*No.*—1991-A-08-1.

In the speech delivered at the Weaving Conference held in the Madras School of Arts in March last, P. Theagaraya Chetty suggested the employment of one or two expert chemists with a good practical knowledge in dyeing to make experiments with indigenous dyes with a view to the improvement of the process of dyeing. The speech was reported in the *Madras Mail* of the 2nd March last. I am to ask you to consult Messrs. Binny & Co., Tulsiram of Madura and Theagaraya Chetty as to the usefulness of investigations of the kind suggested and to let Government have their views as well as your own on the matter.

*Letter*—from A. CHATTERTON, Esq., Director of Industrial and Technical Inquiries in the Madras Presidency.

*To*—the Secretary to Government, Revenue Department.

*Dated*—Madras, the 17th July 1908.

*No.*—438 B. & G.

In reply to your No. 1991-A/08-1, dated Ootacamund, 4th June 1908, I have the honour to state that I have addressed the enclosed letter No. 438 B. & G., dated 9th June 1908, to Messrs. Binny & Co., P. Theagaraya Chetty and K. Tulsiram, and I enclose in original the replies received from Messrs. Binny & Co. and Mr. Theagaraya Chetty. No reply has been received from Mr. Tulsiram.

2. It will be seen that Messrs. Binny & Co. welcome the establishment of a technical institution where practical dyeing will be taught, such teaching to cover the whole field of dyeing and not to be confined to vegetable dyes; whilst Mr. Theagaraya Chetty thinks that an expert chemist and dyer should be brought in to study the indigenous dyes with a view to checking the import of cheap German dyes. I am in entire agreement with Messrs. Binny & Co. in thinking that it would be quite useless to employ an expert solely with the object of reviving the indigenous vegetable dyes. We must accept the fact that except for special purposes aniline and alizarine dyes have driven native vegetable dyes out of use. So far as I know it is only in dyeing wool for carpet weaving that indigenous dyes are still employed, and I think it is possible that an expert in tinctorial chemistry would be able to effect improvements in the processes now in use. I am in favour of getting an expert out from England who should also be able to deal with bleaching as well as dyeing, but I am extremely doubtful as to whether the institution of dyeing classes for students to attend would be of much practical benefit. My idea would be to get a man out from home, send him round the country to study the present methods of dyeing employed in Madras, Madura and elsewhere and ask him to submit a report suggesting what he can do to improve matters. If the report contains practical suggestions which could be carried out, I think it would be better to establish a small dye-house and undertake dyeing on a commercial scale, and in this way we should be able to prove that the suggested improvements would lead to commercial success and this would be followed by their adoption by those engaged in the dyeing trade.

3. I may mention that a very large business in alizarine dyes is done by the Badische Anilin Fabrik in Madura and that twice a year they send one of their experts to look after their interest and advise the users of their dyes. I understand that Badische people are thoroughly satisfied with the present processes and have strongly recommended the dyers in Madura not to alter them. On the other hand, I have had personal enquiries for assistance in solving dyeing problems which I have not been able to take up, not being expert in these matters. If classes were opened for students, there might be a few in the beginning, but I do not think the number would be large. There is no doubt that if we got an expert out and made the fact widely known, he would receive a great many enquiries for advice and assistance.



But so far as I can judge the Indian dyer takes no particular interest in the art of dyeing except in so far as his own particular work is concerned. He will be glad to receive special tips to improve his own work, but will hardly be able or willing to undergo a scientific training in dyeing.

4. It seems to me that we might well place this question before the forthcoming Industrial Conference and ask for an expression of opinion as to whether it is desirable (1) to get an expert dyer and (2) whether he should be placed in charge of a laboratory in which modern processes of dyeing are taught or whether he should be employed to work out improved practical processes and demonstrate their utility on a commercial basis.

## ENCLOSURES.

(1)

Letter—from A. CHATTERTON, Esq., Director of Industrial and Technical Inquiries in the Madras Presidency.  
To—Messrs. BINNY & Co., the Hon'ble Mr. P. THEAGARAYA CHETTY Garu, and M.R. Ry. K. TUISIAM AVARGAL of Madura.  
Dated—the 9th June 1908.  
No.—438 B. & G.

It has been suggested to Government that an expert chemist with a good practical knowledge of dyeing should be brought out with a view to making experiments with indigenous dyes in the hope that some improvements would be effected which would result in the revival of the use of vegetable dyes. I am to request that you will be good enough to let me have an expression of your opinion as to the usefulness of the investigations proposed and also whether there will be any advantage in Government instituting tinctorial laboratory in Madras for general investigations into dyeing processes and for the training of expert dyers.

2. It is possible that it might be worth while employing an expert to investigate definite problems which can be placed before him by those interested in the trade even supposing that it will not be worth while to establish a permanent tinctorial laboratory. Government will welcome any expression of the views you care to send me and will be glad to have practical information which will enable them to gauge the necessity for work in this direction.

(2)

Letter—from the Manager, Messrs. Binny & Co., Limited, Madras.  
To—the Director of Industrial and Technical Inquiries in the Madras Presidency.  
Dated—Madras, the 16th June 1908.

We are in receipt of your letter No. 438 B. & G., dated 9th instant, asking for an expression of our opinion on the subject of reviving the use of vegetable dyes.

In reply we have to state that we do not consider any practical purpose would be served either by the institution of a tinctorial laboratory or by the employment of an expert solely for the object of reviving indigenous vegetable dyes. The use of these dyes (not excepting indigo) in European managed dye-houses has become gradually less and less until it is now unknown. Further, the increasing sale of aniline dyes among the natives shows that they appreciate the cheapness and effectiveness of the aniline article. We regret we have no figures by us relating to imports into the Madras Presidency which is a comparatively small consumer, but we have been informed by the Bombay branch of the Farbenfabriken of the increase into Bombay and could probably obtain figures from them, if they would be of use to you.

With regard to the appointment of an expert, we would welcome the establishment of a technical institution or classes where practical dyeing would be taught, such teaching to cover the whole field of dyeing and not to be confined to vegetable dyes.

(3)

Letter—from the Hon'ble Mr. P. THEAGARAYA CHETTY Garu.  
To—the Director of Industrial and Technical Inquiries in the Madras Presidency.  
Dated—Madras, the 15th July 1908.

With reference to your letter No. 438 B. & G., dated the 9th ultimo, I may mention that I have often spoken to you that the Government ought to take up dyeing into their hands and get an expert chemist and dyer to experiment upon indigenous dyes for producing and dyeing at a cheap cost to check the inroads of cheap German dyes. More than ten years ago a Committee with Dr. Thurston as Secretary and Messrs. Crole, Chambers and Dr. D. Duncan sat in connection with the Victoria Jubilee Technical Institute when I gave evidence. I then suggested that an expert chemist and dyer must be brought in to study the indigenous dyes, to experiment upon them to produce them cheap and to improve the process of dyeing and mordanting which

are very laborious tasks taking months together to complete. This suggestion I made to check the import of German dyes. Matters are hundred times worst now, and I think, if proper steps are not taken to produce indigenous dyes cheaper and make the process of dyeing and mordanting cheaper and less laborious, in course of ten years indigenous dyes, which were once the admiration of the European world, will completely disappear. I then also suggested that when improved methods are discovered weavers and dyers must be taught in the improved art and that a school was necessary for the purpose. My after-experience confirms those opinions, and I now think that no time should be lost in carrying out these suggestions. I will, on behalf of the weaving population, thank you for pressing this matter upon Government and make it an accomplished fact as early as possible.

I would suggest an expert on Rs. 750 or 1,000 a month be engaged from home or from the continent for two years with option of renewal of service for further period. The object of two years limit is to see his capacity for work and if he proves an useful person his services may be continued, if not another may be brought in. He must have a good tinctorial laboratory fitted up with an assistant in charge of it. He must also have a free hand for experiments and should not be hampered with departmental restraint. It may cost about Rs. 25,000 a year, and in my opinion it will be well spent even though it ends in failure which I hope not.

Demi-official—from A. CHATTERTON, Esq., Director of Industrial and Technical Inquiries in the Madras Presidency.

To—the Secretary to Government, Revenue Department.  
Dated—Madras, the 18th July 1908.  
No.—438 B. & G.

In continuation of my letter of yesterday on the subject of dyeing I enclose a letter from Mr. Theagaraya Chetty in reply to one which I wrote to him asking what his opinion was on my proposal to start a Government dye-house on a commercial scale.

## ENCLOSURE.

Letter—from the Hon'ble Mr. P. THEAGARAYA CHETTY Garu.  
To—the Director of Industrial and Technical Inquiries in the Madras Presidency.  
Dated—Madras, the 17th July 1908.

In continuation of my letter of the 15th instant regarding dyeing industry, I may mention that it will be an excellent thing to start a dye-house in charge of an expert. I suppose it is admitted by all that factory is the best training school. A dye-house with a laboratory attached in charge of an expert dyer and chemist will not only serve as a research institute but also serve as an object lesson and a training school, and in course of a few years the whole concern might be taken up by a company just like the aluminium industry started by you; and I am sure the chrome tanning started now will soon be taken over by a private company.

You know perfectly well that capitalists this side feel shy at present at anything, but when once they see a flourishing and successful industry they are sure to go into it boldly. If you can induce the Government to establish a dye-house with an expert dyer and chemist, you will be achieving great deal in the way of helping the development of an industry.

**8. Note, dated 10th August 1908, by Mr. W. FRANCIS, Collector of Malabar, on the development of Malabar Industries.**

I hope I may be forgiven if, uninvited, I mention one or two points connected with this district which might, I think, engage the attention of the Industrial Conference to be shortly held at Ootacamund. I have mentioned them briefly to Mr. Kühner, who is to be one of the Malabar witnesses, but I am not sure that I made myself clear to him.

2. Malabar is so usually spoken of as a land flowing with milk and honey that the impression is apt to be formed that the people there are in no need of special assistance in finding new means of livelihood or in keeping the wolf from the door. And yet it is probably the case that in few other Madras districts are the mouths to be fed pressing so closely upon the land which feeds them. No doubt we appear in the returns as having the lowest percentage of non-agriculturists in the Presidency (see page 214 of the last Census report, and certainly our Mission and other tile-works provide occupation for a few hundreds of people in half a dozen places along the coast lines; our ports afford cool work when they are not closed for the monsoon months; and we have more than the usual proportion of wood-cutters and (cart-tracks being few) of coolies who live by carrying loads from place to place; but the real reason why we figure as being less agriculturist than the average is (see page 214 of the report again) that the figures under "Food, drink and stimulants" are so high, and this is only due (see page 206 of the report) to the large numbers of fishermen, rice-pounding women and toddy-drawers whom we include—and not to the existence of any manufactures of note.

3. Yet (see page 20 of the report) the population of Malabar in 1901 was second in density only to that of Tanjore (notwithstanding the fact that the immense areas in Malabar which are covered with uninhabitable hills and jungle are not excluded in calculating this density) and the inhabitants actually doubled in numbers in the thirty years 1871–1901—a rate of increase which is  $2\frac{1}{2}$  times the average for the Presidency as a whole. Moreover, except that a few of the Mappillas go to the estates on the Nilgiris, emigration, which in other districts affords such relief, is here (see pages 33 and 34 of the report) an almost negligible quantity, the Malayali suffering severely from home-sickness if he leaves his native shore, and declining to be enticed away.

4. So much for the need for some remedy. I might easily enlarge on other characteristics of the people which hinder their advancement, such as the laws of inheritance among the Mappillas, which entail the division of the family land among the (usually) numerous children of a deceased, so that holdings become minute to a degree; the almost equally pernicious tarwad system, under which a younger son has a claim to maintenance and need never do a day's work all his life so long as the family property suffices to support him in penurious idleness, and so on; but the figures given above seem to be enough for the present purpose.

To suggest remedies is less easy. There is a fortune in the fish and fish manure industries, but they may probably be left to the care of Sir F. Nicholson and Messrs. Hollinghurst. The latter, as you no doubt know, have lately started at Cochin the manufacture of fish-manure, setting up machinery. The need for scientific preparation of the stuff lies in the fact that if the sun-dried product of the ordinary fisherman is exported as it stands, it heats on the ship owing to the fish-oil in it. A native merchant of Cochin this year collected 2,000 tons of this fish manure at Cochin for the Japanese market (the Japs sent collecting agents to Colombo, I am told), but could not persuade any ship to take it; and the last I heard of it was that it was lying festering on the beach. Messrs. Hollinghurst will first express the oil and then powder the residue. Fish-canning has also been carried on for some time by a Frenchman at Mahé, his tinned sardines being almost indistinguishable from the usual European brands.

5. The local Agricultural Associations are doing something to improve the local agricultural methods, paying attention first to the important rice crop and next to possible ways of utilizing to more purpose the immense area of dry land which now

grows nothing more profitable than a scanty crop of chama or hill-rice every three years. I am in hopes that if we show ourselves in earnest in this matter, the Government will soon give us an agricultural farm of our own, to enable experiments to be made with the valuable crops which are almost peculiar to Malabar, such as arecanut, coconuts, ginger, arrowroot, tapioca, plantains, etc. Pepper is already being studied at the farm at Taliparamba.

6. I think it is in the working up of the market for these special products that our chief hope of salvation lies, and it is to the possibilities in this direction that I want to draw attention now.

7. Enclosed are newspaper cuttings about plaintain-meal and tapioca. In 1904–1905, 62,000 acres were shown as under plantains in the district, but the official figures hardly give a fair idea of the area under this crop, as they do not include the thousands of acres which are raised in small patches in the gardens which surround every house in the district and are classed in the returns as being under their chief crop, viz., coconuts. Plantains are absurdly cheap at certain seasons and with difficulty procurable at others. If those which are now allowed to rot for want of a sufficient market during the former period could be turned into meal, much waste could be prevented and an export trade might soon be established.

8. Tapioca has lately become a very popular crop. It will grow here with the minimum of care in the poorest of soils. A stem of a mature plant is chopped into cuttings and struck into the ground and every one of these roots itself and becomes a plant. This plant again is very plentiful at some periods of the year and scarce enough at others. But there is more than one kind of tapioca and the people get hold of the wrong kinds; and there is more than one way of cooking the root and the people use the wrong ways, turning what might be wholesome diet into food which induces indigestion and cholera. One would think that it must surely be possible to devise some way of turning the root into flour of the kind known to Europeans as tapioca and thus enabling the crop to be stored and rendering it more wholesome.

9. Some kinds of arrowroot grow wild in the jungles here. Better kinds are raised in small quantities for home consumption in almost every garden. But the best varieties, such as the Egyptian, will do equally well and an industry in powdering and exporting this seems quite possible. Already there is great local demand for the Egyptian kind grown by a missionary at Vaniankulam and the home farm of the Kavalpara estate.

10. The agricultural experts do not concern themselves with such questions, I believe, holding that their function is confined to showing how things may be grown, and not how they may be cooked, stored or exported, and we cannot look to them for help. The local European firms have usually as much on their hands as they care for in the collection and export of articles which are already understood and have an assured market, and unless Government will lend a helping hand I do not think that these questions stand much chance of being worked out.

11. But the most important of all this local produce seem to be the various products of the coconut palm, and it is on these that I should like to lay special emphasis. It is an odd thing that though in South Malabar they are exported to the extent of no less than 148 lakhs, in North Malabar the export of them is valued at only 21 lakhs. I attach the figures of exports in the second volume of the District Manual, which are the only ones available here, and though not up to date will serve the present purpose. Cochin is, of course, the port for much of Travancore, but, even allowing for that, there is a vast difference in this trade between the north and south, which no one I have met can explain, though I have asked European merchants and a number of natives who were by way of knowing about such matters. It is not because coconuts are not grown in North Malabar. In the three northern taluks the official statistics give 108,000 acres of them. In the five southern taluks the area is 150,000 acres, but this difference is not enough to account for the fact that the exports from the south are worth between seven and eight times as much as those from the north.

12. The only reason for the difference I have heard was from one of the members of Volkart Brothers, who said there was some peculiar property in the mud of the

backwaters of the south which rendered the coir soaked in them finer and of a better colour than that of the north. This does not sound very convincing, for to the casual eye there is no difference in the backwaters or their mud, and anyhow it does not account for the fact that there is such a difference in the value of the other products of the tree which do not depend upon mud, such as copra, oil and cake. I thought perhaps there might be some movement of coir and copra from the north to the south, where hydraulic presses for coir and power-driven oil-mills are commoner. But the railway and coasting statistics do not show any, and I cannot learn that there is any great traffic of the sort by backwater.

13. In the south the preparation of coir is a regular cottage industry of the most typical kind. Throughout the year wherever one goes, one hears the noise of the women hammering out the fibre and sees them taking, in the evening, that part of it which they have rolled into yarn, to the nearest little wayside shop to be exchanged for salt, chillies, paddy, etc. But in the north of the district nothing of the kind goes on and the coir is commonly used as fuel.

14. I cannot help thinking that it would be worth while to have this and the other matters above alluded to investigated properly. I myself have neither the time nor the knowledge necessary.

#### ENCLOSURES.

(1)

Value of exports of products of the cocoanut tree from the chief Malabar ports—average for five years ending 1902-1903.

| Port.              | Coir.     | Cocconuts. | Copra.    | Cocconut oil. | Oil-cake. | Total.      |                                    |
|--------------------|-----------|------------|-----------|---------------|-----------|-------------|------------------------------------|
|                    | RS.       | RS.        | RS.       | RS.           | RS.       | RS.         |                                    |
| Cochin ... ..      | 42,30,967 | 52,037     | 2,81,198  | 66,05,031     | 5,07,774  | 1,16,77,907 | South Malabar,<br>Rs. 1,48,01,738. |
| Ponnani ... ..     | 8,525     | 2,22,275   | 30,368    | 24,380        | ...       | 8,60,552    |                                    |
| Beyepore ... ..    | 80,025    | 1,56,459   | 10,842    | ...           | ...       | 2,47,126    |                                    |
| Calicut ... ..     | 8,05,036  | 4,76,693   | 10,27,759 | 1,79,153      | 27,432    | 25,16,153   |                                    |
| Quilandi ... ..    | ...       | 1,37,851   | ...       | ...           | ...       | 1,37,851    |                                    |
| Badagara ... ..    | ...       | 3,13,901   | 10,48,102 | 20,070        | ...       | 13,82,073   | North Malabar,<br>Rs. 20,91,724.   |
| Kallayi ... ..     | ...       | 20,244     | ...       | ...           | ...       | 20,244      |                                    |
| Tellicherry ... .. | ...       | 27,771     | 2,26,142  | 26,901        | ...       | 2,80,814    |                                    |
| Cannanore ... ..   | ...       | 92,480     | 15,475    | 21,327        | ...       | 1,29,282    |                                    |
| Azhikkal ... ..    | 33,890    | 87,457     | 20,113    | ...           | ...       | 1,41,460    |                                    |
| Total ... ..       | 52,33,503 | 15,88,058  | 26,59,827 | 89,76,863     | 5,35,206  | 1,68,93,462 |                                    |

(2)

"Madras Mail", July 27, 1908.

#### PLANTAIN MEAL MANUFACTURE.

The potentialities of plantain meal are set forth in an interesting article in the last issue of the *Indian Trade Journal*. It is a subject which crops up from time to time and then is apparently forgotten. The late Sir H. M. Stanley, during his travels in Central Africa, was so struck with the value of this product that he recommended machinery for its manufacture being erected in Africa. A Company for manufacturing plantain meal, called "Bananaflour," was formed at Home several years ago, but its specialities have not become well known. There is, however, no doubt that plantain meal is a valuable food, especially to be recommended for children and invalids on account of its digestibility, and it should form an important minor industry in the country. Another London Company has offered for sale banana flour for bread, banana oats for porridge, banana custard powder, banana cocoa, banana cake and pastry flour, banana blanc-mange powder, banana jelly powder, banana health salts, etc. The meal, it is said, has also been manufactured for several years in Central America and the West Indies; and in India there are a few scattered concerns, e.g., at Saharanpur, where plantain meal is manufactured in a small way; but practically nothing seems to have been done to produce it on a large scale and with such machinery as will turn it out in commercial quantities at the lowest possible cost. A European firm at Calicut, which has lately been examining the possibilities of this industry, sent the *Indian Trade Journal* a sample of banana meal prepared by it. This was analysed by Mr. Hooper, of the Indian Museum, and reported on as follows:—"This analysis discloses a starchy food with a small amount of nitrogen and very little fibrous matter. It is quite free from tannin, which is found in some samples of banana flour, and should be very digestible. Its composition is similar to that of the flour made from bananas in America."

As an article of food the absence of tannin increases very considerably the value of this sample of banana meal, which, according to its analysis, occupies an intermediate position between the cereal flours and arrowroot starches, and Mr. Hooper says it should be recommended specially for infants and invalids.

The average weight of fruit required to produce 1 cwt. of flour is 5 cwt., and it is said that Rs. 360 per ton represents the average cost of production in Saharanpur in Bengal, and at Anaradhapura in Ceylon. For foreign markets the cost of packing, freight and shipping charges has to be added to this figure,—say, another Rs. 20 per ton. The total cost should thus not exceed Rs. 380 per ton, or just under 3 annas per lb., while the retail price in Calcutta is said to be Re. 1 per lb., which works out at Rs. 2,240 per ton, leaving a margin of profit of Rs. 1,860 per ton, or nearly 500 per cent. In Venezuela, on the other hand, the price is said to be only 5 annas per lb. and even this should provide a very fair margin of profit.

(3)

"Madras Mail", July 29, 1908.

#### CULTIVATION OF TAPIOCA.

##### A Valuable Cheap Food.

A paper has been issued by the Bombay Revenue Department dealing with the cultivation of tapioca in the Bombay Presidency. It appears that in January last Commissioner Booth-Tucker of the Salvation Army asked Government to favour the experiment of dried tapioca root as cheap food. The root, he said, could be boiled or made into flour with rice powder and could be delivered in Bombay at twenty to twenty-five seers the rupee. The Director of Agriculture thought the matter worth investigating and now states:—"Indications appear to show that tapioca may prove very useful in this Presidency, if not as a regular field crop at any rate in gardens and odd corners. It has grown most successfully on the Poona and Manjri farms, and I am having it tried this year at Dohad, Dhuha and Dharwar and in the Ratnagiri district. I hope next year to be able to offer free sets for planting to the people in those localities, and to be able to tell them what results they may expect to obtain. The cultivation of this plant requires very little trouble, and it seems likely that the Bhils in Khandesh and the Panch Mahals will take kindly to it."

A note on the tapioca plant has been prepared, in which it is stated that the best soil for growing tapioca is a sandy loam which must be well drained for the roots soon decay in water-logged ground. The soil must be rich, for tapioca is an exhausting crop. The plant thrives best in the lowland in the neighbourhood of the sea. In the Bombay Presidency it will thrive well in the bhata (alluvial) lands of Surat and in the regions all along the sea coast. In the coastal tracts the rainfall is assured and the crop can be successfully grown without any irrigation.

The root contains a poisonous principle, which is however dissipated by boiling. In Travancore, where the plant is acclimatised, the well-to-do people boil the tubers three times before eating. Each time the water is thrown off to remove the poisonous properties, but the ordinary people are satisfied with two boilings, and are apparently not aware of the existence of poisonous properties. They say that they boil the root because it then becomes good for eating. The sun-dried slices are boiled twice and the boiled sun-dried slices are boiled once more, and after each boiling the water is drained off. The slices are then seasoned with chilly powder and other condiments. The very poor eat the boiled root without any seasoning. The sun-dried root is also made into flour with a rice pounder. For this purpose the ordinary mortar and pestle can be used. It can also be ground into flour with an ordinary handmill. From the flour thus obtained ordinary cakes may be made with a mixture of bajri, jowari and maize flour. The cakes made of tapioca flour alone are palatable, but a little tough. This toughness, however, does not appear in cakes made of mixed flour.

Its value as food is slightly better than sweet potato dried to the same extent. It is not equal to wheat, but about equal to rice. The Collector of the Panch Mahals reports that it is purchased readily and appreciated by Bhils, and has been sold at 40 lb. per rupee.



## 9. Technical Education for the Workman \*

By Mr. JOHN WALLACE, C.E., Editor, "Indian Textile Journal."

[Reprinted from the Indian Textile Journal.]

How shall we estimate the progress of Technical Education as imparted in our schools during the past 20 years, and where shall we seek the proof of it? One naturally looks among the familiar craftsmen, the carpenters, joiners, masons, smiths, painters, glaziers, plumbers, tin-smiths, and decorators, expecting to find improved methods of work, greater accuracy and expedition and better choice of materials. But such is not the case. Native workmen, working under native control, are, generally speaking, as bad as ever. It is only necessary to visit some of the largest houses in course of construction in the best parts of Bombay, to find workmanship of the lowest class. In one large house, facing the Elphinstone College, all the joinery is finished with the jack plane, many of the joints in shutter frames would admit a half-anna coin, the jhilmils rattle loose, and the locally-made hinges are all deficient in wearing surface. Many of the hinges are not in line. The work of the plumbers and electric fitters is exceedingly rough, although their material appears good; the painters seem quite incapable of mixing the same shade continually, and the national lack of standard of excellence is just as obtrusive now as before. An Indian cannot paint a window frame without painting the glass, and if obliged to clean the glass, he will use sand-paper or emery cloth which ruins the surface. He will varnish a dogcart with his fingers dipped in varnish, or paint doors with a piece of rag, instead of using a brush, leaving clots of paint in the corners. If he paints or colour-washes a wall, he leaves the floor all foul with droppings, and he rarely does any repair work without damaging, in some way, the building in which he works. The Indian mason continues to build walls with stones of a pyramidal shape, the base forming the exterior surface—a most vicious practice, and the cabinet-maker has so little confidence in his own jointing that he ties the legs of tables together to keep them from coming loose. Slovenliness and imperfect knowledge of his craft are the characteristics of his work, and his outfit of tools is that of a man who will buy or make nothing that he can possibly do without, and who has no regard for time as an element of cost. If tools are provided for him he will wear them out in half the time a European would take, and the wear is generally that of abuse or neglect. I found in Dhulia, Khandesh, a very clever wood-worker engaged in joinery and cabinet-making. He had made several labour-saving machines including circular and fret saws. Among his products were kindergarten school sets of models, which he shortly afterwards abandoned, as they did not offer him a sufficient profit, although labour and wood were both cheap. The explanation of his failure lay in the faulty construction of his tools. There was no real accuracy in them. A well adjusted circular saw, properly sharpened, will cut hundreds of cubes so accurately that they do not need planing at all; a slight application of fine sand-paper is all they need, and even that may be dispensed with if the saw is sharpened in a certain manner. The Dhulia joiner might, to-day, have a steady business in kindergarten models if he had the benefit of instruction from a qualified teacher of handicraft, and it is a reproach to the wood-workers of India that any articles of wood, used for drawing or for kindergarten instruction, should continue to be imported from Europe. The potter for many centuries has continued to make unglazed cooking pots while the potters in Southern Europe, with appliances almost as simple as those of this country, are producing glazed goods that are preferred to any other material for cooking pots.

The Indian artificer has no standards of good workmanship; he will give the smallest possible return for his pay and, when taxed with scamping or fraud, he will display considerable ingenuity in refuting the charge, and endeavouring to prove that his work is as good as, and possibly better than, was ordered. It is not etiquette to admit a blunder—and the occasion offers an opportunity for talking. Setting

\* Paper read at the Indian Industrial Conference, 1907.

aside his fertility in excuses, the Indian workman is almost devoid of originality, but it is to be hoped that this waste of energy may, some day, be converted into useful force; it offers an interesting problem to the educationist.

All well-wishers of India desire to see a better use made of the raw products that are exported at present in such quantities. Materials to produce paints, varnishes, leather, canvas, cordage, textiles, drugs, oils, and metals, many of which return in a manufactured state, might all be dealt with here if workmen were more reliable. It is they who determine the final quality and finish of any manufacture, and if they are stupid, careless, irregular, migratory and improvident, no talent of master or manager can avert the deterioration of the product. We must, therefore, give such attention to the education of the workman as shall improve his working capacity.

Meanwhile, large sums are annually spent on Technical Instruction. I do not imply that good workmen are not increasing in India, for that would not be true. Good workmen are being trained in railway, dock-yard and other engineering workshops under European control throughout India, but what I do contend is that the influence of schools where handicraft is taught, pure or mixed with science and literature, has not yet reached the rank and file of workmen, even in the towns where the instruction is given.

It cannot be said that the Indian is averse to things that are foreign. His consumption of kerosine, wire nails, corrugated sheet iron, cheap padlocks and cutlery is enormous, and he has taken kindly, indeed for too kindly, to literary education, until the market is glutted and the pay for clerical work does not provide a decent living. Meanwhile, the earnings of a good craftsman may easily be double those of the clerk. Why, then, should the ordinary workman be so indifferent about technical education? He will not go to a night school, and he has but scant appreciation for the instruction his son may get at an industrial or an art school; indeed, the knowledge of drawing that the boy acquires is the only part of the training that is appreciated by a future employer and by the workman himself.

The schools, sometimes called technical and sometimes industrial according to the fancy of the promoters, and where the prospective workman gets his training, are in charge of men who have not been taught to teach. Some are selected workmen who have exercised their trade for some years; others are young men fresh from some technical institution, who have a very superficial knowledge of handicraft, and have no experience of trade methods and workshops. They generally attach more importance to scientific than to technical knowledge, and this accounts chiefly for their failure as teachers, while the pure workman teacher simply continues the habits of his craft without any thought of improvement. He jealously conceals what he considers to be his trade secrets for fear any boy should become clever enough to supersede him. These secrets generally turn out to be things that are common knowledge in other countries.

One of the rarest things in India is to hear a definition of technical work. It is generally assumed to consist of a mixture, in no fixed proportion, of science and art; the science being mathematical, mechanical and chemical, and the technique—the art of some kind of work in wood and metals. My earliest recollection of King's College, London, is the memory of a definition of physical science given by one of the masters. He said it was a form of knowledge that could be conveyed in writing, and that could be tested experimentally, giving the same results from similar premises. Technique is a word that has been appropriated principally by the exponents of the fine arts, and is used with reference to the work of sculptors, poets, painters, writers, and actors, and in every case it means the distinctive finish of the work, the result of their method, and talent, and although it forms the chief object of criticism, it cannot be acquired by any amount of reading, and is thus completely distinct from science. Technique is the strict equivalent of art and craft, it is the same thing expressed in words of Greek, Latin, and Saxon origin, and although nearly related to science the idea is quite distinct. For example, one may read all that can be written about hammering a nail, handling a saw, wheeling a barrow, riding a horse, or swimming, without acquiring any one of these arts, but the most illiterate man may become expert in them all by a sufficient amount of practice. A technical school is literally one where science is not taught; a school where science and craft

are mixed is a trade school, and to organise a trade school properly the most important directing influence should be that of men having an intimate local knowledge of the trades intended to be taught.

The confusion of the terms technical and scientific are exemplified in two institutions in the Bombay Presidency. In the College of Science, Poona, various physical sciences are taught, and illustrated by means of work in wood and metals for the training of engineers of roads, bridges and canals. In the Victoria Jubilee Technical Institute, Bombay, various physical sciences are taught, and illustrated by means of work in wood and metals, for the training of students in mechanical or electrical engineering and textile work. It is not easy to guess on what basis the titles of the two institutions were chosen, but they illustrate the popular acceptance of the terms science and technique. In Manchester, at the present time, a project is being discussed for the establishment of a technical library. A library of applied science is probably what is meant.

The cause of the present state of technical education in India is traceable to the constitution of the Educational Department which is controlled by University men, whose ideas of education are so built upon reading and writing as a foundation that they have overlooked the true relation of technique to science in a country whose industrial training is still in a very backward condition. In every other country, which has reached any industrial eminence, the knowledge of handicraft preceded by many generations, that of reading and writing. Even in Japan, which is so often referred to as an example for India, reading and writing only became common property about 50 years ago, and even at that time the Japanese craftsmen were a century ahead of the Indian workmen to-day.

Of the leading countries in Europe the same story may be told. Craft reached a high development before literacy was needed and yet, in spite of all past experience, the Indian Government through its Educational Department has attempted to improve the technique of the people through literary channels. It was expected that the young men coming out of the scientific and technical schools would become teachers among the men they would ultimately control, but this did not happen. The scientific training the students received generally increased the mental distance between supervisor and workman. The students had not been taught to teach. In the meantime, and quite unofficially, real technical education has been introduced and was being successfully imparted to the native workmen in the railway and other workshops under European supervision, and the training, being limited to the work the men were paid for, was a success from the beginning. The foremen were not trained teachers, but they knew the work and were responsible for its execution, so the men increased in wage value and learned orderly habits. Success was inevitable, for the teacher knew exactly what was wanted and taught nothing else. This was a good beginning, but it must be improved upon,—a subject to which I shall presently come.

When lay assistance was required for the management of trade schools the Educational Department was not fortunate, for the persons chosen to control these schools were chiefly remarkable for their lack of technical knowledge. Lawyers, doctors, civil servants, merchants are appointed; they carry out the business of the school, and look after the finances, but the important matters of technical instruction are left with the masters, who are frequently very ill-prepared for their duties. If they have been brought from Europe, they naturally want to carry on the work as they have done in their own country, regardless of the enormous differences that exist between the foreign and the Indian student and between the actual industrial requirements of the two countries. In such matters the committee or board should be able to furnish the necessary guidance and control, directing the teacher's efforts to the most immediate need of the crafts represented in the school. The ordinary committee man, who can only regard technical education from a scientific or literary point of view, cannot understand that a sound training in handicraft may be given to a man who cannot read and write. No man can safely meddle with technical education in India who does not know practically the details of at least one trade as exercised both in India and in Europe, in order that the defects in Indian methods may be corrected. This intimate knowledge is necessary, because an inexperienced committee man is liable either to overlook defects in technique, or to propose reforms

that are premature or unsuitable. Is it any wonder if the men who know refuse to sit in committee with the men who do not know? There is also observable among inexperienced men a deplorable disposition to multiply subjects of instruction without any assurance that a competent teacher is available. This has been disastrous in several instances. Lack of knowledge of technical matters is especially noticeable in the speeches of prominent men, delivered on public occasions, such as the opening of a new school or the distribution of prizes. They will talk of the advantages of scientific knowledge, the increase of wealth due to technical training, the utilisation in the country of raw products and, sometimes, even of the dignity of labour; but of real technical matters not a word. And the audience departs not only no wiser, but with a false idea of the subject. The very worst friend of technical education is he who collects the programmes of the most advanced scientific educational institutions in Europe and America, and presents them, in his best literary style, as models to be followed in India. He would repeat, if he were allowed, the errors of the so-called higher education, some of whose results are in such unpleasant evidence to-day.

Technical education has no necessary connection with elaborate buildings containing marble slabs on which the name and virtues of the founder are conspicuously inscribed. Any shed that is of sufficient size and is properly lighted, ventilated, floored and drained is good enough for the purpose. So many schools and so many teachers are required that anything but the simplest of buildings would savour of extravagance.

An educational programme for India should have a very definite object, especially if the subject be technical. The object is to improve the efficiency of the native craftsmen so that he may turn out more and better work and get a better return for his labour. To carry out the programme it will be necessary to know very clearly what are the defects of the workman, what is the knowledge that he most needs, and how much of this most necessary knowledge can be imparted to him, and assimilated, during the time available for his instruction. We seem already to have drifted a long way from the imposing studies of the scientific universities of other countries, but we are getting nearer the mark. In instructing the Indian workman it is also well to remember that he can only take in a limited amount of new knowledge per generation; there is, therefore, all the more need to discriminate in the choice of subjects.

The success of technical instruction in railway workshops suggests an extension of the system by which the foreman might receive a special course of instruction that would improve him as foreman or qualify him to be a teacher in a primary technical school. The carpenter may be taken as a familiar example. He might be selected between the ages of twenty and twenty-five, after having given proofs of his intelligence and ability as a workman, and, as the chief defects of the native workman are carelessness as to measurements and neglect of his tools, the pupil would be instructed in cutting edges with tests as to their working value, the sharpening and use of various saws, the construction of labour-saving devices of wood, simple calculations of quantities and hand sketches with dimensions as working drawings. An important part of his training would be the art of demonstrating with the aid of the blackboard various familiar processes in carpentry. For example, he might represent a jack plane, a saw, a centre bit or even a paring chisel and describe its construction and the reasons for the shape of each part in such a simple language as would be familiar to men of his class. There are reasons for every movement in handicraft, but Indian foremen are rarely able to tell them. A simple course of plain geometry, conveyed as much as possible by means of the plumb-level and tape measure and applied to the school building, would complete the course which could be mastered in from six to eight months. These men should be able to read and write, but they should be able to teach without the aid of books, because most of their pupils will be illiterate.

As the quality of any manufactured article depends on the ability and discipline of the workmen, who are generally illiterate, and who have rarely served any serious apprenticeship, the training of foremen is a matter of great importance. These men would have to be maintained during their period of training, and I have reason to believe that among the Native Chiefs and the wealthy Indian employers sufficient



funds could be raised for the fees of the normal training school and the support of the pupils they would send. The course of training just indicated may seem meagre to a man of European experience but, compared with the mental equipment of the average native maistry, it represents a considerable step on the road to efficiency and it is probably quite long enough to start with. It has, moreover, this recommendation, that while it improves his efficiency in his own line it does not tempt him out of his proper groove towards clerical employment. There is, however, one serious difficulty in the way of this project. There is, so far as I know, no normal training school in India for instruction in handiwork. Attention has been principally directed to the training of masters. This may probably account for my experience in the many technical and industrial schools I have visited. I did not find one saw in good condition, the grindstones with one exception were all in very bad order, and I did not find any of the wooden screw vices of the pattern that are still common in England and are especially suited for Indian workmen on account of their cheapness. What kind of training can the teachers have had to allow the tools to get into such a state, and what is the value of the Inspector who tolerates such slovenly teaching?

The subject of technical instruction cannot be left without reference to the primary training of children of the labouring classes. What should they learn? If we may rely on the evidence of Mr. Nesfield, Director of Public Instruction in the North-West Provinces, the three R's were not of much use. He found that primary education made the children of cultivators less contented with their lot in life, less willing to work and more litigious. He persuaded 1,087 old pupils who had left school for some time to present themselves for examination, and of these, 16 per cent. passed in one or more simple subjects (reading, writing and arithmetic) and in one or other of the three more difficult grades, while the remaining 84 per cent. failed to pass in any one subject. The instruction given them appears to have been of no use in their daily work, and they forgot their schooling as people forget the things they do not practise. Education did not make them better agriculturists, because their instruction did not include anything directly bearing on agriculture. It was also made clear that the short receptive period of the lives of these youths had been sacrificed to a system borrowed from another and totally different country. This incident took place 24 years ago and although object lessons have since been introduced, rendering the tuition more interesting, reading and writing continue to be taught to, and forgotten by, the bulk of the pupils. The teaching of five boys to read, in order that one might remember the art, indicates very peculiar ideas on the subject of education.

The primary trade school can only be opened after teachers of handiwork have been trained in a special class and, taking wood-working by way of example, they should be able to teach the following subjects:—

Freehand drawing and arithmetic as applied to the carpenter's craft. The use of the foot rule in correct measurement.

The reading of the clock.

The use of the mallet and chisel as an introduction to the study of cutting edges.

The use of the saw for exact work, *i.e.*, cutting out a pencil line on both sides of a piece of wood. This is soon acquired when the saw is in good adjustment. The exercises should include working with the saw in the usual state, comparing the time occupied in doing the same amount of work with each saw. As the saw is the most neglected tool in the kit of an Indian workman, special care should be given to this subject. The pupil would finally learn to sharpen and set the teeth of saws.

The systematic grinding and whetting of cutting tools would follow with a comparison of the time used at the grindstone and at the flatstone (*lisano*) generally used. Edges sharp and dull would be examined by a watchmaker's lens and comparative working tests would be made of sharp and dull tools.

Tests of the strength of wood. These are made with various samples of wood of similar size, resting on supports and loaded in the middle with a bag filled with stones, until they break. Instruction should, at the same time, be given on the qualities of the samples tested.

The holding power of nails and screws. The lesson is taught with the aid of a nail-puller and a bag of stones, the wood being held in a vice. Experiments are

made with bright and rusty nails and with screws. Screws, as driven in India, have often less holding power than nails. In this lesson the shape of the point of a screw-driver is explained.

The correct use of planes and their adjustments. This work is taught partly by demonstration at the blackboard and partly by graduated exercises.

The fitting of handles to hammers and chisels. If one may judge by ordinary examples, this subject calls for definite instruction of a simple kind.

Every school should possess examples of wood working machines, made principally of wood to show how much a carpenter may do for himself in making machines of precision. I have, for many years, used a lathe, made principally of wood, in which sawing, screw-cutting and dovetailing is done, besides all the usual work.

A short course of applied geometry will be required in which it will not be necessary to talk of Euclid or the Law of Gravity. The making and testing of a wooden square, a straight edge and a plumb-level, the fixing of hinges three in line (as on a door) and exercise with square, plumb-level and tape measure upon the walls, doors and windows of the workshop, properly explained, should form an introduction to the carpenter's art and a safeguard against many vague or erroneous notions which beset the ordinary worker in wood. This instruction should also render him more observant of any further useful knowledge that might come in his way; it would not be likely to run to waste, for it would all be required by the future workman.

The most successful exponent of technical instruction that I know in India is Mr. Alfred Chatterton, Director of Industrial and Technical Inquiries in Madras. When he introduced the manufacture of aluminium into India, he made no conditions of literary accomplishment in his technical school. He took in such workmen as wished to learn, devised tools of the cheapest and roughest appearance, but which were effective, and afforded the workers every encouragement and assistance when they left, to work on their own account. The success of this aluminium industry needs no further detail. His weaving school is on an equally non-literate basis, and his latest enterprise in boring for water by means of which he has discovered enormous supplies, exceeding in many places the needs of the farmers, will be a standing memorial to his intelligent appreciation of the practical needs of the people. It is impossible at the present time to estimate the benefit he has conferred on the district—not by finding out how to bore for water but by prevailing on a very conservative people to adopt the system and to purchase oil-engines and pumps to lift the water.

India has yet to recover from an educational impulse in the wrong direction. Reading and writing, which have been of incalculable value to certain classes, are not of use to all, and they become positively pernicious when they entice young men away from a sure living by handiwork to the overcrowded ranks of clerical labour. A time will come when literary knowledge will be necessary to the whole population of India, but that is the affair of posterity.

I have endeavoured in the foregoing remarks to prove that no suitable education has been provided for the large class of workmen on whose competence the quality of India's products principally depends, and that many of the attempts that have been made to improve the craftsman have defeated their own ends by teaching the wrong subject and attempting too much. Employers of labour in India, who know the work they command, can all tell how very little special knowledge would be required to increase to a considerable degree the wage value of their men, and how a logical habit of thought, which can be acquired at a very early age, would enable them to continue their education, by habits of observing, throughout a life-time. Education for the masses has been tried for many years, with singular unsuccess if we may judge by results and it is certainly not because the pupil cannot learn. A new class of teachers is required, with special training, to meet the real needs of the working community, and no man should be allowed to undertake class work who cannot furnish proofs of his ability to teach. An incompetent teacher of craft, however clever he may be as a workman, will simply help to perpetuate the faulty methods, the bane of India's industries, which it is the chief object of technical education to remove.



## 10. G.O., No. 2112, Revenue, dated 3rd August 1908.

## ADMINISTRATION REPORT OF THE DIRECTOR OF INDUSTRIAL AND TECHNICAL INQUIRIES FOR THE YEAR 1907-1908.

READ--the following papers :--

(1)

*Letter*—from A. CHATTERTON, Esq., Director of Industrial and Technical Inquiries in the Madras Presidency.

*To*—the Secretary to the Board of Revenue (Revenue Settlement, Survey, Land Records and Agriculture).

*Dated*—Madras, the 18th May 1908.

*No.*—383-A.

I have the honour to submit the following administration report upon the work in progress under me as Director of Industrial and Technical Inquiries in Madras during the official year 1907-1908. The appointment was sanctioned by the Secretary of State for five years, dating from 16th August 1906, so that this report will deal with the first complete year the scheme has been in operation.

2. Since February 1901 I have been on special duty to develop Indian industries and for seven years the policy of direct Government intervention to foster industrial development has been upon its trial. The work was at first carried on in the Educational Department, but gradually it was found expedient to transfer it to the Revenue Department, and now it is only as Inspector of Technical Schools that I am in any way connected with the Educational Department. As a matter of fact those educational institutions which in this Presidency have any pretension to be technical schools are not under me, and it is only the industrial schools which I have to inspect. The work done in these schools is with the object of improving the handicrafts of the Presidency, and the logical outcome of the movement in favour of industrial development will be the transference of these schools from the Educational Department to the Revenue Department in the branch which deals with industrial and technical developments.

3. During the year under review there has been a good deal of enquiry and investigation into the possibility of taking up new industrial lines of work, and at the same time considerable progress has been made in each of the several branches of work started in previous years. These include the development of the chrome process of tanning in India, the investigation of measures for improving the handloom industry and the encouragement of the use of oil-engines and pumps for irrigation. From the beginning this new method of lifting water involved questions relating to the subterranean supply, and at the end of December 1907 the control of the Experimental Boring Operations in the Ponnéri taluk was placed under me.

4. From the time when I was first placed on special duty in 1901 up to the end of February, 1908 my office and workshops were in the School of Arts and, until the arrival of the recently appointed Superintendent of the School of Arts, I was either directly in charge of that institution, or it was under me as Inspector of Technical Schools. Early this year the chrome tanning was transferred to the new Government Tannery, which has been fitted up at Sembiam, and my workshops and offices were moved to the old Ice Factory in the Poanamallee Road, so that, before the close of the official year, my connection with the School of Arts was completely severed.

5. During the year under review, as will be seen in subsequent sections of this report, there has been a large increase in the work of the central office. To enable me to cope with this an Assistant to the Director was sanctioned and Mr. K. T. B. Tressler, B.Sc., an Assistant Engineer in the Public Works Department, took up the new appointment on the 6th January 1908, and up till now he has been in charge of all the work pertaining to the Chrome Leather Department outside the Tannery at Sembiam. In addition he has superintended the transfer of the workshops to the new premises and has been engaged on a series of brake tests on the three types of oil-engine which are considered suitable for irrigation by pumping. From the 13th of August to the 13th of September my services were placed at the disposal of the United Provinces Government and I attended the Conference which was summoned

by the Lieutenant-Governor at Naini Tal to draw up proposals for the development of the industries of those provinces.

6. The expenditure during the year is shown in detail in Appendix I and may be conveniently summarised under the following heads :—

|                                                                  | RS.      | A. | P. |
|------------------------------------------------------------------|----------|----|----|
| 1. Office of the Director of Industrial and Technical Inquiries. | 30,452   | 0  | 1  |
| 2. Chrome Tanning Department                                     | 88,727   | 12 | 7  |
| 3. Weaving Department                                            | 15,023   | 13 | 6  |
| 4. Pumping Department                                            | 16,353   | 1  | 6  |
| 5. Exploration for water                                         | 5,091    | 3  | 9  |
| Total                                                            | 1,55,647 | 15 | 5  |

In addition to the above figures there was capital expenditure on the new Tannery at Sembiam amounting to Rs. 41,863-12-4, making the total expenditure Rs. 1,97,511-11-9. Against this expenditure there were receipts in the Tanning Department amounting to Rs. 85,357-3-9, in the Weaving Department to Rupees 10,536-8-2, in the Pumping Department to Rs. 23-13-9 and for boring work Rs. 29-8-0. This makes the total expenditure by Government during the year Rs. 1,01,564-10-1. Of this amount Rs. 51,174-14-5 may be regarded as net expenditure made up of the following items :—

|                                                                  | RS.    | A. | P. |
|------------------------------------------------------------------|--------|----|----|
| Office of the Director                                           | 30,452 | 0  | 1  |
| Weaving Department                                               | 2,044  | 12 | 7  |
| Pumping Department                                               | 16,329 | 3  | 9  |
| Boring work                                                      | 5,061  | 11 | 9  |
|                                                                  | 53,887 | 12 | 2  |
| From this must be deducted the profit in the Tanning Department. | 2,712  | 13 | 5  |
|                                                                  | 51,174 | 14 | 9  |

and the balance Rs. 50,389-11-4 is capital expenditure which will ultimately be recovered and which is made up of the following items :—

|                                                    | RS.    | A. | P. |
|----------------------------------------------------|--------|----|----|
| New Tannery at Sembiam                             | 41,863 | 12 | 4  |
| Increased stock in trade in the Tanning Department | 6,083  | 6  | 3  |
| Do. do. Weaving Department                         | 2,442  | 8  | 9  |
| Total                                              | 50,389 | 11 | 4  |

In addition to the expenditure of public funds as shown above, the Pumping Department fitted up installations which are approximately valued at Rs. 80,000 and further for private firms machinery and plant to the value of Rs. 20,000 has been purchased and its erection supervised. Lastly attempts have been made to establish private Chrome tanneries at Salem and Coimbatore and the technical management of this plant has been entirely controlled by one of the subordinates of the Tanning Department. The sale-proceeds of leather in these tanneries amounted to more than Rs. 6,000 during the year.

7. To sum up the somewhat complex figures briefly, we have spent during the year about 3 lakhs of rupees, of which one-third has been capital outlay on productive works with funds furnished by private persons and we have recovered by the sale-proceeds of articles manufactured nearly a lakh of rupees. The total net expenditure of public funds was over a lakh of rupees, of which Rs. 50,390 may be regarded as recoverable. The balance really represents the amount spent by Government in opening up and developing the natural resources of the Presidency.

8. During the year under review industrial work has been confined to the Chrome Tanning and Weaving Departments, but a good deal of time has been devoted to collecting information with a view to starting new industrial enterprises in the future. It is by no means an easy matter to discover work which Government may legitimately take up. Something may be done, as in the case of hand weaving and metal work, to improve indigenous industries, but no great results can

be expected from efforts in this direction. The artisans are very ignorant and possess but a limited range of ideas so that they are badly equipped to meet the competition of modern scientifically organized factories. Cottage industries are of no practical importance in India and all efforts to introduce subsidiary occupations have egregiously failed. On the other hand it is possible to successfully establish new industries when there are special local inducements. These exist in the case of cotton, jute, leather and wool which are raw products that can be worked up into manufactured articles for which there is a local demand or for which there is a foreign market. Where there is mineral wealth mining flourishes as in Bengal, Mysore and the Central Provinces, and all over the country the demand for repairs and renewals enables numerous mechanical engineering establishments to be kept going. In Anantapur, Dharwar, Vizagapatam and other districts extensive exploratory mining work is being carried on; and there is plenty of evidence that capital freely flows into India. Most of the obvious industries have been started, and new lines of development can only be discovered by patient and careful study of the resources of the country in respect to the wants of the people or the prospects of markets abroad. 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 scrutinized and definite information obtained that they are available in sufficient quantity at reasonable prices and of the requisite quality. Then the necessary capital outlay must be accurately forecast, and finally it must be ascertained that there is an outlet for not only the main product, but also for all the bye-products of the factory. Most industrial undertakings depend on other pre-existing industries, and if these have not been established in India the necessity of importing material is a severe handicap. In the Madras Presidency agriculture is the main source of the wealth of the people, and the brightest hope of the future lies in the direction of improving the methods of culture, the introduction of new crops and the working up into finished products of the yield of the soil. There is no great abundance of minerals except rather low grade iron ores, the value of which is almost nil in the absence of coal deposits. Water power is scarce except along the Western Ghâts and even there in most cases expensive storage works are essential to a regular supply. Our most valuable assets are enormous areas of forest growth from which an abundant supply of timber suitable for fuel could be obtained, cheap labour and a keen mercantile community which, however, requires much education before it can hope to engage with success in manufactures on a large scale. Capital is not lacking, but there is an almost complete absence of men qualified technically and commercially to handle manufacturing enterprises. The larger industries are almost entirely managed by Europeans and the capital invested in them is mostly in the same hands. To begin with the people must be taught to hoard less and invest their savings in well established concerns in the management of which they may gradually take part and thus gain experience which will be invaluable to them when they try to run alone. At present the manufacturing instincts are weakly developed and there is a vast field for Government intervention in the way of pioneering work. Men have to be trained and concrete examples of successful industries slowly built up. At the outset progress must necessarily be slow as we have to feel our way but already something material has been accomplished and experience accumulated which should render progress more rapid in the future.

9. A brief retrospect of what has been done will perhaps be the best justification of the policy it is proposed to follow in the future. At the end of 1897 aluminium was procured from England with a view to testing its suitability for Indian requirements and in the hope that the demand for it would ultimately be sufficient to justify the establishment of electro-metallurgical works for its extraction from local material. In the course of six years a considerable business was built up and it was then transferred to a company which is in a flourishing condition at the present time. Fully 25 lakhs worth of aluminium goods have been manufactured in Madras and the processes of metal working employed in the factory of the Indian Aluminium Company are in no respect inferior to those in similar factories elsewhere. So far as it goes the venture has been a success but the crowning achievement of making the metal itself in the country has yet to be accomplished. During the last four years attention has been directed to the

manufacture of chrome leather and as will be seen in a later chapter of this report the successful establishment of this industry is fairly in sight and by the general use of this leather a great economy in the consumption of raw hides will be effected which will result in a material increase in the volume available for export. Since 1901 the hand-loom weaving industry has been the subject of many experiments and though no great advance can be recorded a great deal of useful work has been done which may ultimately lead to a marked improvement in the condition of the weavers.

10. In 1902 experiments were first started in lifting water by means of oil-engines and pumps and from the small beginning at Melrosapuram an important development in the water-supply of the country has resulted. Upwards of one hundred engines and pumps of various sizes have been installed and vast bodies of underground water are being explored and opened up by the use of boring tools. Several thousand acres of the best cultivated land in the Presidency have been brought into existence and the profitable nature of the work is best indicated by the rapid recent growth of this way of lifting water. Lakhs of rupees have been devoted to the erection of pumping plants and the improvement of the land, and where water in sufficient quantity exists the returns have been of a most encouraging nature. Of late it has become increasingly evident that there is a wide field for the employment of modern machines driven by oil-engines in preparing agricultural produce for the market and though as yet little has been accomplished there is no doubt that if carefully fostered it is capable of great expansion. What is wanted, to aid progress almost more than anything else, is that the pioneers in these matters should be able to secure at moderate cost capable and disinterested advice regarding the machinery they desire to purchase. To enable this to be given experience must be acquired and experimental work in this direction has been started, chiefly so far with the different types of oil-engines and suction gas producer plants which are on the market.

11. Government possesses almost a monopoly of the scientific skill and experience which is available in this country for the investigation of new projects. Not that there are not many good men in private employ, but their time is so fully occupied that they may be regarded as unavailable for investigation work. It is the misfortune of India that the profits of manufacturing enterprise are withdrawn from the country to a very large extent with the result that there are few capitalists who can afford to devote large sums of money to investigations which may end in no practical result. Such work is usually outside the sphere of joint stock companies, and, though often taken up by private syndicates, it is nearly always in a small way and of a highly speculative character. Bombay in this respect differs from other parts of India. The merchants are wealthy and some of them are enterprising so that they both can and do embark on schemes which require much preliminary enquiry and negotiation. The iron and steel works to be shortly started in the Central Provinces and the scheme not yet fully matured for supplying Bombay with hydro-electric power are both heroic examples of the efforts necessary to place India in line with the rest of the civilised world in regard to the development of its internal resources. What can be done through the agency of the State is well exemplified by the Cauvery power project of the Mysore Government which was carried out under extremely favourable conditions which in no way, however, detract from the success which has been achieved. At the Periyar Lake there is abundance of water power, but the discharge through the tunnel being entirely regulated in the interests of irrigation, no continuous supply of water can be guaranteed and as yet it has not been found possible to evolve a practicable scheme for its utilization. The real difficulty however is undoubtedly the absence of large prospective consumers of power. If irrigation by pumping develops as it now shows some promise of doing, it is not unlikely that in a somewhat distant future the Periyar water power transmitted electrically may supply energy to thousands of pumps and the area of irrigation dependent on this great lake be enormously extended.

12. For the present our work seems to clearly lie in bringing into use internal combustion engines as sources of motive power and our attention is concentrated on encouraging the use of oil-engines for small units and suction gas producer



plants for larger. The former are worked with liquid fuel for a supply of which we are dependent upon the Asiatic Petroleum Company who import it from Borneo and Sumatra. The best fuel for the latter is anthracite coal but charcoal serves nearly as well and of this Madras is capable of producing far more than is ever likely to be required. The charcoal is still manufactured in a most primitive way and no attempt is made to collect the bye-products which in reality are more valuable than the charcoal. In Madras city there are already a number of suction gas producer plants at work and it is quite likely that at no distant date there may be extreme difficulty in getting sufficient charcoal for them. This would be a great misfortune and to prevent it a scheme for the dry distillation of wood is being worked out which it is hoped will offer prospects of a sufficiently remunerative character to justify Government furnishing the capital to carry it out. The casuarina plantations which fringe the coast to the north of Madras are the proposed source of wood and a sample lot of ten tons which was sent to England for analytical experiments there has yielded very favourable results. By the carbonization of 12,000 tons of wood in iron retorts we expect to obtain—

|                                                          | Rs.      |
|----------------------------------------------------------|----------|
| 3,500 tons of charcoal, estimated to be worth...         | 70,000   |
| 54,000 gallons of wood spirit, estimated to be worth ... | 81,000   |
| 540 tons of tar, estimated to be worth ...               | 21,600   |
| 700 tons of acetate of lime, estimated to be worth ...   | 63,000   |
| Total ...                                                | 2,35,600 |

That is to say each ton of wood will yield products worth nearly Rs. 20, and, as the cost of growing the timber is certainly less than Rs. 5 per ton, it will be evident that there is a large margin for working expenses and for interest and depreciation charges on the capital outlay. Casuarina plantations are known to yield from 3 to 4 tons of wood per acre per annum so that an area of only 5,000 acres would easily supply all the wood required. The quantity of firewood burned in Madras averages 120,000 tons per annum so that there ought to be no great difficulty in arranging for the supply required by this factory. Enquiries are now being made regarding the markets in which the various products can be sold and it seems certain that the estimates given above can be realized. From actual experiments made in Madras we have proved that a ton of charcoal will yield 1,600 brake horse-power hours and as the factory will provide more than 10 tons per working day it will provide sufficient fuel for engines aggregating 2,000 brake horse-power. The disposal of the methyl alcohol or wood spirit has directed our attention to the possibilities of alcohol as a source of motive power and there seems to be some prospect that we may profit by the work now being done in France and Germany in this direction. Alcohol is likely to prove a formidable rival to petrol and the price of this latter spirit will be kept within reasonable limits lest it be supplanted by the products of local distilleries just as liquid fuel is kept down in price by the tendency to use charcoal in suction gas producer plants.

13. It is not an unimportant part of the work of the Director of Industrial and Technical Inquiries to supply technical and commercial information to those who are anxious to embark on all sorts of industrial undertakings. This work is all done gratuitously and in most cases the assistance which can be rendered is of a very general character. There are no Consulting Engineers in Madras and merchants have great difficulty in preparing plans and estimates for even the smallest industrial undertakings and much money is wasted in unsuitable plant and bad general arrangements. Advice given gratis is seldom appreciated and better results would probably accrue if fees were charged for the work done, and, as the demand for help grew, the technical staff of the office was correspondingly strengthened. Obviously it will be impossible to give expert advice on every conceivable subject, but in almost every undertaking the services of an Engineer are required and much useful work could be done by placing at the disposal of the public the very miscellaneous engineering experience which is gradually being accumulated. Much machinery is made and offered for sale in India which really is not suited to the requirements of the people and the many failures which are written broad over the face of the country deter further attempts in this direction. The thorough

examination and testing of machinery of all kinds to determine whether it is suitable or not for the purposes intended is a most useful branch of our work and as already mentioned a beginning has been made in this direction. Experiments have been made with sugar and oil mills with very satisfactory results in the former case but with unsatisfactory results in the latter. Messrs. Parry & Co., the Agents of the National Gas Engine Company, have placed one of their engines at our disposal for more than a year and the tests made on it have been of a satisfactory nature and we are able to recommend it along with the Hornsby engine as a suitable motor for general work and for pumping in particular. Lately we have received through Messrs. Oakes & Co. a Crossley oil-engine and that will shortly be subjected to similar tests. The detailed results will be published in the Scientific Report for the year which will be published later on. Similarly there are numerous gas engines and suction gas producer plants and a number of these by different makers have been under observation and subjected to specific trials. Good results have been obtained from plants made by the following firms:—

Messrs. Crossley Bros.,  
The Hornsby-Stockport Combination,  
The National Gas Engine Company, and  
Messrs. Tangye & Co.

There may be others which are equally good but as yet there has been no opportunity of gaining experience with them.

#### CHROME TANNING DEPARTMENT.

During the year under review the Chrome Tanning Department has made considerable progress inasmuch as—

- (1) the work is now carried on in the new Tannery at Sembiam which has been specially equipped for chrome tanning;
- (2) there has been a large increase in the sales of chrome leather;
- (3) the department has been worked at a profit.

Government having ordered that tanning should be given up at the School of Arts, a careful search was made round Madras for a suitable site for a tannery and finally an old native tannery in Sembiam, which was for sale, was selected. Its purchase under the Land Acquisition Act was sanctioned in G.O., R.D., No 2109, Mis., dated 21st August 1907, and when it was decided that all the liming and unhairing work should be done in the tannery and not as heretofore in private yards, a revised estimate amounting to Rs. 52,350 was sanctioned in G.O., No. 341 W., dated 10th March 1908. The premises were handed over to us on the 28th September 1907, and their reconstruction at once taken in hand. Owing to the wet weather and the alterations in the plans which were rendered necessary by the dilapidated condition of the buildings the transfer of the machinery and plant in the School of Arts could not be effected till the beginning of February and tanning work was only started in March and even now at the date of writing this report the building operations have not been completed and some of the new machinery has not yet been got to work. The capacity of the tannery is about double our present requirements, but, if the business continues to grow at the same rate in the future as it has done during the last 12 months, it is pretty certain that the full capacity of the tannery will be reached next year. Motive power to drive the tanning drums and the finishing machinery is furnished by a 24-h.p. National Gas Engine supplied with gas from a suction gas producer plant worked with charcoal. So far this engine has given great satisfaction and the fuel consumption appears to be very moderate being under 25 lbs. of charcoal per hour, the cost of which is about 4 annas. Six new tanning drums, 8 feet in diameter and 4 feet wide, have been added to those which were already at work in the School of Arts and a suitable equipment of modern machinery for finishing off chrome leather has been obtained from England. As no machines have ever been employed in a tannery in the south of India before, I was afraid that we might have some difficulty in getting suitable workmen to handle them, but these apprehensions have proved groundless as with the single exception of the splitting machine they are all now in use and working most satisfactorily. The splitting machine will be brought into use as soon as the



Tanning Assistants have time to devote to its somewhat complicated adjustments as, unless it is in perfect working order, it will spoil and not split hides.

2. For a chrome tannery a very large supply of water is required and at Sembiam the quality has unfortunately turned out less satisfactory than the preliminary analyses led us to expect. The water is raised by a 2" centrifugal pump driven by an electromotor supplied with current by a dynamo driven directly off the gas engine. A large iron storage tank has been erected at a sufficiently high level to get a complete water service to all parts of the tannery. The large draught of water from the well has apparently exhausted the upper sub-soil water and that which we now obtain is very hard. As the great bulk of our work is tanning leather for kavalais and sandals this is not a very serious matter, but it will preclude our attempting the manufacture of high class finished leathers. It is quite possible that after the next monsoon the quality of the water may materially improve, but if not a water-softening plant will materially reduce the trouble or a deep boring may reveal a better supply of water at a lower level.

3. The total sales of chrome leather during the year amounted to Rupees 85,520-12-4, whilst in previous years they were—

|           | RS.    | A. | P. |
|-----------|--------|----|----|
| 1904-1905 | 4,779  | 5  | 6  |
| 1905-1906 | 29,700 | 3  | 9  |
| 1906-1907 | 51,770 | 4  | 8  |

The increase in sales is highly satisfactory, as it is mainly due to a very much larger demand for leather for kavalais and sandals. The following statement compares the outturn of the Leather-manufacturing Department with that of the previous year:—

|                 | 1906-1907. | 1907-1908 |
|-----------------|------------|-----------|
| Boots, pairs    | 3,143      | 3,551     |
| Shoes "         | 590        | 668       |
| Sandals "       | 4,132      | 19,405    |
| Slippers "      | 436        | 552       |
| Hand bags       | 20         | 214       |
| Harness, sets   | 7          | 6         |
| Belting in feet | 1,554      | 2,529     |
| Kavalais        | 156        | 234       |

The very large increase in the number of sandals is partly due to chrome leather sandals having been adopted by the Salt Department and to a large trial order from the Police Department. These two orders account for 9,355 pairs as against 319 pairs in the previous year. The remaining increase represents only in part the extent to which the people of this Presidency are taking to chrome leather sandals as considerable quantities of leather are now sold to native chucklers who manufacture the sandals themselves. Chrome leather has proved so extremely satisfactory for sandals that it has firmly established itself in this direction, and I look to a rapid growth in this part of the business. Similarly the increase in the number of kavalais sold gives no indication of the increase in the number of chrome leather kavalais in use, as the ryots prefer to purchase the tanned hides and get them made up locally. The use of chrome leather has spread most rapidly among the ryots of the Chingleput district and I attribute it partly to the success of the boring operations which are going on in the Tiruvallūr and Ponnéri taluks. This work is keenly appreciated by the ryots and has led them to view any suggestions made by my subordinates with rather more favour than is customary. The result is that chrome leather has been given a fair trial and having proved an unqualified success has practically supplanted vegetable-tanned leather. Gradually the use of this leather is solidly spreading northward and westward and by the opening up of facilities for procuring it, a very great increase in the sales should be effected. Experience however shows that such work can only be done slowly if it is to be done economically. All attempts to extend the demand by sending round travellers have proved unsuccessful as the business done was incommensurate with the expense incurred.

4. In Appendix I is furnished the profit and loss statement of the Tanning Department for the year. From this it will be seen that the operations have resulted in a net profit of Rs. 2,712-13-5 as compared with a loss of Rs. 4,518-6-5 in the previous year. This satisfactory result is attributable to the larger scale on which

operations were conducted, the more favourable rates prevailing for raw material and to the increased experience of the Assistants in the Tanning Department. Of the work done by Mr. N. S. Tiruvenkatacharri, M.A., who is now the Superintendent of the Sembiam Tannery, I cannot speak too highly and I feel confident that when he has a more extended experience in the management of a large factory he will do very well in an independent position.

5. During the year there were 37 students admitted into the tannery and the number would have been much larger had it not been found advisable to limit the number on the register at any one time to 12. A fee of Rs. 5 a month was charged and the total amount realized was Rs. 685 as against Rs. 407-8-0 in the previous year showing that the average attendance was 11 per month and that each student spends about 14 weeks on an average in the tannery. The popularity of this tannery is evidenced by the following tabular statement showing the different provinces of India and the number of students from each:—

|                  |    |
|------------------|----|
| Assam            | 1  |
| United Provinces | 2  |
| Beluchistan      | 1  |
| Madras           | 16 |
| Punjab           | 2  |
| Bengal           | 10 |
| Bombay           | 5  |

Tanning is by no means a popular industry with the educated classes and the numerous demands for admission to the Government Tannery at Sembiam seem to me to distinctly indicate that the educated classes of this country experience great difficulty in getting into industrial concerns where they will have a fair chance of acquiring practical information. There are no classes or regular courses of instruction in the tannery as the staff competent to do such work is fully occupied, but the students have ample opportunities of acquiring a practical knowledge of the work going on and judging by the specimens of tanning they generally prepare on their own account, the majority of them do acquire a fair practical knowledge of the trade.

6. A rapidly growing part of the business is the tanning of hides and skins for outsiders. Not only are large quantities of leather manufactured in this way, but a considerable number of sporting trophies are also dressed by subjecting them to chrome tanning. The numbers of the hides and skins dealt with during the year were—

|                      |     |
|----------------------|-----|
| Tiger                | 9   |
| Mugger               | 81  |
| Deer skins           | 117 |
| Bison and sambar     | 39  |
| Panther              | 33  |
| Cow hides            | 71  |
| Buffalo hides        | 174 |
| Sheep and goat skins | 60  |
| Snakes               | 142 |
| Miscellaneous        | 114 |

7. Whilst chrome tanning as a whole has made good progress during the year, it has to be admitted that the record in some districts is a very unsatisfactory one. In last year's report I mentioned that a small chrome tannery had been started in Salem and was being worked under the supervision of Mr. Visvanatha Pillai, one of the Tanning Assistants. At first it did well, but after a time the proprietors lost interest in the matter and finally ceased buying hides. It was alleged that the leather made in Suramangalam had proved a failure, but I was never able to get clear evidence that this was the fact.

8. In May last year a number of gentlemen to evince their interest in the industrial development of the country started a small company in Coimbatore with a nominal capital of Rs. 20,000 and commenced trading as the Coimbatore Industries Limited. Their principal object was to start the manufacture of chrome leather for kavalais in the district and they did so under my advice, and during the whole of the year I placed at their disposal the services of Mr. T. S. Visvanatha Pillai. Although the nominal capital was so very small only 824 shares of Rs. 10 each were subscribed and of this amount so far only half has been called up or Rs. 4,120

has been collected. A small native tannery was rented and the tanning of hides commenced in tubs instead of drums as there was not enough capital subscribed to purchase them. During the year 1,465 raw hides and 85 skins were purchased at a cost of Rs. 6,757 and of these 606 hides and 85 skins were sold or manufactured into articles and sold realising Rs. 5,342. Considering the small capital this result was quite satisfactory but towards the end of the period the sales fell off owing to the spread of rumours that the chrome leather manufactured by the Company had not fulfilled the promises made for it. When I heard of this, I instructed Mr. Visvanatha Pillai to close down the tanning operations as soon as possible and to make a careful investigation of the results achieved. A report has been submitted to me which shows that the defects have been exaggerated but at the same time there is no doubt that some of the locally made chrome leather was of a very unsatisfactory character. The causes of the bad work are still under investigation and I have advised the Company not to resume operations till the matter is completely cleared up and confidence restored. The defects are, I think, largely due to the tanning having been done in tubs which takes a long time instead of in revolving drums. The Coimbatore ryots use cow hides, whilst in Chingleput and elsewhere buffalo hides are almost universally preferred. The thin belly parts of the cow hides are much overtanned in the tubs and consequently after a comparatively short life become brittle. This is borne out by the fact that buff hides sent from Madras have done well in Coimbatore and their use is extending slowly. Those who have tried them are sending repeat orders and efforts are now being made to get the ryots to give buffalo leather a fair trial. The Company has established a good business in articles manufactured from chrome leather and this continues. It is extremely unfortunate that all the efforts to establish a private enterprise in chrome tanning have so far proved either a complete or partial failure. This points to the fact that chrome tanning requires considerable capital so as to enable work to be done on a large scale and skilled technically qualified supervision employed.

#### IRRIGATION PUMPING DEPARTMENT.

At the beginning of the year the total number of oil-engines and pumps at work or in course of erection was 54 and, during the year, I have received information regarding the installation of 40 new engines, nearly all of them having been put down in accordance with plans drawn up in this office. This makes the total number of engines on our list which are, or will shortly be, pumping water for irrigation 94, aggregating 640 B.H.P. and driving pumps, the combined discharge of which is 2½ million gallons per hour. The duty of water under these pumps is not less than 150 acres per cubic foot per second and, assuming that the pumps work on an average 8 hours a day, the area under irrigation will amount to about 5,000 acres. The whole of this area is either double cropped or devoted to garden crops and without doubt will yield a gross return of more than Rs. 100 per acre per annum. At this low figure the annual value of the produce due to irrigation by pumping by private installations amounts to 5 lakhs of rupees. This is only a rough estimate and does not pretend to any great degree of accuracy and is only put forward to give some idea of the gradually growing importance of this method of irrigation. The following list gives the names of the owners and details regarding the new installations :—

1. A 9-h.p. engine and 4" pump for M.R.Ry. S. Panduranga Mudaliar, Cuddalore, South Arcot district.
2. A 6-h.p. engine and 4" pump at Koliyanur, South Arcot district, for M.R.Ry. Rama Reddi.
3. A 7½-h.p. engine and 4" pump at Kalinjikuppam, South Arcot district, for M.R.Ry. V. Desikachariar.
4. A 7½-h.p. engine and 4" pump at Karumampakam, South Arcot district, for M.R.Ry. Ranga Reddi.
5. A 7½-h.p. engine and 4" pump at Nellikuppam, South Arcot district, for M.R.Ry. Appavoo Padaiachy.
6. A 6-h.p. engine and 4" pump at Anichampaliem, South Arcot district, for M.R.Ry. Nallambala Chetty.
7. A 7½-h.p. engine and 5" pump at Ariyalur, South Arcot district, for M.R.Ry. V. Rangachariar.

8. A 7½-h.p. engine and 5" pump at Melrajankuppam, South Arcot district, for M.R.Ry. N. Raghavachari.
9. A 9-h.p. engine and 4" pump at Anathur, South Arcot district, for M.R.Ry. Saba-pathi Pillai.
10. A 10½-h.p. engine and 6" pump at Malligrampattu, South Arcot, for M.R.Ry. J. Dorasawmi Reddiar.
11. A 6½-h.p. engine and 3" pump at Siruvanur, South Arcot, for M.R.Ry. Dornai Raja Mudaliar.
12. A 10½-h.p. engine and 5" pump at Kavanipakam, South Arcot, for M.R.Ry. Seetharam Reddiar.
13. A 7½-h.p. engine and 4" pump at Arigilavadi, North Arcot, for M.R.Ry. Venkatasubha Reddiar.
14. A 12-h.p. engine and 5" pump at Gudiyattam, North Arcot district, for M.R.Ry. M. Govindasawmi Nayudu.
15. A 7½-h.p. and 4" pump at Mangaducherri, North Arcot district, for M.R.Ry. N. Krishna Rao.
16. A 7½-h.p. engine and 4" pump at Walajah, North Arcot district, for M.R.Ry. M. Muniswami Reddiar.
17. A 7½-h.p. engine and 3" pump at Kālahasti, North Arcot district, for Raja P. Rama Rayanagar, M.A.
18. A 10½-h.p. engine at Arni, North Arcot district, for the Jagirdar of Arni.
19. A 5-h.p. engine and 3" pump at Nallur (near Wandiwash), North Arcot district, for M.R.Ry. N. Govinda Reddi.
20. A 7½-h.p. engine at Ramaiyapattam, Nellore district, for Mr. Dastagiri Sahib.
21. A 9-h.p. engine and 6" pump at Achialpuram, Trichinopoly district, for M.R.Ry. Subbaraya Pillai.
22. A 10½-h.p. engine and 4" pump at Palathur, Anantapur district, for M.R.Ry. Venkataramanappa.
23. A 10½-h.p. engine and 3" pump at Palathur, Anantapur district, for M.R.Ry. P. Kurugodappa.
24. A 6-h.p. engine and 3" pump at Anamalai, Coimbatore district, for M.R.Ry. V. Chikka Naicker.
25. A 7½-h.p. engine and 4" pump at Ravanasamudram, Tinnevely district, for M.R.Ry. R. Sivarama Aiyar.
- 26 & 27. Two 12-h.p. engines and two 10" pumps at Mangalagiri, Kistna district, for the Atmakur Lift Irrigation Company, Limited.
28. A 16-h.p. engine at Gudivāda, Kistna district, for M.R.Ry. V. Seshayya.
29. A 5-h.p. engine and 3" pump at Alinjivakam, Chingleput district, for the Zamindari of Alinjivakam.
30. A 6-h.p. engine and 4" pump at Orakkadu, Chingleput district, for the Zamindar of Orakkadu.
31. A 6-h.p. engine and 4" pump at Punjetti, Chingleput district, for M.R.Ry. Appavoo Mudaliar.
32. A 7½-h.p. engine and 4" pump at Kaliyanur, Tiruvallūr taluk, Chingleput district, for M.R.Ry. Seetharam Nayudu.
33. A 7½-h.p. engine and 4" pump at Manjankaranai, Chingleput district, for M.R.Ry. Ramakrishna Nayudu.
34. A 3½-h.p. engine at Surapet, Chingleput district, for Messrs. T. R. Tawker & Sons, Madras.
35. A 7½-h.p. engine and 4" pump at Surapet, Chingleput district, for Messrs. T. R. Tawker & Sons, Madras.
36. A 6-h.p. engine and 4" pump at Government Farm, Hagari, Bellary district.
37. A 7½-h.p. engine at Mannadipet, South Arcot district, for M.R.Ry. Viswanatha Reddi.
38. A 7½-h.p. engine and 4" pump at Veermachampetti, Trichinopoly district, for M.R.Ry. Rama Aiyar.
39. A 9-h.p. engine and 5" pump at Anamalai, Coimbatore district, for M.R.Ry. L. Subbaraya Mudali.
40. A 32-h.p. gas engine and suction gas producer plant and 10" pump for the Gunjana Project, Cuddapah district.

2. Agricultural loans to the extent of Rs. 22,000 were granted to the following applicants during the year and there are still a large number of applications for such loans pending :—

*List of loans sanctioned from 1st April 1907 to 1st May 1908.*

|                                                                     | Rs.    |
|---------------------------------------------------------------------|--------|
| 1. M.R.Ry. Chikka Naicker of Anamalai, Coimbatore district ...      | 2,500  |
| 2. „ Ratnasabapathi Mudaliar, Tondiarpet, Madras ...                | 2,500  |
| 3. „ Appavoo Padaiachi, Nallikuppam, South Arcot district ...       | 3,000  |
| 4. „ V. Desikachari, Tiruvendipuram, South Arcot district ...       | 3,000  |
| 5. Zamindarni of Alinjivakam, Chingleput district ...               | 1,500  |
| 6. M.R.Ry. Bama Aiyar of Viramachampatti, Trichinopoly district ... | 4,000  |
| 7. „ Paramasiva Gounden, Vadakariattur, Trichinopoly district ...   | 500    |
| 8. „ L. Subbaraya Mudaliar of Anamalai, Coimbatore ...              | 5,000  |
| Total ...                                                           | 22,000 |

3. The bulk of the engines and pumps have been purchased from Messrs. Massey & Co. on the hire-purchase system, the terms of payment usually being one-fourth of the cost when the agreement is signed and three subsequent instalments of one-fourth of the cost at intervals of six months, interest being charged on the balance due at the rate of 8 per cent. per annum.

4. The centre in which oil-engine irrigation is most rapidly developing is the South Arcot district where there are now 33 engines and pumps at work. The reason of this is that the soil is fertile and there is a very abundant supply of water in beds of coarse sand lying from 10 to 15 feet below the surface of the ground. To the north of Madras the boring operations in the Ponnéri and Tiruvallūr taluks have revealed extensive supplies of sub-artesian water, and within the last three months five engines and pumps have been purchased by local ryots in addition to three engines and pumps already installed by Mr. Gopinatha Tawker in Surapet. In previous reports and in a number of papers which I have written upon the advantages of this method of irrigation I have dealt with most of the questions connected with this work, and it is unnecessary to unduly lengthen this report by going over the same ground again. I append, however, a copy of the paper on "Lift-Irrigation," which was contributed to the Industrial Conference held at Surat in December 1907, as it contains a fairly full statement of the present position.

5. From the facts stated above it will be seen that irrigation with water lifted by oil-engines and pumps is making steady progress and this is sufficient evidence that the same is profitable. It is very difficult to get any reliable information regarding actual profits, and on this point I am only able to submit conclusions based on general observations and on the reports of my subordinates. In a few cases the installations have been badly managed or from unavoidable causes crops have suffered injury, with the result that the working has entailed a loss or very little profit, but in most cases the returns have been excellent and it would probably be an underestimate to place the net profit at 25 per cent. per annum on the capital invested in the installations and in the improvement of the lands. The high prices at present prevailing have placed the ryots in a very enviable position, and as the cost of labour and cattle have risen proportionately they are beginning to appreciate the advantages offered by these powerful labour-saving devices. In those tracts where water is abundant it is the smallness of the holdings and the lack of capital that delay the adoption of irrigation by pumping. There is no longer any doubt about the advantages of this way of lifting water. The ryot is not afraid of the oil-engine and I think it may be fairly said that those who are able to purchase them are envied by their neighbours instead of derided by them as was invariably the case two years ago. Only one case has so far come to my notice where a number of ryots have joined together to purchase an oil-engine and pump, but I am of opinion that it will not long be singular and I have instructed the Supervisors to render all possible assistance and to do what they can to initiate co-operative

working in this direction. In one instance a Lift Irrigation Company has been formed with a capital of Rs. 12,000 to install a pumping station on the banks of the Kistna Western Delta Main Canal to irrigate 500 acres of land too high to be commanded by direct flow. The average lift will be about 8 feet and the maximum lift 10 feet. Two 12-h.p. engines and two 10" pumps are now being erected and irrigation will commence in July. It is desirable to encourage such experiments as it may be fairly assumed that when the water has to be pumped it will be used with economy and the data from these pumping stations should be useful in ascertaining what duty of water is most profitable.

6. It is well known that the duty of water ranges between rather wide limits, but there is no information of any value to show what is the duty of water which yields the best results. It was thought that the establishment of the Experimental Pumping Department would lead to the collection of a good deal of information on this point, but so far very little has been gathered, and there seems little prospect that in the immediate future the Pumping Department will be able to do much, as the staff is fully occupied in extending the sphere of operations.

7. *Government installations.*—The first experiment with an oil-engine and pump was made at Melrosapuram six years ago and the Rev. Mr. Andrew, who is still in charge of the Settlement, reports that during the last year the engine ran for 1,005 hours and raised 1,870,000 cubic feet on an average height of 23 feet. The area under cultivation was 17·66 acres which yielded crops worth Rs. 1,691. The cost of running the engine was Rs. 303-10-0 to which may be added another Rs. 300 for interest and depreciation.

Of the other installations, that at Panampet which was lent to Messrs. Parry & Co. for two years has now been handed over from the 1st of January to the munsif of the village for a period of three years, the man having deposited a sum of Rs. 1,000 as security for the maintenance of the same in good order. The water-supply is good, but the soil in the immediate neighbourhood of the well is very sandy. The ryots in the village purchase water from the munsif at a fixed rate per hour for the whole of the supply from the engine, and careful accounts are being kept to ascertain whether this system of working is profitable and whether it is desirable to encourage it. A second installation is at Madura in charge of the District Agricultural Association, a third is at Kadiampatti with the Rev. Mr. Andersen, a fourth is at the Government Farm, Saidapet, whilst a fifth has been temporarily lent to several people for preliminary work in putting down larger installations. These engines and pumps have served their original purpose well and they are all still at work. It has been impracticable this year on account of the pressure of more important work to scrutinize the detailed information regarding them which has been recorded, but it will be done later on and any information of value will be published in the Scientific Report.

8. The working of the engines and pumps used by the Agricultural Department appears to have been satisfactory as no complaints have been made. At the Hagari Experimental Farm I have had a Supervisor stationed during the greater part of the year completing the erection of the farm buildings and studying the water-supply question. From the time the freshes first come down the river till the beginning of the hot weather there is no difficulty with the water-supply, but the well sunk in the padugai land adjacent to the pumping station yields scarcely more than one-tenth of the quantity which it was calculated would be derived by this means from the sand of the Hagari river. This is due to the exhaustion of the water in the cone of sand round the well. Once the water is drawn off no further supply can be obtained till either local rainfall occurs or a flood passes down the river. As explained in the scientific report of last year, the only way to get a large supply of water at the Hagari farm in the hot weather will be to put up a number of small pumping plants at some distance from one another so as to draw the water from a larger mass of sand.

9. *Gunjana installation.*—This pumping project, which was started in the Public Works Department, was sanctioned in G.O., No. 1793, Revenue, dated 17th July 1907, and has been handed over to this department to be carried out. At the end of the year no work had been done on the site, but the plans have been



finally revised and the engine and pump ordered from England. This plant will be noteworthy as being the first pumping station in which a suction gas producer plant will be at work. The engine, which is of the Crossley type, is 32 B.H.P. and will drive a 10" centrifugal pump to irrigate 500 acres of land which is at present chiefly devoted to the growing of turmeric. The working of the installation will be conducted on the same lines as a minor Government irrigation work, the idea being that the ryots should be charged the actual cost of lifting the water they use. This charge, of course, includes an allowance for interest and depreciation.

10. The establishment employed in the Irrigation Pumping Department consisted of one Sub-Engineer, four Supervisors and one Overseer. Practically the whole of the time of the Supervisors was devoted to pumping work, but the Sub-Engineer Mr. Rajagopalsawmi Mudaliyar was employed for a considerable part of time on other work, chiefly the reconstruction of the Tannery at Sembiam and the erection of the new machinery and plant. The Overseer worked under the Deputy Collector and was employed the whole of the time in the Ponnéri taluk and the valuable nature of the work done there testifies to his practical knowledge and skill in boring.

11. The expenditure in the Pumping Department amounted to Rs. 16,353-1-6, of which Rs. 12,860-5-4 was on account of the pay and travelling allowances of the establishment. From the time the experiments first began up to the 31st March 1908, the total expenditure on experiments in pumping with oil-engines and in the development of the same has amounted to Rs. 95,491-12-6. Against this sum there are assets which will probably realise from Rs. 15,000 to Rs. 20,000, so that the net cost of introducing oil-engine irrigation in this Presidency may be taken as not less than three-quarters of a lakh.

12. So far all the work has been done free of charge to the landholders concerned, but the time has now arrived when some portion of this expense may be fairly borne by those who avail themselves of the assistance of the Pumping Department. At first it will not be wise to charge fees covering more than a small part of the cost of the work, lest such charges should unduly retard progress. The fact that Government have constituted a special department for the development of this irrigation and have so far made no charges to those who have benefited by it, has undoubtedly engendered the suspicion in the minds of many ryots that there is some sinister ulterior motive behind it. The imposition of fees will therefore help to dispel this illusion. It will probably lead to some attempting to do the work on their own account to avoid paying fees, but it is equally certain that these enterprising individuals will make a mess of it and finally seek the assistance of the department to extricate them from their difficulties. This will be an object lesson not without considerable value to the country, as the sooner the people learn that it is extremely unwise to invest money without the advice of competent and disinterested Engineers the better it will be for them.

13. Towards the end of 1906 a Deputy Collector was placed on special duty to assist the ryots of the Tiruvallūr and Ponnéri taluks of the Chingleput district in sinking wells. The idea was to develop well irrigation by granting loans under the Agricultural Improvement Loans Act and to prevent waste of money by a preliminary exploration of the ground with boring tools. At first the scheme was not very successful, but when it was modified to include the improvement of existing wells, very satisfactory results were obtained. The sub-artesian water, which had previously been discovered in the village of Surapet to the south of the Kortaliyar river, was found to extend over a large tract of country in the Ponnéri taluk to the east of the Main Trunk road. The work was in the immediate charge of the special Deputy Collector till the end of 1907, when he was transferred to the Coimbatore district, and I took over the detailed control of the boring operations, placing one of my Supervisors in charge of the same. The work was then extended into the Tiruvallūr taluk and the results of the first four months working in that taluk indicate that there also considerable bodies of underground water under pressure exist. As already mentioned a beginning has been made to utilize these valuable sources of water-supply by the installation of five engines and pumps, and, doubtless, as time goes on, the number will steadily increase. The

exploratory work, however, is mainly intended in the first instance to open out new sources of water-supply which the ryots can utilize with the means at present at their disposal. Many wells which formerly dried up in the hot weather owing to the failure of the surface sub-soil water now yield an abundant supply of water which rises into them through pipes which penetrate the impervious layer of clay overlying the water-bearing sands. The conditions are somewhat similar to those which prevail in the United Provinces but with this important difference that the water-bearing sands are very coarse and yield a much larger supply of water without any risk of the well being filled with sand. It is at present impossible to say what quantity of water is available, or what is the largest quantity that can be drawn off at any one point, as so far the ryots have not been able to make use of more than a small fraction of the water-supply which has been placed at their disposal. It is only at Surapet that any data bearing on this point have so far been obtained. The static water level is generally from 12 to 16 feet below the surface of the ground and the inflow to the wells depends upon the diameter of the pipe connecting the well with the water-bearing sands and upon the extent the water-level in the well is lowered below the static level. In one well at Surapet with a head of about 9 feet 700 gallons per minute can be continuously obtained through two 7" pipes sunk close together. A Venturi Meter has been fixed at this installation and from time to time tests are made to determine whether there is any material variation in the flow. So far no indications of a decreased supply have been observed, but it is possible that later on the pressure may decrease somewhat and the vertical height through which the water has to be lifted will increase. In another instance also at Surapet a 4" pipe sunk through the bed of an old tank yields a sufficient supply of water to keep a 4" pump going. The volume in this case cannot be accurately estimated as part of the water is due to percolation from the sub-soil. The supply is sufficient for the engine and pump, but if more water were required it would be easy to increase the volume by putting down a larger tube.

14. In the previous quarterly reports of the Deputy Collector, the latest of which deals with the work done up to the end of December last year, the information regarding the borings is given in tabular form, and I submit a modified tabular statement bringing the information up to the end of the year under review.

TABLE I.

|                              |                     |     |                   |    |
|------------------------------|---------------------|-----|-------------------|----|
| Total number of borings, 259 | Fresh wells, 106    | ... | Sub-artesian      | 38 |
|                              |                     |     | Percolation water | 16 |
|                              |                     |     | Failed            | 52 |
|                              | Existing wells, 153 | ... | Sub-artesian      | 74 |
|                              |                     |     | Percolation water | 2  |
|                              |                     |     | Failed            | 77 |

From this statement it will be seen that in all 259 borings have been made of a total length of 8,845 feet. Of these 74 borings have disclosed the certain existence of sub-artesian water, 38 the probable existence of the same and 18, while failing in this respect, have penetrated beds of coarse sand from which fair supplies of water can be derived by ordinary surface wells. One hundred and twenty-nine or one-half of the borings proved a failure, and these naturally included those which penetrated to the greatest depth, as the work was carried on in the hope that by its continuance success might result. The average depth from the surface of the ground of the borings in wells when sub-artesian water-bearing sand was reached was 42.5 feet, whilst when the work was started from the ground the depth was only 35.2 feet.

15. From the beginning records have been kept showing the strata passed through by each boring, but unfortunately owing to the lack of education on the part of boring maistries these sections are not very reliable, and it is doubtful in many cases whether the actual depth of the water-bearing sand below the surface of the ground has been accurately recorded. It is nevertheless of great importance to endeavour to ascertain the general level at which these sands exist and to ascertain with the smallest possible amount of boring the absence of these sands.

TABLE II

Showing depths in feet at which the sub-artesian supply was tapped in wells.

| 21 to 30 ft. |        | 31 to 40 ft. |        | 41 to 50 ft. |        | 51 to 60 ft. |        | 61 to 70 ft. |        | 71 to 80 ft. |        | 81 to 90 ft. |        | 91 to 100 ft. |        |
|--------------|--------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|---------------|--------|
| No.          | Depth. | No.          | Depth. | No.          | Depth. | No.          | Depth. | No.          | Depth. | No.          | Depth. | No.          | Depth. | No.           | Depth. |
| 1            | 24     | 4            | 31     | 1            | 41     | 2            | 51     | 1            | 62     | 1            | 75     | ...          | ...    | 1             | 96     |
| 1            | 25     | 3            | 32     | 5            | 42     | 3            | 52     | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| 3            | 26     | 1            | 33     | 3            | 43     | 2            | 53     | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| 1            | 28     | 4            | 34     | 1            | 44     | 1            | 54     | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| ...          | ...    | 2            | 35     | 2            | 45     | 2            | 55     | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| ...          | ...    | 4            | 36     | 1            | 46     | 2            | 57     | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| ...          | ...    | 5            | 37     | 3            | 47     | 1            | 59     | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| ...          | ...    | 2            | 38     | 1            | 48     | ...          | ...    | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| ...          | ...    | 2            | 39     | 3            | 49     | ...          | ...    | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |
| ...          | ...    | 3            | 40     | 2            | 50     | ...          | ...    | ...          | ...    | ...          | ...    | ...          | ...    | ...           | ...    |

In Table II is recorded the depth from the surface of the ground at which each successful boring from the bottom of a well reached the water-bearing sand. From this table it will be seen that in the great majority of cases borings under 50 feet in depth struck the water and that there were only three borings over 60 feet in depth which were successful and of these two were in the Tiru-vallūr taluk nearly 40 miles from the coast.

TABLE III

Showing borings from the surface which probably tapped sub-artesian water.

| 21 to 30 ft. |              | 31 to 40 ft. |              | 41 to 50 ft. |              | 51 to 60 ft. |              |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| No.          | Depth in ft. | No.          | Depth in ft. | No.          | Depth in ft. | No.          | Depth in ft. |
| 1            | 24           | 2            | 31           | 1            | 42           | 1            | 54           |
| 3            | 25           | 1            | 32           | 2            | 43           | ...          | ...          |
| 1            | 26           | 3            | 34           | 1            | 44           | ...          | ...          |
| 3            | 27           | 1            | 33           | 2            | 48           | ...          | ...          |
| 2            | 28           | 2            | 35           | 1            | 49           | ...          | ...          |
| 1            | 29           | 1            | 36           | 1            | 50           | ...          | ...          |
| 2            | 30           | 1            | 37           | ...          | ...          | ...          | ...          |
| ...          | ...          | 3            | 38           | ...          | ...          | ...          | ...          |
| ...          | ...          | 1            | 39           | ...          | ...          | ...          | ...          |
| ...          | ...          | 1            | 40           | ...          | ...          | ...          | ...          |

Evidence of a similar character is furnished by Table III which shows the depth at which water-bearing sand was reached for which there is strong presumption that the water contained therein is under pressure. Till wells are sunk and attempts made to utilize the water, it is not absolutely certain that the supply is of a sub-artesian nature. These results are of considerable importance as tentatively at any rate they point to the conclusion that, when a boring has penetrated 60 feet from the surface of the ground and sub-artesian water is not struck, there is little likelihood of it being struck at a greater depth. This of course only applies to the area round Ponnéri in which borings have been made.

TABLE IV

Showing depths, etc., bored through with no results up to 31st March 1908.

| 31 to 40 ft. |              | 41 to 50 ft. |              | 51 to 60 ft. |              | 61 to 70 ft. |              | 71 to 80 ft. |              | 81 to 90 ft. |              | 91 to 100 ft. |              |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|
| No.          | Depth in ft. | No.          | Depth in ft. | No.          | Depth in ft. | No.          | Depth in ft. | No.          | Depth in ft. | No.          | Depth in ft. | No.           | Depth in ft. |
| 1            | 31           | 1            | 41           | 1            | 51           | 4            | 61           | 1            | 71           | 1            | 84           | 1             | 93           |
| 2            | 37           | 1            | 42           | 4            | 52           | 3            | 62           | 1            | 74           | ...          | ...          | ...           | ...          |
| 2            | 38           | 1            | 43           | 1            | 53           | 2            | 63           | 1            | 80           | ...          | ...          | ...           | ...          |
| 1            | 40           | 1            | 45           | 4            | 54           | 3            | 65           | ...          | ...          | ...          | ...          | ...           | ...          |
| ...          | ...          | 2            | 46           | 2            | 55           | 1            | 66           | ...          | ...          | ...          | ...          | ...           | ...          |
| ...          | ...          | 3            | 47           | 8            | 56           | 1            | 67           | ...          | ...          | ...          | ...          | ...           | ...          |
| ...          | ...          | 1            | 48           | 3            | 57           | 5            | 68           | ...          | ...          | ...          | ...          | ...           | ...          |
| ...          | ...          | 1            | 49           | 5            | 58           | 2            | 69           | ...          | ...          | ...          | ...          | ...           | ...          |
| ...          | ...          | ...          | ...          | 2            | 59           | ...          | ...          | ...          | ...          | ...          | ...          | ...           | ...          |
| ...          | ...          | ...          | ...          | 3            | 60           | ...          | ...          | ...          | ...          | ...          | ...          | ...           | ...          |
| 6            | 211          | 11           | 501          | 33           | 1,335        | 21           | 1,332        | 3            | 225          | 1            | 84           | 1             | 93           |

In Table IV is furnished a statement showing the depth to which the boreholes were carried from which no result was obtained. Some of the boreholes obviously were stopped too soon, but 21 were carried beyond 60 feet, and 5 beyond 70 and up to 93 feet. It is only recently that boring tools have been supplied capable of boring to a greater depth than 50 feet, and I hope that a considerable number of boreholes will be put down from the bottom of existing wells to much greater depths than has hitherto been possible so as to definitely ascertain whether there are deep-seated beds of sand containing water such as exist in the neighbourhood of Pondicherry, where the depth of the artesian boreholes varies from 120 to 350 feet. In the alluvial deposits along the coast boring work is not very expensive, the average cost for a 3-inch borehole being about 4 annas a foot up to a depth of 20 feet. Thence onward to 40 foot depth it costs 6 annas a foot, and beyond up to 60 feet 12 annas a foot. From 60 to 70 feet the cost is Re. 1 a foot and from 70 to 80 feet Rs. 1-4-0 a foot. Beyond that depth only a few borings have been made and the cost of the work done has varied considerably.

16. In the reports of the Deputy Collector a certain amount of information has been furnished regarding the utilization of the water-supplies which have been opened up, and to that information I can, at the present time, add very little, but I am informed that a considerable number of wells will be sunk towards the end of the hot weather when the work can be done most cheaply. I have already alluded to the important fact that five oil-engines and pumps are now being installed and will all shortly be at work.

17. The expenditure upon boring operations during the nine months the Deputy Collector was in charge amounted to Rs. 2,230-1-11, and during the last three months an additional expenditure amounting to Rs. 5,091-3-9 was incurred, of which over Rs. 4,000 was for the purchase of new boring tools.

#### WEAVING DEPARTMENT.

The Government Weaving Factory at Salem has throughout the year been worked under the superintendence of Mr. N. Subramania Aiyar. The statement of accounts appended to this report, Appendix III, will show that as a factory a very material improvement has been effected during the year. The total sale-proceeds amounted to Rs. 10,536-8-2 as against Rs. 4,476-14-0 in the previous year. The net cost of running the factory was Rs. 2,044-12-7 as compared with Rs. 3,461-14-1

in the previous year. This result reflects great credit upon the Superintendent and is, I think, a clear indication that, if not now, at any rate, in time handloom weaving factories will yield a profit on the working. In dealing with the accounts of the Salem Factory, it must be remembered that the same is a Government institution and that it is very unpopular in the town among the trading classes whose interest are identified in the maintenance of the present status of the weavers. During the year there has been some slight improvement in the labour supply, and a slightly better class of men were attracted to the factory by the much higher wages they could earn than when working in their own houses. The dislike to any form of factory life is still very strong, and those who work in the factory display a surprising degree of indolence and ignorance. The prevailing high prices have materially increased the spending powers of the agricultural population and naturally the weavers have benefited thereby. Work is plentiful and a fairly remunerative rate can be obtained. Sooner or later this state of things will come to an end, and it is only then that a big movement in favour of the factory system is likely to occur.

2. It must not be supposed that no efforts have been made to get the hand weavers to take to improved weaving appliances in their own homes. At Salem we have done everything that we can, going so far as to offer free instruction in the use of the looms at the factory and the loan of the looms free of charge afterwards. Even this has not induced any individual weavers to come forward, and a somewhat similar result has been obtained in almost every other town in the Madras Presidency, where weaving is an important industry. I think it is hopeless to expect any progress in this direction. In most instances the weaver is in the hands of the bunnia whose conservative instincts preclude any possibility of change and so long as the man is in bunnia's debt he is helpless.

3. The weaving industry appeals to the popular imagination and is therefore an industrial topic much written about in the newspapers. Most writers display an astonishing ignorance of facts, and the fallacies about weaving which are currently accepted have done not a little to direct effort in the wrong direction. Under the auspices of the National Fund and Industrial Association we held in February and March last, a weaving competition open to weavers from all parts of India in the compound and sheds of the School of Arts, Madras. Taking advantage of the presence of nearly every practical exponent of new methods of hand-weaving we held a Conference at which were discussed all the prominent hand-weaving problems. A report on the Competition and the proceedings of the Conference will be published by the National Fund and Industrial Association very shortly. I append a copy of a note on the results of the weaving competition which was published in a recent number of the *Indian Trade Journal*. Valuable results were obtained and the conclusions arrived at from our experiments at Salem were abundantly verified. Some of these conclusions were set forth at length in last year's report on the Salem Weaving Factory and in greater detail in a short paper which I contributed to the Industrial Conference at Surat and which I append. The position now is that there is no better loom on the market than the European fly-shuttle loom in use at the Salem Factory and elsewhere. Mr. Churchill of Ahmednagar has invented a loom which promises to be a great improvement on any existing form of handloom, but at present the details are by no means satisfactory, and it will require both time and money to bring them to perfection.

4. In regard to the very important question of sizing, the Competition brought out the fact, which was confirmed at the Conference that in Madras our sizing methods are much in advance of any other part of India. Personally I am doubtful if anything can be done, as a material modification in the method of sizing will mean a change in the texture of the cloth, which may be unacceptable to the native purchasers.

5. The Competition and the Conference in general supported the conclusion we have arrived at in Salem and confirmed the idea that we are working on the right lines. The immediate problem of the future is rather the education of the weaver than the improvement of the weaving appliances.

6. As it seemed undesirable to confine our attention solely to cotton weaving I endeavoured to procure some ramie yarn with a view to the manufacture of ram goods, but unfortunately the mills from which I had expected to obtain a supply

of yarn suddenly stopped working and the experiments are therefore at present in abeyance. In the meantime during my trip to the Northern India my attention was drawn to worsted weaving in handlooms, and with the assistance of Messrs. T. A. Taylor & Co. I have procured a small supply of suitable yarn for experiments in this direction. The yarn has actually been sent to Salem, but no work has yet been undertaken. The idea is ultimately to manufacture hand-made woollen or worsted shawls dyed with indigenous materials. As we import our cotton from Lancashire so we shall probably have to import our wool or worsted from Yorkshire.

7. In the workshops in Madras handlooms and parts of handlooms are manufactured and are in slight demand as models which local carpenters and smiths copy. During the year eleven complete looms, ten fly-shuttle slays and eighteen sets of take-up motions were sold. A small stock of handloom fittings of English manufacture is also maintained in Madras and small sales of these have been effected, but generally native weavers consider that brass reeds and English healds are too expensive, and it will take a long time to convince them that the heavier initial outlay easily repays itself in the greater efficiency of working.



*Profit and Loss Statement of the Tanning Department for the official year 1907-1908.*

\* Includes value of stores per S.S. "Dunera" Rs. 308-13-11 and S.S. "Blackwell."

\* Includes value of stores per S.S. "Dunera" Rs. 908-13-11 and S.S. "Blackwell."

+ Includes Rs. 100 to be returned to the Indian Industrial Company.

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# APPENDIX III.

Profit and Loss Statement of the Weaving Department for 1907-1908.

| Assets.                                                               | Rs. |     | Rs.   |       | Rs.    |      | Rs.    |      | Rs.   |             |
|-----------------------------------------------------------------------|-----|-----|-------|-------|--------|------|--------|------|-------|-------------|
|                                                                       | A.  | P.  | A.    | P.    | A.     | P.   | A.     | P.   | A.    | P.          |
| Remittance into the Treasury—                                         |     |     |       |       |        |      |        |      |       |             |
| Salem                                                                 | ... | ... | 8,338 | 12 11 | ...    | ...  | ...    | ...  | 6,918 | 12 6        |
| Madras                                                                | ... | ... | 1,672 | 4 3   | 10,536 | 8 2  | ...    | ...  | 4,204 | 5 10        |
| Pyasab Treasury                                                       | ... | ... | 288   | 10 0  | ...    | ...  | ...    | ...  | 236   | 8 0         |
| Book adjustments                                                      | ... | ... | 38    | 13 0  | ...    | ...  | ...    | ...  | 640   | 6 10        |
| Outstandings on 31st March 1908                                       | ... | ... | 833   | 5 0   | 833    | 5 0  | ...    | ...  | 720   | 0 3         |
| Stock of manufactured articles on 31st March 1906—                    |     |     |       |       |        |      |        |      | 2,057 | 4 2         |
| At the Salem Weaving Factory                                          | ... | ... | 2,380 | 4 0   | ...    | ...  | ...    | ...  | 246   | 8 0         |
| At Madras cost of four looms at Rs. 70                                | ... | ... | 250   | 0 0   | 2,909  | 7 3  | ...    | ...  | 348   | 14 0        |
| Cloths at the Museum                                                  | ... | ... | 239   | 3 3   | ...    | ...  | ...    | ...  | 43    | 14 0        |
| Stock of unfinished articles—                                         |     |     |       |       |        |      |        |      | 1,571 | 6 9         |
| At Salem Weaving Factory                                              | ... | ... | 185   | 0 0   | ...    | ...  | ...    | ...  | 1,380 | 12 0        |
| Raw materials at Salem                                                | ... | ... | 612   | 0 0   | 1,708  | 5 10 | ...    | ...  | ...   | ...         |
| Do. Madras                                                            | ... | ... | 911   | 5 10  | ...    | ...  | ...    | ...  | 15    | 0 0         |
| Liabilities of last year 1906-1907 paid during this year              | ... | ... | 210   | 10 4  | 210    | 10 4 | ...    | ...  | 65    | 0 0         |
| Expenditure to be debited to Capital account, Weaving Factory, Salem. | ... | ... | 485   | 11 1  | 485    | 11 1 | ...    | ...  | ...   | ...         |
| Total                                                                 | ... | ... | ...   | ...   | 16,883 | 15 8 | ...    | ...  | ...   | ...         |
| Loss                                                                  | ... | ... | ...   | ...   | 2,044  | 13 7 | ...    | ...  | ...   | ...         |
| Grand Total                                                           | ... | ... | ...   | ...   | ...    | ...  | 18,728 | 12 3 | ...   | 18,728 12 3 |

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## APPENDIX IV.

PAMPHLET ON LIFT IRRIGATION.

## APPENDIX V.

PAMPHLET ON SALEM WEAVING FACTORY.

## APPENDIX VI.

[Reprinted from "the Indian Trade Journal."]

## THE WEAVING COMPETITIONS IN MADRAS.

During the last week of February and the first week of March a weaving competition was held in Madras with the object of procuring definite data regarding the performances of the various types of hand-loom which are now offered to the Indian weaver. The response to the invitations to compete was very satisfactory, and every type of Indian made hand-loom that has been brought forward during the last few years was entered by those interested in its development to show what it was capable of. Fifty-one looms actually started work on the first day of the competition, all belonging to one or other of the following classes:—

1. Indigenous hand-looms.
2. Indigenous hand-looms fitted with the fly-shuttle slay.
3. European hand-looms
4. The Sayajee Cottage Loom, invented by Rao Bahadur Raoji B. Patel.
5. The Triumph Loom of the Salvation Army.
6. The Japanese Loom, as manufactured in Belgau.
7. The Now Ahmednagar Loom, invented by Mr. D. C. Churchill.

The competition did not, however, attract any of the imported looms which have recently been widely advertised as suited to Indian requirements. These looms are light power-looms which can be driven by hand, but experience seems to show that they are too heavy for the Indian weaver, who is usually a man of poor physique.

The competitions were divided into two sections and in each-section there were five classes. The first section was for indigenous hand-looms only, as it was recognised that it would be unfair to ask them to compete against the improved looms. They might have been left out altogether, but it was considered desirable to ascertain what work could be done on such looms under similar conditions to those under which the improved looms were worked. Data would thus be furnished showing the extent to which improvements have been effected. Although there are probably more than two and a half million indigenous hand-looms at work in the country, they have never been subjected to careful tests and the information available about them is all of the rough and ready order. In the second section all the improved looms competed one against the other, but unfortunately the different types of looms were not equally well represented. The Salvation Army only put forward two looms and Mr. Churchill only one, and even then he was unable to strictly comply with the conditions laid down.

The five competitions of each section were the same for both sections and were as follows:—

1. To weave cloth of 20<sup>s</sup> count in both warp and weft, width of cloth one yard. Number of ends per inch 48. Number of picks per inch 48.
2. To weave cloth of 60<sup>s</sup> count in both warp and weft, width of cloth from 45 to 54 inches. Number of ends per inch 72. Number of picks per inch 72.
3. To weave cloth of 100<sup>s</sup> count in both warp and weft, width of cloth from 45 to 54 inches. Number of ends per inch 80. Number of picks per inch 80.
4. To weave Madras handkerchiefs 40<sup>s</sup> count in both warp and weft. Picks per inch 72. Ends per inch 72. Width, one yard.
5. To weave Madras handkerchiefs 60<sup>s</sup> count in warp and 40<sup>s</sup> in weft. Picks per inch 108. Ends per inch 80. Width, one yard.

All the weaving was "plain" and could be done with two treadles—in the first three classes only grey yarn was to be used; but the two classes of Madras handkerchiefs were chequered coloured work involving frequent changing of the shuttle and careful attention to the beating up of the weft to produce a satisfactory result.

In the original programme of the competition work was to commence on Monday morning at 8 o'clock and to continue throughout the week ending on Saturday afternoon at 5-30 p.m. The weavers were to work 7 hours a day, or 42 hours in all. The end of February was specially selected for the competition as being the time when rain was least likely to fall and some of the sheds provided for the looms were not made water tight. The unexpected happened and several heavy showers fell on the first day of the competition and damaged a number of the warps of the "pit" looms. After some discussion it was decided to go on and to arrange for a second competition in the following week, all the warps for which were to be provided by the local Committee and were to be of as uniform quality as possible.

The results of the two competitions are given in two tabular statements below. In both competitions the Japanese hand-loom was withdrawn; and in the first the Salvation Army looms were withdrawn as it was found that the warps were unsatisfactory. It may here be remarked that the quality of the warps which the competitors supplied themselves with varied very much and the output of the looms was greatly influenced thereby. Generally speaking the Madras competitors provided much better warps than those brought from other parts of India, and there seems to be but little doubt that in this important preliminary process to weaving practice in Southern India is far in advance of other provinces. The results of the competition must be regarded as disappointing to those who are keenly interested in the resuscitation of the hand-loom industry, as they disclose the fact that as yet none of the newly introduced looms can claim to be a substantial improvement on the best models of the old English hand-loom as manufactured in Madras and exhibited by the Government Weaving Factory at Salem and by Mr. P. Theagaroy Chetty. This result confirms the conclusions arrived at after long trials in the Salem Weaving Factory as recorded in the account of the work done at that institution which was presented to the Surat Industrial Conference. The improvement of the hand-loom is no simple task, and it is fairly evident that those who have essayed to do so, with the single exception of Mr. D. C. Churchill, do not possess the requisite experience of weaving and knowledge of mechanics combined with the necessary inventive faculty to enable them to attain success. The failure of the English manufacturers is not due to lack of technical skill, for their looms are wonderfully ingenious pieces of mechanism, but to almost complete ignorance of the Indian weaver and the conditions under which he works. A power-loom to run successfully must be driven at a uniform speed, but if a man is employed to work it the supply of power is most irregular and it is hopeless, therefore, to expect that a lightly made power-loom will make a good hand-loom. To obtain good results from the fly-shuttle loom, the weaver must exercise a high degree of skill, and his arms and legs must work in complete co-ordination. During the competition the best weavers were able to attain a maximum rate of 140 picks per minute and they seemed able to keep working at 100 picks a minute indefinitely. Yet, when the cloth was measured up, only in one instance was the average speed over 70 picks per minute; and generally, even with good weavers and fair warps, the efficiency of picking was below 50 per cent. This result is nevertheless twice as good as the average rate of picking which has hitherto been obtained from the weavers in the factory at Salem.

In all the new looms an attempt is made to reduce the number of independent operations to be made by the weaver. In the fly-shuttle loom they are three: (1) forming the shed by the action of the feet on the treadles, (2) throwing the shuttle by jerking the picker string with the right hand, (3) beating up the weft by the slay moved with the left hand. In the Sáyajee loom and the Salvation Army loom the picking motion is worked off the slay and the operations of the weaver reduced to two. On narrow coarse cloth this system does not work badly. It is certainly easier for the weaver to apply the power; and though, during the competitions, the weavers at these looms could not pick as fast as did the men at the European pattern of hand-loom, this was possibly due to the fact that they were less skillful. But for fine counts with a large number of ends to the inch and close picking there is no doubt that these looms are inferior. As pointed out by Mr. Churchill in his paper on "the hand-loom at Ahmednagar," the driving mechanism comes into operation too late and there is a tendency while beating back to catch the shuttle before it has passed through the shed. In addition, to obtain sufficient power to drive the shuttle, the slay has to be moved rapidly forward and brought to rest suddenly. The action is somewhat violent and conducive to irregularities, which cannot fail to damage the warp. The wider the loom the more violently must the slay be pushed back to give the shuttle sufficient impetus to cross the warp, whereas it is obvious that the reverse would be desirable.

This method of driving the shuttle was employed by Mr. Churchill in the first hand-loom he produced, but he has now definitely abandoned it in favour of an entirely new design in which the weaver supplies the power, looks after the warp, changes the shuttle, and the loom does the rest. It is thus essentially a power-loom, but it differs from all other power-loom inasmuch as the rate of working is to some extent controlled by a spring, the action of which tends constantly to keep the weaver working at a uniform speed. This is undoubtedly a great

advantage in a treadle-loom; and, as the mechanism is very light, all the moving parts run on ball bearings. It is extremely easy to work and the weaver is not unduly fatigued. As yet the loom has only been adjusted for coarse work; and, when exhibited in Madras during the competition, it was set to run at about 135 picks per minute. During a day's run the effective average was 104 picks per minute. This is certainly an improvement on any other hand-loom, and it remains to be seen whether it can work equally well on fine counts and much wider cloth. Apparently there should be no difficulty in this extension of its sphere of practical utility, but it is possible that it will be necessary to make it mainly of iron to secure permanence in the somewhat delicate adjustments between the various parts. Wood is not a very satisfactory material for a comparatively delicate mechanism, as it is liable to warp and to crack and is affected by the amount of moisture in the atmosphere. It is undoubtedly an improvement on power-loom adapted to hand-weaving, and it will probably prove a success in hand-loom weaving factories but in the hands of individual weavers it may prove beyond their capacity to keep in working order.

It has been advocated by some that in the present condition of hand-weaving in India it would be wise to move slowly and be content in the first instance with getting the fly-shuttle slay adopted generally. The cost of the change would be small and the improvement in rate of weaving considerable. On this point the weaving competition yielded but little information, as there were only three such looms entered, and the rain unfortunately damaged the warps on two of them, and the enterprising Sholapur weaver who brought them down had to withdraw them. The third loom worked on a very fine warp of 100<sup>s</sup> counts and made an average of 36 picks per minute in the first test and 34.5 in the second. On the frame looms in the first competition the best average was 29.8 picks per minute, but in the second competition three weavers averaged, respectively, 48.3, 47 and 40 picks per minute. The difference in the two results is entirely due to the variations in the quality of the warp and the very excellent result obtained in the country-loom fitted with a fly-shuttle slay is to be attributed mainly to the very superior warp.

The European hand-loom, apart from the use of the fly-shuttle, differs from the country-loom in the fact that it is self-contained in a frame and that the warp is beamed and this process of beaming involves a considerable amount of extra labour preliminary to weaving. Practically the native weaver performs an equivalent operation at intervals during the process of weaving, instead of getting it all done beforehand. Deducting the time thus lost, there is no reason why he should not attain the same average rate of picking as is obtained in frame looms with beamed warps. In the competitions a number of what were styled "improved pit looms" were entered, which were in reality frame looms, the longitudinal members of which were dispensed with by embedding the posts of the front and back frames very firmly in the ground. The system possesses the merit of cheapness, but the looms are in essentials frame looms. When allowance has been made for the labour expended in beaming, it is by no means definitely proved that the frame looms can turn out more cloth than can be manufactured in the same time on country-loom with fly-shuttle slays. The quality of the work is, however, better; and, as the frame loom can be fitted with an automatic take-up motion, great regularity in picking can easily be ensured. In all the classes of the competitions devoted to plain weaving the advantage derived from the employment of a take-up motion was very evident.

A detailed scrutiny of the tabulated results of the competitions reveals some very useful information. First as to the ratio of the work done on fly-shuttle looms and on country-loom. The latter did not attempt the finest work, but on those of 60<sup>s</sup> counts the best result was 17.5 picks per minute on cloth 43 inches wide, against 69.5 picks per minute on cloth 51.5 inches wide. That is, more than four times as much cloth was turned out. With warps of 20<sup>s</sup> counts and one yard wide the ratio is 2.5, whilst on the Madras handkerchiefs it is only 1.35. In this case it is probable that the low ratio is partly due to the superior skill of the weavers on the country-loom, but for the most part the frequent changing of shuttles discounts the advantage of the better method of picking. The wider the cloth the greater is the gain due to the use of the fly-shuttle; and, in very wide work, such as turban cloths, which are 2 feet wide, one weaver can easily work a fly-shuttle loom much faster than two men on a country-loom. The results of the competition establish the fact that there is a great but variable degree of advantage in the use of the fly-shuttle. Roughly it may be taken as three to one.

The looms which did the best all-round work in the competitions were those manufactured in Madras on the lines of the old English hand-loom. In the second competition, with counts of 100<sup>s</sup>, the average rate of picking of the three best looms was 45 per minute, against 21 per minute in the single Sáyajee Cottage Loom which competed. With counts of 60<sup>s</sup> four looms averaged 55 picks per minute, against 50.5 obtained in the Salvation Army Loom and 36 in the Sáyajee Cottage Loom. With counts of 20<sup>s</sup> one of the looms from the Salem Weaving Factory averaged 63 picks per minute in both competitions, against 35 by the Sáyajee Cottage Loom and 37 by the Salvation Army Loom. In the first competition: loom from Bengal of the Serampore pattern averaged 73 picks per minute with 42 ends to the inch; but, in the second competition, working with a new reed with 52 ends to the inch, only 37 picks per minute were obtained. This result may have been due to differences in the quality of the warp, but the increase in the number of ends per inch also had much to do with it.



In reviewing the results of these competitions the question naturally arises—has the information been obtained that was sought for and, if so, what use can be made of it? Some valuable data have undoubtedly been collected which could have been obtained in no other way; but the conclusions deduced from them in the preceding paragraphs will by some scarcely be accepted as final. Those who competed had no previous experience of such competitions and their preliminary arrangements might have been greatly improved upon, so that the inventors of the new looms have gone away dissatisfied with themselves and still of opinion that their looms would have done better had things been otherwise. That the quality of the warps exerted a pronounced influence on the results obtained with the looms is not to be disputed, and points to the necessity of greater attention to this preliminary process. It is fortunate, however, that a second competition was held when the warps supplied were of more uniform quality, and the results, therefore, more strictly comparable. As a final test of the merits of the different looms the competitions have proved satisfactory, and we may claim now to be in a position to state definitely what type of loom may be best employed on a specified kind of work. In the paper on the Salem Weaving Factory already alluded to, figures are given as to the average output of the weavers in that factory, and a comparison with those obtained in the competition shows that when a sufficient stimulus is employed the weaver can without fatigue turn out more than twice as much work as he is willing to do at Salem even when working on liberal piece-work rates. If the Salem weavers would work at the same rate in the factory that they did during the competitions, there would be a good profit on the capital invested. Between the best of the competing looms the differences in output of coarse work are not much greater than would be expected where so much depends upon the skill of the weaver, but for fine work the old English hand-loom is unquestionably superior.

Looking, as the writer does, to the development of hand-loom weaving factories as the most desirable and the most probable solution of the Indian weaving problem, it must be confessed that the new loom invented by Mr. Churchill is an impediment to any immediate advance in this direction and yet a promise of their ultimate establishment. The loom possesses many valuable features, but it requires time and money to be spent on perfecting them. Apparently Mr. Churchill is not in a position to give his whole time to his loom, and the Missionary Society with which he is connected is unable to furnish him with the funds. As the loom is not patented and its early completion would be of immense advantage to the hand-loom industry, the provision of the pecuniary assistance can be confidently recommended as a way to contribute to the industrial development of the country second to none at the present time. With the possibility of such a loom being on the market in a year or two, the capitalist would scarcely be likely to invest a large amount of money in any of the existing types of looms. The Churchill loom promises twice the output of any other loom capable of being worked by Indian weavers, but it is hardly likely that in its final form it will be a suitable loom for weavers working independently. With an output that may be reckoned as six times that of the indigenous hand-loom, special arrangements for warping will be necessary and they will have to be supplied by a central factory even if the loom be worked in a weaver's house. A lakh or two devoted to the complete working out of all the details of this loom and the demonstration of its advantages to the weaving world would be well applied. It certainly seems a pity that ample opportunity should be denied Mr. Churchill to bring to early maturity an invention which holds out so much promise.

ALFRED CHATTERTON.

| Serial Number.        | Description of Loom.                      | Ends per inch. | Counts of warp and weft. | First Competition.      |               |               |                 | Second Competition.       |                         |               |               |                 |                           |
|-----------------------|-------------------------------------------|----------------|--------------------------|-------------------------|---------------|---------------|-----------------|---------------------------|-------------------------|---------------|---------------|-----------------|---------------------------|
|                       |                                           |                |                          | Average picks per inch. | Length woven. | Hours worked. | Width of cloth. | Average picks per minute. | Average picks per inch. | Length woven. | Hours worked. | Width of cloth. | Average picks per minute. |
| CLASS I.              |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| 4                     | Frame Loom ... ..                         | 80             | 100 <sup>8</sup>         | 76½                     | 44 7          | 42½           | 52½             | 16                        | 85                      | 57 11         | 24½           | 48              | 40                        |
| 25                    | Improved Pit Loom ... ..                  | 80             | 100                      | 79·8                    | 43 2½         | 42½           | 51½             | 16½                       | 95½                     | 60 9          | 24½           | 48              | 47                        |
| 13                    | Frame Loom ... ..                         | 82             | 100                      | 85·2                    | 73 1          | 42½           | 54              | 29½                       | 80½                     | 74 5          | 24½           | 54              | 48½                       |
| 14                    | Do. ... ..                                | 82             | 100                      | 87                      | 47 11         | 42½           | 55              | 19½                       | 92½                     | 32 8          | 24½           | 54              | 24½                       |
| 41                    | Country Loom with fly-shuttle slay ... .. | 82             | 100                      | 75·8                    | 92 11         | 39            | 46              | 36                        | 82                      | 51 5½         | 24½           | 48              | 34½                       |
| 31                    | Sáyajee Cottage Loom.                     | 80             | 100                      | ...                     | ...           | ...           | ...             | ...                       | 79                      | 44 4          | 24½           | 48              | 28                        |
| CLASS II.             |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| 1                     | Frame Loom ... ..                         | 72             | 60 <sup>8</sup>          | 73·9                    | 172 11        | 42½           | 51½             | 60                        | 70½                     | 120 7         | 24½           | 48½             | 69½                       |
| 28                    | Improved Pit Loom ... ..                  | 72             | 60                       | 71·5                    | 141 6         | 42½           | 50½             | 47½                       | 71½                     | 90 9          | 24½           | 48              | 52½                       |
| 16                    | Frame Loom ... ..                         | 72             | 60                       | 73·3                    | 128 2         | 42½           | 53½             | 44½                       | 71                      | 94 6          | 24½           | 53½             | 55                        |
| 18                    | Do. ... ..                                | 72             | 60                       | 71                      | 97 5½         | 42½           | 53              | 30½                       | 69½                     | 86 8          | 24½           | 53½             | 49½                       |
| 39                    | Country Loom with fly-shuttle slay ... .. | 82             | 60                       | ...                     | ...           | ...           | ...             | ...                       | 68                      | 83 11         | 24½           | 53½             | 46½                       |
| 20                    | Salvation Army ... ..                     | 74             | 60                       | ...                     | ...           | ...           | ...             | ...                       | 61½                     | 101 11        | 24½           | 48½             | 50½                       |
| 35                    | Sáyajee Cottage Loom.                     | 72             | 60                       | ...                     | ...           | ...           | ...             | ...                       | 66                      | 66 8          | 24½           | 46½             | 35½                       |
| 42                    | Country Loom ... ..                       | 85             | 60                       | 76                      | 49 2          | 42½           | 43              | 17½                       | ...                     | ...           | ...           | ...             | ...                       |
| 43                    | Do. ... ..                                | 80             | 60                       | 73½                     | 34 10         | 42½           | 39½             | 12                        | ...                     | ...           | ...           | ...             | ...                       |
| CLASS III.            |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| 8                     | Frame Loom ... ..                         | 53             | 20 <sup>8</sup>          | 50·5                    | 296 0         | 40½           | 33              | 73                        | 47                      | 83 2          | 21            | 32              | 37½                       |
| 9                     | Do. ... ..                                | 52             | 20                       | 49                      | 118 10½       | 42½           | 40½             | 27½                       | 43                      | 83 3½         | 24½           | 35              | 29½                       |
| 5                     | Do. ... ..                                | 48             | 20                       | 51½                     | 205 9½        | 42½           | 39              | 50                        | 44½                     | 122 5         | 24½           | 36              | 44½                       |
| 22                    | Improved Pit Loom ... ..                  | 48             | 20                       | 46                      | 218 8         | 42½           | 36              | 47½                       | 40                      | 133 3         | 24½           | 37½             | 45                        |
| 84                    | Sáyajee Cottage Loom.                     | 50             | 20                       | ...                     | ...           | ...           | ...             | ...                       | 41½                     | 103 6         | 24½           | 36              | 35                        |
| 21                    | Salvation Army ... ..                     | 52             | 20                       | ...                     | ...           | ...           | ...             | ...                       | 39                      | 116 1         | 24½           | 35              | 37                        |
| 17                    | Frame Loom ... ..                         | 48             | 20                       | 43½                     | 309 9         | 42½           | 34              | 63½                       | 46½                     | 164 7         | 24½           | 35½             | 62½                       |
| 30                    | Country Loom ... ..                       | 48             | 20                       | 44½                     | 95 2          | 34            | 35              | 25                        | 44½                     | 79 7          | 24½           | 36              | 30½                       |
| 46                    | Do. ... ..                                | 50             | ...                      | ...                     | ...           | ...           | ...             | ...                       | 47½                     | 75            | 24½           | 35              | 29½                       |
| 47                    | Do. ... ..                                | 65             | ...                      | ...                     | ...           | ...           | ...             | ...                       | 59½                     | 47 4          | 24½           | 27              | 22½                       |
| CLASS IV.             |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| MADRAS HANDKERCHIEFS. |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| 2                     | Frame Loom ... ..                         | 84             | 60 × 40                  | 101½                    | 58 11½        | 42½           | 36              | 28                        | 109                     | 42 3          | 24½           | 37              | 37½                       |
| 26                    | Improved Pit Loom ... ..                  | 84             | 60 × 40                  | 101                     | 47 3          | 42½           | 37              | 22                        | 107½                    | 44 7½         | 24½           | 36              | 39½                       |
| 19                    | Frame Loom ... ..                         | 84             | 60 × 40                  | 65½                     | 27 5          | 42½           | 34½             | 8½                        | 75½                     | 21 11½        | 24½           | 34              | 18½                       |
| 33                    | Sáyajee Cottage Loom.                     | 82             | 60 × 40                  | ...                     | ...           | ...           | ...             | ...                       | 86½                     | 29 6          | 24½           | 36              | 20½                       |
| 23                    | Country Loom ... ..                       | 80             | 60 × 40                  | 105½                    | 34 3          | 42½           | 36½             | 17                        | 117½                    | 28 9          | 24½           | 37½             | 27½                       |
| 24                    | Do. ... ..                                | 80             | 60 × 40                  | 112½                    | 33 7          | 42½           | 37½             | 18                        | 122                     | 25 4½         | 24½           | 37              | 25½                       |
| 44                    | Do. ... ..                                | 81             | 60 × 40                  | 114                     | 18 8½         | 20            | 38              | 21½                       | 117                     | 29 6          | 24½           | 37½             | 28                        |
| 45                    | Do. ... ..                                | 86             | 60 × 40                  | 113                     | 24 10         | 34            | 37½             | 16                        | 117                     | 19 4          | 24½           | 33              | 18½                       |
| CLASS V.              |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| MADRAS HANDKERCHIEFS. |                                           |                |                          |                         |               |               |                 |                           |                         |               |               |                 |                           |
| 3                     | Frame Loom ... ..                         | 88             | 40 × 40                  | 87½                     | 36 6          | 42½           | 37              | 40                        | 83½                     | 64 6          | 24½           | 36              | 44                        |
| 27                    | Improved Pit Loom ... ..                  | 88             | 40 × 40                  | 88                      | 91 10½        | 42½           | 36½             | 38                        | 89½                     | 56 10         | 24½           | 37              | 41½                       |
| 32                    | Sáyajee Cottage Loom.                     | 74             | 40 × 40                  | ...                     | ...           | ...           | ...             | ...                       | 58                      | 55 6          | 24½           | 36              | 26½                       |

*Proceedings of the Board of Revenue (R.S., Sur., L. Rds. and Agri.),  
Mis. No. 2788, dated 24th June 1908.*

The Hon'ble Mr. J. Twigg.

*Read*—the following paper:—

*Letter*—from A. CHATTERTON, Esq., Director of Industrial and Technical Inquiries, Madras.

*To*—the Secretary to the Commissioner of Revenue Settlement, Survey, Land Records and Agriculture.

*Dated*—the 26th May 1908.

*No.*—383-A/B. & G.

I have the honour to forward my administration report for the year 1907-1908 which I have had set up in type at the Government Press and I enclose nine spare copies.

2. After writing the report it was brought to my notice that in paragraph 7 of G.O., No. 1985, Revenue, dated 7th August 1907, it was ordered that the report on pumping experiments might be incorporated as was done last year in the annual administration report of the Agricultural Department. This, if Government so desire it, can still be done as the detailed report of the pumping experiments is contained in a separate section, pages 9 to 16; but I think it will be convenient to allow the report to remain as it has been prepared as it will enable Government to review the whole of the work carried on by me as Director of Industrial and Technical Inquiries.

*Resolution*—Mis. No. 2788, dated 24th June 1908.

The report of the work of the Director of Industrial and Technical Inquiries for the year 1907-1908 will be submitted to Government with reference to paragraph 7 of their order No. 1985, Revenue, dated 7th August 1907. It is an admirable summary of the efforts of the Director to develop and foster certain important industries and the results disclosed are as full of promise as they are interesting to read.

2. Chrome-tanning operations expanded considerably during the year, the total sales of leather amounting to Rs. 85,520-12-4 against Rs. 51,770-4-8 in the preceding year or an increase of nearly 65 per cent.; and according to the profit and loss statement, the net result of the year's working was a profit of Rs. 2,712-13-5 as against a loss of Rs. 4,518-6-5 in the preceding year. The results are encouraging. The operations have now been removed to the new Government tannery at Sembiam, which is nearing completion, and the Board hopes that with the improved facilities for tanning provided at the new premises, it will be possible to reduce the cost of manufacture and thus enable a reduction to be made in the price of chrome leather. The water-supply at the new tannery has proved disappointing both as regards quantity and quality and has arrested the extension of the operations, but Mr. Chatterton anticipates that the quality of the water may materially improve after the next monsoon and that if this should fail, the defect may be remedied by a water-softening plant or by deep boring which may strike a better supply at a lower level.

3. The Board regrets to note that none of the chrome-tanning concerns hitherto started by private enterprise has proved a success. Chrome tanning in this respect is in strong contrast with aluminium manufacture, which engages the activities and capital of a large private factory at Madras. It is satisfactory to note, however, that chrome-leather sandals and kavalais are increasing in popularity and that it pays the ordinary Indian chuckler working on his own account to use chrome leather for the goods manufactured by him for his customers.

4. The work of the Salem Weaving Factory during the year under report was satisfactory. The sales during the year amounted to Rs. 10,536-8-2 as against Rs. 4,476-14-3 in the previous year and the net cost at which the factory was

worked was reduced from Rs. 3,461-14-1 in 1906-1907 to Rs. 2,044-12-7 during the year under report. The Board endorses Mr. Chatterton's remark that this result reflects credit upon the Superintendent in charge. Further improvement is a work of time and the Board trusts that every effort will be made by the Superintendent and his staff to bring home to the weavers the advantages of hand-loom weaving and the need for the cultivation of habits of regularity and discipline. The results of the proposed experiments with worsted yarn will be awaited with interest. The subject of sizing adverted to in paragraph 3 of G.O., No. 1985, dated 7th August 1907, is dealt with in paragraph 4 (page 18 of the report).

5. With reference to paragraph 7 of G.O., No. 1985, Revenue, dated 7th August 1907, the Director of Agriculture has been requested to incorporate the portion of the report relating to the pumping department in the administration report of the Agricultural Department for the year. Mr. Chatterton's report is however now submitted as a whole to Government as desired by him so as not to disturb the mutual connection and interdependence of the various parts of the work of the department.

(True Extract.)

L. D. SWAMIKANNU,  
*Secretary.*

*Order*—No. 2112, Revenue, dated 3rd August 1908.

Miscellaneous.

Recorded.

2. The Government note with pleasure the very satisfactory progress achieved during the year in every department of work under Mr. Chatterton's control.

(True Extract.)

A. G. CARDEW,  
*Secretary to Government.*

# 11. Papers relating to the Apprentice system in use on the East Indian Railway.

## I

*Extract from The Times' Engineering Supplement of the 15th July 1903.*

\* \* \* \* \*

We have received from Mr. H. K. Bamber, late Carriage and Wagon Superintendent of the East Indian Railway, an outline of a plan which was put into operation in 1904, and by which the sons of upper-class Indians were accepted in the workshops of the carriage and wagon department of the Railway for training as mechanics with a view to become leading hands or assistants to European foremen, with commensurate pay. This plan, states our correspondent, has worked well; it has overcome prejudice to manual labour, and has given promise of making excellent workmen out of the lads who enter the works. The candidates for the course are required to have passed the entrance examination in mathematics of the Calcutta University, though they may have failed in the aggregate of subjects; they are also required to be physically fit, and not to be more than 19 years of age. The full period of training is seven years, and the first six months is probationary and without pay. At the conclusion of the term of apprenticeship a certificate is granted and the apprentice becomes a skilled mechanic. The number of candidates has so far been more than equal to the requirements of the workshops. By an extension of this system it would be possible to create in the near future a supply of thoroughly well-trained and contented Mechanical Engineers to supply the existing needs of the railways and industries.

## II

*Letter—*from W. A. DRING, Esq., Agent, East Indian Railway.  
*To—*the Secretary to Government, Revenue Department.  
*Dated—*Calcutta, the 15th August 1908.

With reference to your Demi-official No. 63-I of 3rd August 1908, I beg to send herewith a copy of our Carriage and Wagon Superintendent's letter No. 1401-A of 13th instant and of the rules for admission of apprentice mechanics into the East Indian Railway Workshops at Lillooah, which I hope will be found to contain the information asked for.

If anything further is required, kindly let me know.

## ENCLOSURE 1.

*Letter—*from C. G. H. DANBY, Esq., Carriage and Wagon Superintendent, East Indian Railway, Lillooah.  
*To—*the Agent, East Indian Railway, Calcutta.  
*Dated—*the 13th August 1908.  
*No.—*1401-A.

*Technical and Industrial Education in India.*

[Your Memorandum No. 19704 E of 10th August 1901.]

In returning the enclosures to your above, I beg to forward herewith, for the information of the Government of Madras, a copy of the rules for admission of apprentice mechanics into the Lillooah Workshops, together with copies of agreement forms to be executed by Europeans (or East Indians) and Natives respectively.

2. On satisfactory completion of the full term of training, native apprentices are eligible for promotion to the grade of skilled mechanic on Rs. 50 to Rs. 75, according to qualifications, and can thereafter rise under the Company's rules to Rs. 240.

3. The scheme has on the whole yielded fairly good results. Out of the 34 native apprentices who joined between 1904 and 1908 there are still 18 in the service, 3 having died and 13 left after serving a few months. I think it, however, only fair to state that 11 out of these 13 left within two years of the inception of the scheme.

4. The lads still in the service have done and are doing very well, both in the Workshops and at the Technical School, and I have every reason to believe they will in due course turn out very useful mechanics.

5. The great stumbling block to the success of the scheme is the rooted objection of higher class natives to manual labour of any kind, coupled with the fact that their social system does not permit of their engaging in pursuits where the initial salary is insufficient to maintain a man and his family. I am of opinion, however, that these objections are not insuperable, and that in course of time employment of this nature will become more popular and better appreciated as it is more widely known.

## ENCLOSURE 2.

## EAST INDIAN RAILWAY.

## CARRIAGE AND WAGON DEPARTMENT.

## *Rules for the admission of Apprentice Mechanics to the Lillooah Workshops.*

Apprentice mechanics will be admitted to the Lillooah Workshops, as vacancies occur, on passing a satisfactory competitive examination as to their educational qualifications and physical fitness for the work.

Candidates must not be less than 15 years of age, and only Europeans and East Indians who have passed the Middle School and Natives who have passed the Entrance Examination are eligible for admission.

Applications for permission to appear at the competitive examination, accompanied by proofs of age and a certificate of moral character signed by the Principal of the applicant's school or by some other person of repute, should be addressed to the Carriage and Wagon Superintendent, by whom passes over the East Indian Railway will be issued to approved candidates.

The subjects in which candidates will be examined are as follows:—

- |                  |                          |
|------------------|--------------------------|
| (1) Arithmetic.  | (5) English Language.    |
| (2) Algebra.     | (6) Elementary Physics.  |
| (3) Mensuration. | (7) Elementary Drawing.  |
| (4) Geometry.    | (8) General knowledge.   |
|                  | (History and Geography). |

For six months after appointment apprentices will be on probation, and if found unsuitable will not be indentured. If their conduct, however, has in every way been satisfactory, they will be required, on completion of the probationary period, to sign the attached agreement (Form C. & W. 39) and will draw pay at the following rates:—

| Europeans and East Indians. |    |    |    |    | Natives. |    |    |    |    |
|-----------------------------|----|----|----|----|----------|----|----|----|----|
| RS.                         |    |    |    |    | RS.      |    |    |    |    |
| 30                          | .. | .. | .. | .. | 1st year | .. | .. | .. | 5  |
| 30                          | .. | .. | .. | .. | 2nd "    | .. | .. | .. | 10 |
| 35                          | .. | .. | .. | .. | 3rd "    | .. | .. | .. | 15 |
| 40                          | .. | .. | .. | .. | 4th "    | .. | .. | .. | 20 |
| 50                          | .. | .. | .. | .. | 5th "    | .. | .. | .. | 25 |
| ..                          | .. | .. | .. | .. | 6th "    | .. | .. | .. | 30 |
| ..                          | .. | .. | .. | .. | 7th "    | .. | .. | .. | 35 |

Increases under this scale may be refused or deferred if an apprentice misconducts himself or does not make satisfactory progress.



Every apprentice must attend the departmental Technical school during the whole course of his training, paying the following fees which will be deducted from his pay sheets:—

| Europeans and East Indians. |    |    |    |    |    |          |    | Natives. |
|-----------------------------|----|----|----|----|----|----------|----|----------|
| RS.                         | A. |    |    |    |    |          |    | RS.      |
| 1                           | 8  | .. | .. | .. | .. | 1st year | .. | 0 4      |
| 1                           | 8  | .. | .. | .. | .. | 2nd "    | .. | 0 3      |
| 1                           | 12 | .. | .. | .. | .. | 3rd "    | .. | 0 12     |
| 2                           | 0  | .. | .. | .. | .. | 4th "    | .. | 1 0      |
| 2                           | 8  | .. | .. | .. | .. | 5th "    | .. | 1 4      |
| ..                          | .. | .. | .. | .. | .. | 6th "    | .. | 1 8      |
| ..                          | .. | .. | .. | .. | .. | 7th "    | .. | 1 12     |

A sum equivalent to 10 per cent. of an apprentice's pay will be deducted from his pay sheets monthly as a security deposit for the due fulfilment of the contract, and paid into the East Indian Railway Savings Bank to his credit. If he leaves the service without permission, or otherwise misconducts himself, the whole amount at his credit will be forfeited. Should, however, he serve the full term of his apprenticeship, and conduct himself to the satisfaction of the Carriage and Wagon Superintendent, he will be allowed to draw the aggregate amount of his contributions with accrued interest.

LILLOOAH,  
24th September, 1907.

C. G. H. DANBY,  
Acting C. & W. Superintendent.

ENCLOSURE 3.

C. & W. 39.

ARTICLES OF AGREEMENT made the .. day of .. 190 ..

BETWEEN THE EAST INDIAN RAILWAY COMPANY hereinafter called the Company of the first part .. of the second part and .. of the said .. hereinafter called the "Apprentice" of the third part.

WHEREAS the said .. of his own free will doth by these presents put, place and bind the "Apprentice" to the Company for the term of five years from .. Now it is hereby agreed as follows—

1. The Apprentice shall and will faithfully and diligently serve the Company as their Apprentices in their Carriage and Wagon Department for and during the said term of five years and shall and will from time to time and at all times during the said term readily and cheerfully obey and execute the lawful and reasonable commands of the Company and its officers and will not depart or absent himself from the service or employ of the Company during the said term without the consent of the Company first obtained but will at all times during the said term conduct himself with all due deference diligence honesty and temperance and shall and will truly and honestly serve the Company as a faithful Apprentice ought to do in all things whatsoever.

2. During the first six months of the said period of five years the Apprentice shall be liable to be discharged at any time during or at the expiration of the said period of six months at the discretion of the Superintendent for the time being of the Carriage and Wagon Department of the Company.

3. If at the expiration of the said period of six months the Apprentice appears likely to be of use to the Company, he shall remain in the service of the Company for the remainder of the said period of five years and receive pay at the rates hereinafter mentioned.

4. The Company shall accept the Apprentice as their Apprentice in the Carriage and Wagon Department and will in the event of the Apprentice not being discharged during or at the expiration of the first six months of the said period of five years pay him monthly wages at the following rates, provided always that if the Apprentice fails to make satisfactory progress increments may be refused or deferred at the discretion of the Superintendent for the time being of the Carriage and Wagon Department of the Company:—

|             |                                    |    |    |    |    | Per month. |
|-------------|------------------------------------|----|----|----|----|------------|
|             |                                    |    |    |    |    | RS.        |
| For the 1st | year of the said period of 5 years | .. | .. | .. | .. | 30         |
| "           | 2nd                                | "  | "  | "  | .. | 30         |
| "           | 3rd                                | "  | "  | "  | .. | 35         |
| "           | 4th                                | "  | "  | "  | .. | 40         |
| "           | 5th                                | "  | "  | "  | .. | 50         |

5. The Apprentice shall during the said period of five years attend the Departmental Technical school regularly, and for the tuition there received shall pay a fee equivalent to one-twentieth of the salary, to be deducted monthly from his pay sheet.

6. The Company shall during the continuance of this agreement and as a security for the due performance thereof by the Apprentice be at liberty to deduct during each month one-tenth part of the pay of the Apprentice. Such one-tenth of pay shall be paid into the East Indian Railway Savings Bank and shall be absolutely forfeited to and retained by the Company in the event of the Apprentice leaving the service of the Company without the consent of the Company during the said period of five years or if he misconducts himself in any way. If the Apprentice shall serve the full period of five years to the satisfaction of the Company, he shall be entitled to receive the total amount so deducted from his pay together with the interest accrued thereon.

7. The Company if dissatisfied with the conduct of the Apprentice or with the manner in which he discharges his duties shall be at liberty at any time during his agreement to dismiss the apprentice.

As witness the hands of the parties.

Witness.

ENCLOSURE 4.

C. & W.1.

EAST INDIAN RAILWAY.

CARRIAGE AND WAGON DEPARTMENT.

Agreement of Apprenticeship, Native.

I .. hereby agree to serve the East Indian Railway Company as an Apprentice in the Workshops of the Carriage and Wagon Department at Lillooah station or elsewhere for a period of seven years (the first six months thereof to be on probation) upon the terms that during each of such years I shall receive by way of remuneration the following sums, provided I make satisfactory progress:—

|             |    |    |    |    |    |    |    | Per month. |
|-------------|----|----|----|----|----|----|----|------------|
|             |    |    |    |    |    |    |    | RS.        |
| 1st year at | .. | .. | .. | .. | .. | .. | .. | 5          |
| 2nd "       | "  | .. | .. | .. | .. | .. | .. | 10         |
| 3rd "       | "  | .. | .. | .. | .. | .. | .. | 15         |
| 4th "       | "  | .. | .. | .. | .. | .. | .. | 20         |
| 5th "       | "  | .. | .. | .. | .. | .. | .. | 25         |
| 6th "       | "  | .. | .. | .. | .. | .. | .. | 30         |
| 7th "       | "  | .. | .. | .. | .. | .. | .. | 35         |

and I also agree to abide by all the departmental rules and regulations affecting my work.

I further agree to a deduction of 10 per cent. of my monthly salary being made and placed to my credit in the East Indian Railway Savings Bank, the sum so accruing to be repaid me with interest either on my leaving the service with permission, or on completion of the full period of my apprenticeship. This deduction to be a guarantee of my good behaviour and may be forfeited to the East Indian Railway Company should I misconduct myself or fail without permission to complete my term of training.

I further agree to attend the Departmental Technical school as required under the rules, and to pay a fee equivalent to 5 per cent. of my salary for the tuition there received, to be deducted from my pay sheet monthly.

Date

Signature

1st witness

2nd witness

Signature of father or guardian

## List of Workshops in the Madras Presidency.

| Locality     |                    | Description of works                          |                                    | Average daily number of workmen in 1907. |
|--------------|--------------------|-----------------------------------------------|------------------------------------|------------------------------------------|
| District.    | Town, suburb, etc. | By whom maintained.                           | Name of work.                      |                                          |
| Vizagapatam  | Waltair            | Madras and Southern Mahratta Railway Company. | Railway Workshop                   | 635                                      |
| Hidāvari     | Dowlaiswaram       | Government                                    | Public Works Workshop              | 167                                      |
| Kistna       | Bozwada            | Do.                                           | Do.                                | 110                                      |
| Anantapur    | Gooty              | Madras and Southern Mahratta Railway Company. | Railway Workshop                   | 120                                      |
| Madras       | Georgetown         | Madras Municipal Corporation.                 | Madras Corporation Workshop        | 136                                      |
| Do.          | Do.                | Port Trust Board                              | Port Trust Workshop                | 325                                      |
| Do.          | Egmore             | South Indian Railway Company.                 | Railway Workshop                   | 317                                      |
| Do.          | Do.                | Electric Tramway Company.                     | Tramway Works                      | 202                                      |
| Do.          | Do.                | Government                                    | Gun Carriage Factory               | 871                                      |
| Do.          | Fort St. George    | Do.                                           | The Madras Arsenal                 | 335                                      |
| Do.          | Mint Buildings     | Do.                                           | The Army Clothing Factory          | 120 to 400                               |
| Do.          | Do.                | Do.                                           | Public Works Workshop              | 352                                      |
| Do.          | Perambore          | Do.                                           | The Harness and Saddlery Workshop. | 716                                      |
| Chingleput   | Do                 | Madras and Southern Mahratta Railway Company. | Railway Workshop                   | 3,103                                    |
| North Arcot  | Arkonam            | Do.                                           | Engineering Workshop               | 626                                      |
| Do.          | Do.                | Do.                                           | Telegraphic Engineering Workshop.  | 177                                      |
| The Nilgiris | Aravankad          | Government                                    | The Cordite Factory                | 847                                      |
| South Arcot  | Vilupuram          | South Indian Railway Company.                 | Railway Workshop                   | 120                                      |
| Tanjore      | Negapatam          | Do.                                           | Do.                                | 2,781                                    |
| Trichinopoly | Trichinopoly       | Do.                                           | Do.                                | 266                                      |
| Madura       | Madura             | Do.                                           | Do.                                | 250                                      |
| Malabar      | Shoranur           | Do.                                           | Do.                                | 193                                      |

## 12. Note on the Agricultural College, Coimbatore, and the Agricultural Policy of Government.

Early in the year 1905, the Government of India addressed the Secretary of State for India on the subject of the reorganization of the Agricultural Departments in this country. They stated that they desired to give the chief Local Governments sufficient funds to enable them to provide for the effective development of agricultural experiment, research, demonstration and instruction. The ultimate aims which the Government of India had in view included the establishment of an experimental farm in each large tract of country, of which the agricultural conditions are approximately homogeneous, to be supplemented by smaller demonstration farms, the creation of a well-equipped Agricultural College in each large Province, and the provision of an expert staff for purposes both of education and research. The Secretary of State having expressed general acceptance of the Government of India's programme, the work of reorganizing the Agricultural Department in this Presidency commenced during the year 1906-1907 and is still being carried on.

2. Up to the year 1906-1907, the Directorship of Agriculture had been held by a Member of the Board of Revenue, who was also responsible for the Department of Revenue Settlement and controlled the Departments of Revenue Survey and Land Records, besides possessing other duties. It was then decided to appoint a separate Director of Agriculture who, under the general control of the Board, would be able to devote his whole time to the development of the Agricultural Department. Mr. M. E. Couchman, I.C.S., was selected for this post and took charge of his duties on 24th October 1906. He has thus had rather less than two years in which to carry out the task entrusted to him.

3. One of the first functions of the reorganized Department of Agriculture was to provide efficient and practical instruction in the science of Agriculture. A College of Agriculture under the control of the Educational Department had existed for twenty years at Saidapet, but had to a great extent failed to fulfil the functions expected of it. As stated in paragraph 14 of the Note on Technical Education,\* the instruction given at this college was not sufficiently practical, the students turned out seldom continued to practise agriculture, and the land round the college was too inferior to serve the purposes of a college farm. It was accordingly decided, at an early stage at the course of the reorganization of the department, that the Agricultural College at Saidapet should be abolished and that a new School of Practical Agriculture and a Research Institute should be established instead under the control of the Revenue Department. A site was selected near Coimbatore and a considerable area of land was acquired for the purpose, the total estate consisting of 450 acres, of which 287 acres are under cultivation and the remainder occupied by buildings connected with the college, research institute, residential quarters, etc. The land was acquired in February 1906, the expert agriculturist who had been obtained from England to be Principal of the College and Institute arrived towards the end of that year, and the farm buildings were taken over from the Public Works Department in July 1907. The Central Farm has thus been under working for a year to a year and a half.

4. Meanwhile the work of erecting suitable buildings for the Agricultural College was commenced at the end of 1906. The admission of fresh students to the Saidapet institution had been stopped in 1905 and on the last batch completing their studies, the Saidapet College was closed in December 1907. The college buildings at Coimbatore were not then sufficiently advanced to enable work to be begun there, but in June 1908 it was found possible, though the buildings are not yet complete, to admit the first set of students. It will still be nearly three years before any of these students will be available for the work of the department.

\* Industrial Conference Paper No. 3.

5. The staff of the Coimbatore Agricultural College consists of a Principal (who is also in charge of the Central Farm), a Professor of Botany, a Professor of Agricultural Chemistry, and a staff of six native assistants. In fixing the curriculum and rules of the college, the aim of Government has been to avoid the mistakes committed at Saidapet and to turn out practical agriculturists and not merely graduates in agriculture. They have accordingly laid stress on the fact that the main object of the college is practical training, not the granting of diplomas or degrees; that students entering the college shall be free to take up one or more separate courses of instruction in agricultural subjects and shall not be bound to go in for the complete course; and that the standard of education required on admission shall not be so high as to exclude students belonging to the ryot class who intend to make agriculture their means of livelihood. With the same object the Government have approved of the Principal's proposal to refrain from drawing up stereotyped syllabuses and have directed that the knowledge of science to be exacted from students should be purely elementary. The first year's course, which has to be taken by all students, includes Chemistry, Physics, Practical Agriculture, Botany, Entomology and Physical Geography. In the second and third years, the course includes Theoretical and Practical Agriculture, Botany, Entomology, Elementary Zoology, Agricultural Engineering and Veterinary Science. As already stated, it is open to students to take any part of the course in these two later years, though the full course must be taken by those who aim at the diploma in agriculture. While the college will fulfil an important duty in training officers for employment in the Agricultural Department, where properly trained subordinates are greatly needed, it is hoped that it will also turn out men who will devote themselves to the practical profession of agriculture and will not merely look to Government service for a living.

6. In addition to the whole-time Director of Agriculture who has been added to the department since its reorganization was undertaken in 1905, and to the Deputy Directors of Agriculture. expert officers provided for the Agricultural College at Coimbatore, the department has further been strengthened by the appointment of two Deputy Directors of Agriculture (in lieu of one such appointment which previously existed). These two Deputy Directors divide the Presidency between them, one, whose head-quarters are at Bellary, taking the northern or Telugu half, the other, with head-quarters at Trichinopoly, having charge of the southern or Tamil portion and the West Coast. The duties of these Deputy Directors are to look after the management of the several agricultural stations within their circles, to study the agricultural conditions of each main tract, to advise and guide the local agricultural associations, to attend agricultural shows, control and aid in the distribution of suitable seeds and implements, and answer the enquiries of practical agriculturists as to improved methods of cultivation and the like. As these officers have been at work little more than a year, their time has so far been largely taken up with the management of the agricultural stations under their control, but it is hoped that in future they will be able to devote more time to touring in their respective circles.

7. The agricultural stations now in existence are nine in number, as noted below, exclusive of the Central Farm at Coimbatore. The principle followed in regard to the creation of these stations has been to ensure that, as far as possible, each station shall be devoted to the study of some definite problem. Thus the Samalkota station has dealt with sugarcane, the Palur station with ground-nut, the Taliparamba station with the pepper vine, the Koilpatti station with cotton, the Hindupur station with agaves, and the Hagari station with the irrigation of black-cotton soil. It will be noticed that some of the most important crops of the Presidency, notably paddy, have not yet been taken up for individual study in a separate farm. This is because it was found impossible, owing to the dearth of qualified subordinates for charge of these stations, to increase their number, but it is hoped that further progress in this respect will be possible before long. The Attur station has, however, been lately closed, as it was found that its soil was unsuited to agricultural experiment.

| Station.       | District.   | Principal subject of study.          |
|----------------|-------------|--------------------------------------|
| 1. Samalkota   | Gódvári     | Sugarcane and sugarcane disease.     |
| 2. Bellary     | Bellary     | Cotton and cholam.                   |
| 3. Hagari      | Do.         | Irrigation of black-cotton soil.     |
| 4. Hindupur    | Anantapur   | Agave cultivation.                   |
| 5. Nandyal     | Kurnool     | "Northern" variety of cotton.        |
| 6. Attur       | Chingleput  | Fodder crops and fruit trees.        |
| 7. Palur       | South Arcot | Ground-nut and sugarcane.            |
| 8. Koilpatti   | Tinnevely   | Cotton.                              |
| 9. Taliparamba | Malabar     | Pepper vine and pepper vine disease. |

8. The methods which have been followed by the department in its efforts to promote agricultural progress, apart from the work actually done in the agricultural stations, necessarily vary with the character of the problem under consideration. An important question is in most cases the provision of good seed. This has been given special attention in connection with cotton. In Tinnevely not only was pure karunganni cotton seed distributed from the Koilpatti station, but considerable quantities of this seed were bought from ryots who had sown farmseed the year before and were readily disposed of. In Gódvári, seed-canes from the Samalkota station have been so extensively distributed that farm canes are estimated now to account for half the entire cane area in the delta.

The provision of good seed is closely connected with the question of introducing better varieties. Much of the work done at Samalkota has thus been devoted to the discovery of a cane which should unite good sugaring quality with the power of resisting disease. Although it seems unlikely that a perfectly immune variety will be found, several canes with resisting power much greater than that of the local varieties have been introduced, and the seed-canes distributed have belonged to these improved varieties. Similarly in regard to cotton, the karunganni seed that has been distributed is superior to the common uppam variety. The introduction of fresh crops into new and suitable areas is another important matter which has received attention. As an instance ground-nut may be taken. Trial plots of this crop have given good results in Malabar and South Canara, and further steps are now being taken for its introduction in those districts. Ground-nut has also been introduced into Kurnool, Cuddapah, Anantapur, the Kistna uplands and the Pollachi division of Coimbatore. The introduction of jute cultivation in this Presidency may also be instanced. Not long ago, the Deputy Director, Southern Circle (Mr. Sampson), found a specimen of the Bengal jute plant (*Corchorus capsularis*) growing wild near Shiradi in South Canara, so that the prospects of the introduction of the crop on the West Coast seem favourable.

9. The adoption of improved methods and implements must always be a main object of the Agricultural Department, and to this end the importance of securing the good will and interest of the ryot population in the neighbourhood of the agricultural stations and of inducing them to visit the farms and examine the processes there followed has been specially recognised. In Tinnevely expert hands from Bellary have been brought down to teach the use of the country drill and bullock-hoe, and the local ryots are beginning to recognise the improved results obtainable by the use of good seed and thorough cultivation, the latter only possible in well-drilled crops. In order to induce ryots to avoid mixture of varieties, which reduces the value of the cotton, a premium of two annas per acre has been offered in the Deccan to those who grow practically pure crops, and in 1906-1907 this premium was paid in respect of 1,074 acres. In Tinnevely demonstrations have been given of the advantages of paddy planted by single plants, and this method has attracted attention also in Tanjore and South Arcot. In order to encourage the irrigation of dry crops, the supply of water free of charge has been sanctioned under the Ponnalur tank in Nellore.



10. The Agricultural Department has further recognised that one of its duties is to assist the efforts of local associations for the promotion of agricultural improvement. Several of these associations are doing useful work, notably the Ganjám and the Kumbakonam Associations. Cattle and Agricultural Shows have been held at various centres, some with marked success, and grants towards the cost of prizes have, in each case, been provided by the department. The information collected by the experts working in the department is also disseminated by means of bulletins, in English and in the vernacular, and in 1907-1908 an Agricultural Calendar was published, containing short popular articles on matters of agricultural interest, such as the care of cattle, the single planting of paddy, and irrigation by oil-engines.

11. The scheme of reorganization which was put forward in 1905 includes provision for a large extension of the veterinary work of the department. The provision of new buildings for a Veterinary College in Madras City had been undertaken even earlier and the new college was taken into use in July 1905. The first batch of students had been admitted in January of the previous year, and these finished their course of instruction in December 1906, and were drafted into the department as Veterinary Assistants. As more and more qualified men become available, the provision of Veterinary hospitals and dispensaries will be increased. Excluding the Madras and Saidapet institutions, there were only two Veterinary hospitals in the Presidency at the commencement of the year 1904-1905. The number is now nine, five under the management of the District Boards, one under a private Society for the Prevention of Cruelty to Animals, two (at Pithápuram and Vizianagram) under wealthy zamindars and one in a Native State (Pudukkóttai). In the year 1907-1908 the number of animals treated in these hospitals was 28,248.

12. In addition to the work done at the Veterinary hospitals, it is proposed to provide a staff of Itinerating Veterinary Assistants. In the year 1907-1908 six such assistants were at work, and were employed in attending to outbreaks of cattle disease, in demonstrating to ryots the benefits of preventive inoculation, and in carrying on the work of inoculation in infected centres. Over 38,000 animals were inoculated against rinderpest and anthrax during the year, and out of this number less than 200 died, though the total mortality from these diseases during the course of the outbreak among uninoculated animals was over 11,000. It is hoped eventually to provide thirty Itinerating Veterinary Assistants and ninety Veterinary dispensaries in this Presidency.

13. In conclusion the work done under the Director of Industrial and Technical Irrigation by pumping. Inquiries for the promotion of irrigation by pumping requires brief notice. The result of boring operations in the Ponnéri and Tiruvallúr taluks of the Chingleput district has been the discovery of a large body of subterranean water and five oil-engines and pumps for the exploitation of this supply have been installed. The employment of oil-engines and pumps for purposes of irrigation has made considerable progress in various parts of the Presidency, and at the end of 1907-1908 there were 94 engines at work, driving pumps of which the discharge is  $2\frac{1}{2}$  million gallons per hour, sufficient for the irrigation of 5,000 acres. There is reason to believe that there is room for a great extension of these operations, and that the work of the Agricultural Department in this direction is only now beginning.

OOTACAMUND,  
5th September 1908.

A. G. CARDEW.

### 13. Note on the Investigation of Madras Fisheries and the Formation of a Fishery Department.

In 1899 Sir Frederick Nicholson, in a note on the need for a reorganization of the Agricultural Department in this Presidency, urged the great importance of the fishery industry as a means of increasing both the food-supply and the manurial resources of this country. At the time nothing was done, but at the beginning of 1905 the question was revived, and Sir Frederick Nicholson having offered his services and expressed his willingness to assist in initiating a department of fisheries, he was appointed Honorary Director for Fisheries to the Government of Madras and has been since prosecuting enquiries both in India and in other parts of the world with a view to practical action being taken for the development of the fisheries of the Presidency.

2. The first step which resulted from Sir Frederick Nicholson's investigation was the issue of orders to enable the fish-curing industry, as it at present exists, to procure supplies of salt on more favourable terms and subject to less restrictions than formerly. Sir Frederick Nicholson proposed in 1906 that the issue price of salt for fish-curing purposes in the yards of Malabar should be reduced to As. 10 a maund, that the hours during which night work is allowed in fish-curing yards should be extended, that curers should be given facilities for cleansing their salt-fish in the sea near the yards, and that duty-free salt should be allowed to be taken to sea in fishing boats for curing purposes. These proposals were generally approved and sanctioned by Government, the last and most important suggestion being accepted subject to certain conditions for the safeguarding of the revenue.

3. The next year was mainly occupied by enquiries in Japan (regarding whose fisheries Sir Frederick has written a valuable note), Germany, the United States, and Great Britain, and there has not yet been time to carry into execution the schemes which Sir Frederick Nicholson has drawn up as a result of his studies. But practical action to carry out his ideas is now being taken, and the following brief summary will show what is proposed.

4. In the first place an experimental fishery station is to be opened at Ennore, a few miles north of Madras in which thorough trial will be made of the best methods of catching, preserving and distributing fish. Care will be taken not to interfere with the indigenous fishing industry, and with this view the scope of catching work will be in deep sea areas, outside the three-mile or five-mile limit within which the native fishermen work. Sailing boats (and not steam-fishers) will be used, but a motor-boat will be employed as a carrier to bring the fish to shore quickly. Experiments will be made in the preservatives most suitable for use in this country in keeping fish free from taint. The methods of curing will be fully studied, and it is hoped to supply an improved quality of cured fish for public consumption. Marine pisciculture generally will not be attempted, but it is proposed to start an oyster laying ground close to Experimental Station at Ennore and to breed oysters for the Madras market as well as for export. The whole question of nets for catching will also be investigated and public and private co-operation in all these experiments will be freely invited.

5. Sir Frederick Nicholson's second proposal is to establish a canning factory on the West Coast, possibly at Tellicherry, where the work of canning fish, especially sardines, for the Indian and foreign market will be practically carried on. As on the East Coast, a motor-boat will probably be needed to bring the fish ashore; canning plant of modern type will be set up, the cans being made at the factory; and students will be trained in the whole art of canning so as to fit them to supervise such factories as private enterprise may provide.

6. In connection with the canning factory on the West Coast Sir Frederick Nicholson proposes to establish a small factory to turn out fish manure. At present 15,000 tons of this manure are now exported from the Malabar district alone, but that it might be usefully employed in the country is proved by the fact that Japan

uses as much as 134,000 tons annually. The Agricultural Department's services will be utilized in bringing to the notice of the ryots the practical value as manure of the fish fertiliser manufactured at this factory.

7. These are the chief directions in connection with marine fisheries in which Sir Frederick Nicholson proposes to take action. For these purposes he has lately been given as an Assistant Mr. James Hornell, who is both a Marine Zoologist of distinction and has also had extensive experience of practical fishery work in Ceylon under the Ceylon Company of Pearl Fishers.

8. In regard to fresh-water fisheries, Sir Frederick Nicholson's proposals are less advanced. He has drawn attention to the important source of income which inland fisheries, especially carp culture, supply to the agricultural population both in Germany and Japan. But the possibility of producing a similar state of things under Indian conditions is a matter which requires further investigation. For this work Sir Frederick Nicholson has now an expert Assistant in Mr. H. C. Wilson, who has had practical experience of fresh-water fish culture in England and who has been engaged for the last two years in the study of the trout-streams of the Nilgiri Hills and in the methods of fish preservation in the larger rivers which flow from those Hills.

Ootacamund,  
8th September 1908.

A. G. CARDEW.

14. Note, dated 8th September 1908, by Dr. MORRIS W. TRAVERS,  
F.R.S., Director of the Indian Institute of Science, Bangalore.

It appears to the author of this note that the problems to be considered at the Conference fall under four distinct headings, namely :—

- (1) The organization of a Department of Industrial Enquiry.
- (2) The provision of facilities for education and research in applied science.
- (3) The establishment of trade schools.
- (4) The improvement of existing industries and the introduction of new industries.

The need for the establishment of such a department is beyond question. It should serve as a means of securing co-operation between individuals engaged either in industrial and technical enterprises or in investigations, and of collecting and disseminating information. That the department should "control" technical and industrial education appears open to question, unless such control is of a very elastic character. On the one hand it is inadvisable to saddle the Director of the Department with the duties which the "control" in education usually carries with it, and on the other it is doubtful whether centralised direction is beneficial to technical departments and trade schools.

The terms technical and industrial are frequently used in the papers submitted to the members of the Conference and it appears that they are sometimes taken to be almost if not actually synonymous.

It will be necessary at the outset to arrive at a clear understanding as to the exact meaning which is to be attached to each of them. For the methods and objects of technical and industrial education are so totally different that confusion must otherwise arise. The object of technical education is to train a student to apply theoretical principles to practical purposes and to make use of theory in solving such

problems as arise in carrying out manufacturing processes. Technical education must be based upon scientific education ;

there is, at the same time, a considerable danger that it may not be sufficiently practical, and this is particularly the case in India where it is difficult for a student to obtain any insight into manufacturing processes in the course of his training, or even after he has finished his course. On the other hand the scientific aspect of the training must not be lost sight of. A recent report on a certain industry in South Africa ascribed the slow rate of progress which was being made to the fact that the industry was in the hands of individuals calling themselves "practical men," who

were, to quote from the report, "unable to understand or apply theory". Scientific and technical education are inseparable, and as I will point out later, this fact has an important bearing on the problem.

The object of industrial education is to train "hands" and perhaps foremen for works, and does not involve the teaching of general principles but only of their application. The training should be

Industrial education should be in close touch with industry. mainly manual,—for as far as the workman is concerned even geometrical drawing

or design involves little or no theory, and only such book study should be introduced as will enable the workman to make the best use of his hands. Accuracy and rapidity of work in a definite handicraft should be the result of the training.

So far as the organisation of technical and industrial education is concerned there is one important point of difference which it is important to lay stress upon at the outset. Technical education, and to this

must be added technical research, cannot be separated from education and research in pure science, and the more branches of science and technology there are associated in one locality, or better still in one institution, the more successfully will education and research be carried out. Industrial education need only be in touch with the industry for which it provides workmen, and each branch of industrial education is almost independent of others.

There have been several schemes for the organisation of technical education before the public during the past few years, involving the establishment of technological institutes, and it is sometimes claimed that though India cannot afford to spend money on pure science the commercial salvation of the country lies in the development of applied science and technology. Reference is made to the progress made in Germany, an attention is called to the technical schools which have been established in that country and also in America, Switzerland and elsewhere. That these institutions invariably contain fully equipped departments of pure science, and that it is around these departments that the departments of technology centre is lost sight of. The fact that in Germany the *Technische Hochschulen* arrived at their present position of independence from the Universities is little more than an accident is only obvious to those who are acquainted with the history of university development. Neither Germany nor Switzerland are wealthy countries, and their universities and technical schools are maintained in either case by the State, so that it is hardly likely that they would establish departments of pure science of the highest standard of excellence in their technical schools as well as in their universities if this were unnecessary. It follows that the establishment of independent and isolated departments of technology in India is likely to prove false economy rather than a royal road to success. Experience gained in France confirms this view.

Organisation of technical education in the West. It must not be forgotten that the creation of an industrial India does not merely imply the transplanting of European industries into an exotic soil, where the aid of cheap labour will counterbalance rule-of-thumb management. It is necessary in almost every case to investigate the effect of the changed conditions, the variation in the raw material, and the effects of climate on the processes involved, and this is work which requires highly trained managers. With the practical man the result will be the same as was arrived at in certain cases in South Africa. Mr. Chatterton has shown in his report that an industry (chrome tanning) which had been successfully carried on in Madras did not meet with equal success elsewhere, but no doubt he and his highly trained assistants will find a solution of the difficulties. However, this is an excellent example of what is certain to happen in the case of imported industries which can only be successful when directed by highly competent men.

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The majority of the problems which come under the notice of any one engaged in technical research are of so complex a character that the investigator is placed at a great disadvantage if he is unable to consult colleagues engaged in branches of science and technology other than that in which he is himself an expert. Suppose, for instance, a problem connected with the manufacture of spirit is under consideration. It will best be solved by the co-operation of a chemist, a bacteriologist, and an Engineer. There are numberless problems in which the man who has time to devote his attention to pure chemistry can assist one who is obliged to give his attention to the technology of some branch of chemistry and is unable to follow the developments of his science.

Reasons for association of science and technology. While on the one hand technology is apt to become divorced from science, there is an even greater danger of the business side of the training being ignored altogether. It is not unusual to find that students who have been extremely well trained both in the theoretical and practical branches of their subject, so that they could erect a work and conduct the processes with a certain amount of success, have not the slightest idea of the methods of arriving at the cost of production, of markets, or of business matters generally. It is not easy to provide for this side of the training.

One arrives at the conclusion then that if provision is to be made for teaching and research in applied science the new departments should be established in connection with institutions in which departments of pure science, and possibly of applied science

already exist. There is only one objection to this arrangement, and that is that it may result in separating particular branches of applied science from the industries with which they are associated. This has, however, been found to be a lesser evil than the isolation of individual branches one from the other, and from pure science, and on this point Western opinion can be easily arrived at by considering the situation of three of the most important scientific and technical institutions in the world, the Technische Hochschule at Charlottenburg, the School of Technology at Boston, and the College of Science and Technology in South Kensington, London.

To sum up the points already considered it is suggested that education and research in applied science (technical education) should be provided for in departments attached to such an institution as the Engineering College, and that industrial education should be provided for in trade schools established in the centres of the industries. Night schools do admirable work in the West, but it is difficult to obtain the services of efficient teachers. It is doubtful if teachers could be on duty by day and by night in India.

It may be added that the points which have been considered have received attention in organising the Indian Institute of Science. The Director hopes to receive students from Madras, and to work in co-operation with the new department of the Madras Government when it is established.

In conclusion certain other matters may be considered briefly. Observations on the methods of Indian workmen lead to the conclusion that they are not unwilling to learn the use of Western methods and appliances, but it is not of much use for industrial schools to teach the use of modern tools while it remains so extremely difficult to buy good European tools at a moderate price. Perhaps the new department might find the means of inducing European firms to send their travellers through the country as the Singer Sewing Machine Company have done, and provide good tools on reasonable terms. These remarks apply particularly to wood-workers. The fact that the public is satisfied with a low standard of excellence in almost every kind of work is largely responsible for the inferior quality of Indian workmanship.

Considering the questions raised in connection with the development of industries it may be remarked that it is too often the case that the authorities, within and without India, are apt to consider that an industry does not require assistance except at its birth or until through economic causes it is about to be swept out of existence. In the former case there is in India too much of a tendency to attempt to introduce entirely exotic industries, such as the manufacture of lead pencils or glassware, and to neglect the natural resources of the country. On general economic grounds the working up of raw material which can be more readily obtained in India than elsewhere, both for export and for home consumption, should be of greater advantage to the country, than the manufacture of articles upon the sale of which European competition would leave but a small margin. At present enormous quantities of material used in the manufacture of drugs, essences, etc., are exported from India, and large quantities of the manufactured articles are reimported. The fibre-yielding materials of India have been by no means completely investigated. This list might be extended considerably. Of course there is no reason why such products as acids, alkali, and heavy chemicals generally should not be manufactured extensively in the country, as the freight alone is sufficient to protect the industry from competition.

With regard to the improvement of existing industries which flourish, but for which much might be done, the manufacture of pottery, oils, paints, tobacco, silk, should be considered at an early date.



15. Note, dated 8th. September 1908, by Mr. C. B. SIMPSON on Government assistance to Industry and starting of Factories by Government.

The question of Government starting factories is an important one for merchants and others who are engaged in industrial work in this country. I think that very serious consideration and consultation with the representatives of industries should precede any such undertaking. I consider that in ordinary circumstances the presumption is against the desirability of Government starting an industry unless it is one in which the private capitalist does not already exist or is not likely to venture to engage in.

There are of course various ways in which Government may with advantage assist the resources of the country without coming into competition with the private capitalist. Among these I would name the supply of good seed such as groundnut and cotton seed to ryots, the development of deep sea fishing as is being done at Eunore, the supply of stud animals for breeding.

Possibly the manufacture of aluminium metal might also be a fair field for experimental action, but I think it undesirable for Government to undertake industrial schemes such as the tanning factory, the aluminium factory and the weaving factory at Salem.

I also think that this question must be looked at from the standpoint of India as a whole. If an industry is flourishing in Calcutta, Bombay or Rangoon, developed by private capital, I do not think it would be fair for Government to start or subsidise a factory in Madras that would in any way compete. With increasing facilities for exchange of goods, factories in one part of India almost inevitably compete with similar factories in another part.

I think Government should do all in its power to improve hand-loom weaving, on the lines suggested by Mr. K. Krishnaswami Rao and Mr. P. Rajaratna Mudaliyar, by sending out maistries and carpenters, and to improve the methods of cotton ginning, hand spinning and to introduce other cottage industries of any kind that will occupy the village people.

We have an instance of a cottage industry near our doors at Pulicat where baskets have been made for many years, and it is industry of this sort, I think, there is great room for, industries that could be introduced amongst the people which would occupy their spare time and bring them in revenue and be more suited to their habits and their country surroundings than factory life.

Cottage industries would benefit the people materially, increase the wealth of the country, and so far as I can see would injure no one, whilst if Government launch out into factory enterprises, I think they will be moving in a direction in which I do not think Governments should go. They must compete with private enterprise in almost every case.

The result of starting Government factories will be to lead to the establishment, sooner or later by Government, of other subsidiary factories such as the training schools for fitters foreshadowed in Mr. Chatterton's note in Paper No. I—schools, which to be of any value, must in reality be workshops. Further, by establishing such industries, Government will seriously interfere with existing industries by competing with them for industrial labour which is already scarce enough. This competition will be unfair, in addition, for work-people will always prefer Government hours and Government pensions to private employment.

Every year the Buckingham and Carnatic Mills are each of them from 500 to 600 work-people short in March, April and May. Their complement is full about August, whilst for the rest of the year they have a small surplus in the hope of reducing the effect of the migration that will follow with the next spring.

An examination of the industries already started will show that there are grave doubts as to their benefit.

As regards the aluminium industry, Government are accused of displacing by aluminium goods the work of brass workers, whose goods many consider to be as serviceable as aluminium. There can be no doubt that the one industry has been developed at the expense of the other. The factory, I understand, is largely employed on work for regiments and the demand for ordinary domestic utensils, so far as my enquiries go, is very small.

The aluminium industry by the figures given us in the year 1903-1904 only reached a turnover of Rs. 2,91,000, surely a very small industrial figure considering it had the whole weight of Government behind it. An industrial annual turnover of Rs. 3,00,000 has not added much to the industries of India. If the initial factory had led to further factories being opened, I think the enterprise might have been considered justifiable; as it is there is no word of other factories being opened, and the first one with experience bought at the expense of the country is now the property of a Company and its production apparently suffices for all India.

By starting a tanning factory, Government will necessarily compete with existing factories, if not in Madras at any rate in Cawnpore. If it is Government's object to improve the system of tanning, I think they should confine their efforts to research and experimental work, such as can be carried on in a laboratory, and to technical training. I cannot conceive that the Government factory, without assistance in the shape of Government orders, such as the Jail Department receives, can ever be a commercial success, and I think that Government before long will regret the enterprise. I think the same attention devoted to the improvement in the quality of cattle, which would benefit the quality of the hide, would prove a much more valuable asset to the country as a whole and to the tanning industry in particular.

Whatever reasons Government may have had for starting aluminium and tanning factories, it does not seem to me that it would be sound, under any circumstances, for them to start factories for industries which already exist. For instance, if sugar can be more economically produced by the methods employed in Java than in India, it would not be fair or right for Government to start a factory in India. Such a factory could only enter into direct competition with the existing industry and would deservedly be stoutly opposed; but no sugar manufacturer would object to a laboratory turning out students trained to Java methods, if Java methods are superior; on the contrary, I am sure, they would welcome such a laboratory.

The Hon'ble Mr. P. Theagaraya Chetty, in his letter, dated 31st July 1908, Paper No. V, thinks that his proposals "will serve as object-lessons to open the eyes of capitalists." I do not agree with him and consider that the opening of Government factories on a commercial basis will make capitalists shy of investing money in any industry at all. We have all to pay for our experience in every industry, and it is not right or fair that Government should pay for the experience of certain Companies.

What will happen if Government cannot float off projected factories to Companies? Will they be bolstered up as the jails are by receiving enforced Government orders to the detriment of all private enterprise?

The power-looms at Coimbatore are a typical instance of unfair competition by a Government factory. So long as the looms at the jail were worked by hand, there was no serious suggestion of unfairness, but as soon as they were worked by power, their work became a menace to private enterprise and in fact rendered idle for several years machinery specially imported to manufacture clothing for Government departments.

With regard to hand-looms, I deprecate the collection of these into factories such as is apparently being done at Salem. I think Government in starting such factories are unfair to enterprising manufacturers such as those referred to in Industrial Conference Paper No. IV, page 12, where five factories of the Basel Mission are referred to, one of Mr. A. J. Peri's and some others. Surely the knowledge of the existence of these enterprises should have prevented a hand-loom factory ever being opened at Salem by Government and so virtually entering into competition with others who have probably slowly and laboriously worked up their industry.

A point that power-loom users would be justified in raising in connection with these factories is that hand-loom cloth is exempted from excise duty. No power-loom user seriously objects to the cottage industry receiving the benefit of freedom from the  $3\frac{1}{2}$  per cent. excise; but when looms are collected into factories, particularly by Government, I think they are justified in taking exception to it, as the benefit to the cottager, in my opinion, then ceases.

The principal reason hand-loom weaving was exempted from excise was because of the difficulty of collection. If hand-loom weaving can be extended by grouping into factories, it will be at the expense of power-loom users who will be justified in pressing for the excise duty to be extended to the hand-loom factories. The excise duty is no small matter to the power-loom user. The capital of the Buckingham Mill Company (Limited) is Rs. 10,50,000, and the excise duty paid by this Company during the official year 1907-1908 was Rs. 67,127 representing 6.40 per cent. on the capital.

To pass from the consideration of factories already established, in paper 3, page 15, it is suggested that a dyeing factory should be started and on page 17 there is an estimate for starting one on a capital of Rs. 40,000, with a recurring expenditure of Rs. 50,000. Now this factory, if started, can only result in disastrous loss to Government or in unfair competition with existing dyeworks which from the amount of chemicals imported seem to be doing a flourishing business.

The amount of capital invested in dyeing machinery at the Buckingham Mill alone is not less than 5 lakhs; the monthly expenditure amounts to Rs. 35,40,000; the area covered by the buildings is about 80,000 square feet or the size of Mr. Spring's new dutiable import shed; and it employs about 400 work-people. If any industry is established in this Presidency on a commercial basis, surely dyeing is one of them and I cannot conceive any argument or justification for Government starting a dyeing factory.

Dyers have to import their chemicals from Europe and have to pay 5 per cent. import duty on them. The power-loom user importing dyes therefore has to pay this duty, but in addition to this duty his dyed cloth is scheduled at a higher rate for excise than undyed, a manifest unfairness. By starting a dyeing factory Government would have no duty to pay on the chemicals it imports and the factory would thus at once start with an unfair handicap. Further, the yarn would be used by hand-loom weavers who pay no excise on their undyed cloth and consequently would have no enhanced duty on their dyed cloths, all of which would still further handicap the power-loom manufacturer in competition with the hand-loom weavers. This further handicap I for one would not object to if the villager working in his own home benefited by it, but I think it would be most unfair for factories of hand-loom, particularly those started by Government, to enjoy this advantage.

That Government should train chemists in dyeing on European lines, I think, is right. Any competition that may result from that education is fair and square enough, but I do not think Government should go beyond giving or helping to give men their training in Technical schools on the lines of English Technical Colleges.

It is not necessary for Government to start dyeing on a commercial basis in order to introduce improved methods. This end could be attained by bringing out as suggested a special chemist to study the existing industry and to teach correct and improved methods. To such action there could be no objection. The Dyeing Department of the Leeds University is widely known; students from all over the world attend its classes; but no dyeing on a commercial basis has ever been done there; in fact, I believe the Clothworker's Company, who have provided most of the funds, insist that commercial dyeing *shall not* be done. This is done in the best interests of the industry and of the University.

There are, it seems to me, other lines along which Government might do a great deal to assist in many ways industries that already exist, and with all diffidence I would suggest that the evidence of such willingness to assist would do more to develop existing industries and encourage fresh industries than any industrial enterprises on the part of Government.

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Merchants in Madras might receive more sympathy from the Board of Revenue and the Secretariat. Applications which, in the stilted language of Government, are called "petitions" are scarcely ever successful and the only satisfaction occasionally received is to find above or below a curt paragraph of dismissal a row or two of stars from which it may be inferred that the official appealed against has received some exhortation which it is not considered good for the "petitioner" to hear, but the existence of which leads the petitioner to hope for better things next time!

Recently I am glad to say there have been signs of change. The Collector of Sea Customs has joined the Chamber as an Honorary Member and I am sure from the regularity of Mr. Todhunter's and Mr. Heaney's attendance that they have found that the closer association with merchants assists them with their work inasmuch as they can at least enter into and appreciate the merchants' standpoint. Since the advent of the Sea Customs Collector to the Chamber, appeals to the Collector and from the Collector's decision have been much reduced, and when a decision does go against the merchant, there is no feeling now that the Collector has not understood the case and gone into the question himself.

It is too much to expect a Member of the Board of Revenue to join the Chamber, but might it not be possible for all appeals and applications to be made to a Special Commercial Secretary who might join the Chamber and whose duty it might be to investigate and understand the mercantile application, grievance, or standpoint, and place it suitably before the proper authority.

Merchants feel also that they have reason to complain of the delays in dealing with applications for land made to Collectors under the Acquisition Act or otherwise. These sometimes are inordinate and are most disconcerting to applicants.

Again applications for mineral licenses seem to be passed about from department to department in a way that is bewildering to the merchant and occupies an immense amount of valuable time.

If Government would try to meet business men a little by promptitude in correspondence (some important letters receive no reply at all) and show more sympathy in dealing with applications relating to industrial enterprises, I am sure that the country would benefit, and that a much better understanding would exist between the Government and the merchants than is now the case in this Presidency.

16. Note, dated 12th September 1908, by Mr. ALFRED CHATTERTON, B.Sc., in reply to the above.

The note presented by Mr. C. B. Simpson to the Conference deals with one of the most important subjects under discussion and as the views put forward are diametrically opposed to the policy which is now pursued in this Presidency and which it is not unlikely will be adopted in other parts of India, it seems to me desirable even at the risk of tediousness that Mr. Simpson's statements should be examined in detail. I doubt very much if Mr. Simpson would have written the note if he had read Paper No. VIII which was issued to the members of this Conference. This paper is my last annual report to Government and contains, amongst other things, information regarding the working of the industrial departments, against the establishment of which this protest has been entered. If the members of the Conference carefully peruse paragraphs 8 to 12 of that report, they will see that Mr. Simpson's remarks have been written without a detailed knowledge of the actual facts and that in reality we have to a large extent been working in the direction which he considers the only safe one to pursue.

Mr. Simpson would prefer that Government should not ordinarily take up the work of pioneering industries, but he admits that in certain cases it is permissible. He says: "I consider that under ordinary circumstances the presumption is against the desirability of Government starting any industry *unless it is one in which the private capitalist does not already exist or is not likely to venture to engage in.*" And again "possibly the manufacture of aluminium metal might also be a fair field for experimental action." The pioneering of industries by Government is therefore not condemned *in toto*, but only such industrial schemes as the Chrome Tanning Factory, the Aluminium Factory and the Weaving Factory at Salem; that is to say all the concrete examples of work in this Presidency are condemned, and it is a matter of regret that Mr. Simpson has expressed no opinion on the scheme for the establishment of a plant for distilling wood which is outlined in paragraph 12 of the annual report already alluded to. This scheme has not yet been carried out and it would be interesting to ascertain whether Mr. Simpson considers this *an industry in which the private capitalist does not already exist or is not likely to venture to engage in.* Mr. Simpson apparently does not object to the pioneering of industries by Government under conditions which in the main I accept, but he takes objection to the existence of Government factories on grounds which are only valid if the Government pioneer factories are allowed to continue indefinitely as manufacturing institutions. It will be convenient to deal with his objections *seriatim*.

At the outset he says: "If an industry is flourishing in Calcutta, Bombay or Rangoon developed by private capital I do not think it will be fair for Government to start or subsidise a factory in Madras that would in any way compete. With increasing facilities for exchange of goods factories in one part of India almost inevitably compete with similar factories in another part." I do not think Government ever contemplated the establishment of a factory in Madras which would directly compete with the existing factories in other parts of India. At the same time I cannot admit that competition must necessarily exist, as the question of freight is an extremely important one, and it is quite conceivable that many materials might be manufactured in Madras and in the north of India without any possibility of competition arising. Factories situated along the coast may or may not compete with one another but they have always to meet the competition of imports from Europe and America. The freight between London and India is frequently much less than the freight between Indian ports. For example, some time ago the rates between Madras and Rangoon were more than twice as high as the rates between London and Madras.

Further on in his note Mr. Simpson says: "The result of starting Government factories will be to lead to the establishment sooner or later by Government of other subsidiary factories such as the training schools for fitters foreshadowed in Mr. Chatterton's note in Paper No. I schools which to be of any value must in reality be workshops. Further by establishing such industries Government will seriously

"interfere with the existing industries by competing with them for industrial labour which is already scarce enough. This competition will be unfair in addition, for work-people will always prefer Government hours and Government pensions to private employment." It is unfortunate that he is not in any way acquainted with the Government factories under discussion, and I would ask him to produce a single case in which any of the Government factories under my control has in the least degree entered into competition with private enterprise for industrial labour. I can by calling for records of the subsequent careers of boys trained in our industrial schools supply evidence that hundreds of trained workmen have been turned out and have readily found employment in private workshops. The very rapid development in the use of oil-engines necessitated some special arrangement being made for the training of drivers, and if Mr. Simpson objects to the establishment of industrial schools to train fitters and engine drivers, I should be glad if he would suggest some better method by which the demand for these men can be met. The allusion to Government hours and Government pensions does not apply to the pioneer factories in existence. None of the men employed are on the permanent establishment and they are therefore not entitled to pensions, and the hours they work are those which usually prevail in the factories and workshops in Madras.

The remarks on the aluminium industry are based upon erroneous information as to the actual facts. Paragraph 9 of my report briefly states the reasons which led to the starting of the aluminium industry and in addition to the facts there stated it may be well to add that, after preliminary experiments to demonstrate the practicability of manufacturing aluminium goods in India, the matter was brought to the notice of every firm in Madras, and they one and all with the exception of Messrs. Best & Co. declined to have anything to do with the business. Previous to the starting of this work in Madras attempts were made to introduce aluminium into India in Bombay, which met with complete failure, and when I first approached him on the subject, the then Managing Director of the British Aluminium Company told me that he had no hope whatever of finding a market for aluminium in India. It is probable therefore that the British Aluminium Company views this industrial experiment with greater favour than Mr. Simpson who draws attention to the fact that an industrial annual turn over of three lakhs of rupees is not a matter of great importance, but that I think shows that probably private enterprise was right in rejecting the initial overtures whilst the ultimate success of the Indian Aluminium Company has justified the preliminary experiment undertaken in the School of Arts. Moreover it should be remembered that, so far from the aluminium industry having been established at the expense of the country, when the accounts were finally closed and after due allowance had been made for every conceivable item of expenditure except my pay there resulted to Government a profit of Rs. 29,580. Mr. Simpson says: "If the initial factory had led to further factories being opened I think the enterprise might have been considered justifiable"; that I think would imply that industrial experiment is only to be undertaken when the result can be predicted beforehand. It is admitted that we have not yet succeeded in placing the aluminium industry on such a footing as would justify the establishment of works for producing the metal in the country, but we are slowly progressing in that direction, and the progress of the aluminium industry is by no means unsatisfactory. Besides a large factory in Bombay under European management there are a considerable number of small native factories established in the Gódvári district, and the metal-working plant of the Indian Aluminium Company in Madras is unquestionably as good as can be found in any other part of the world. Mr. Simpson states that the aluminium industry has been developed at the expense of the brass workers, but this is far from being the case. If the manufacture of aluminium goods had not been started in India, there is unquestionable evidence that they would have been imported from Germany and other countries. To take a single example, thousands of German water-bottles were brought into India, but we succeeded in manufacturing by hand in Madras a more serviceable water-bottle and completely stopped the importation of the foreign article. Already considerably more than 100,000 such bottles have been made in Madras, and a plant has recently been obtained whereby as many as 500 per day can be produced. If Mr. Simpson had made enquiries from the Indian Aluminium Company as to the nature of the demand for aluminium in India, he would have been informed



that, although there is a considerable demand from the regiments and military authorities for aluminium utensils, yet the bulk of the business of the company is to supply the demand for ordinary domestic utensils.

Dealing with the tanning factory I think Mr. Simpson's criticisms would have been less severe if he had been acquainted with the history of that Institution and with the objects for which it was started. It may be well to clearly state that before any experiments in chrome tanning were made in Madras with funds provided by Government, the Chamber of Commerce had officially informed the Madras Government that members of that body had had their attention directed to the subject of chrome tanning, and after costly experiments they had come to the conclusion that the establishment of chrome tanning in Madras was impracticable for climatic reasons. There is no truth in the statement that "by starting a tanning factory Government will necessarily compete with the existing factories, if not in Madras, at any rate in Cawnpore." It would have been more exact to have introduced the word "Chrome" before tanning, as vegetable tanned leather is not made in the Government factory, and at the time it was started chrome leather was not made in Cawnpore. I make this statement, not on hearsay evidence, but as the result of a visit to Cawnpore in August 1905. It should be explained that, when Government were first asked to provide funds for experiments in the manufacture of chrome leather, it was pointed out that one of the most important properties of chrome leather was its capacity to resist the action of water, and it was thought that this property might be turned to the advantage of the ryots who use enormous quantities of leather for water-bags and kavalais. Paragraph 3 of the report of the Chrome Tanning Department shows that in this respect our anticipations have been realised, and it is possible that, if Mr. Simpson had read that report, he would not have arrived at the conclusion that "Government before long will regret the enterprise."

If the chrome process of manufacturing leather ultimately succeeds in displacing the present methods of tanning the benefit to the country at large will be not inconsiderable. The internal consumption of leather for water-bags and sandals is very large, and I think I can produce sufficient evidence to convince Mr. Simpson that the chrome leather manufacture in the Government Tannery is for these purposes at least twice as good as the imperfectly tanned hides which come out of native tanneries. If the internal consumption of hides is therefore reduced by 50 per cent. the number available for export will be correspondingly increased. If the market abroad were already overstocked there might be no great advantage in this, but it is a well-known fact that the demand for leather is steadily increasing and the general tendency of prices has been continuously upward for more than half a century. The ryots of Chingleput have already learnt to appreciate the durability of chrome leather and they purchase it freely although we charge them a considerably higher price than that at which they can obtain a corresponding amount of vegetable tanned leather. They buy the chrome leather because it is to their advantage to do so, and the tanner who has lost his business in Chingleput finds a ready sale for his leather with the firms who carry on an export business.

When chrome tanning was first taken up, there was no idea of starting that branch of the business which is devoted to the manufacture of chrome leather into saleable articles. Experiments showed that the leather was suited for many purposes besides kavalai bags and trunks, but the trade had no confidence in it, and from inability to dispose of our leather in the raw state we had to engage chucklers to make it up into kavalais, sandals, boots and shoes and dozens of other miscellaneous articles. This branch of the business we shall be only too glad to close as soon as we can.

In connection with the hand-loom industry, Mr. Simpson's remarks can be dealt with very briefly. The Salem Weaving Factory was mainly started as an experimental station for testing the various forms of hand-loom on the market and to test the possibility of getting the hand-loom weavers to work under factory conditions. A full account of the work done there will be found in the paper which I contributed to the Surat Industrial Conference. The Salem Weaving Factory in no way enters into competition with the five factories of the Basel Mission. It was established to demonstrate that the fly shuttle loom could be used in the manufacture of fine native cloths and these articles are not manufactured in the Basel Mission Workshops. For

twenty years or more efforts have been made in various parts of the Madras Presidency to introduce improved methods of weaving among the people engaged in this industry. They have all failed and the serious movement for the improvement of this industry which has grown up during the last few years can be clearly traced to the effect of the Government Weaving Factory, which for years was located in Madras and was finally transferred to Salem about two and a half years ago. It attracted the interest of the native weavers and of the native public, because from the beginning we carefully eschewed the manufacture of what I may term "Mission goods" and confined ourselves entirely to the production on the fly shuttle loom of materials which had hitherto only been manufactured on native hand-loom. The successful demonstration that such work could be done has led to many similar experiments in other parts of the country, and it is possible that the hand-loom weaving industry will eventually gravitate into factories, the establishment of which Mr. Simpson seems to deprecate. It is quite outside the scope of this Conference to discuss the evil effects of the excise duty, but I am prepared to accept Mr. Simpson's contention that hand-loom factories should be placed on the same footing as power-loom factories should they ever pass beyond the experimental stage.

I have now to deal with certain general propositions put forth by Mr. Simpson. He says: "whatever reasons Government may have had for starting aluminium and tanning factories it does not seem to me that it would be sound under any circumstances for them to start factories for industries which already exist." To this proposition I cordially assent and I do not think there is the least fear that Government will ever dream of starting a cotton mill, a jute mill, or a paddy hulling plant in the Madras Presidency. If Mr. Simpson possessed as much experience of running Government factories to pioneer new industries as it has been my fate to acquire, he would not, I think, consider them a very serious menace to private manufacturers.

In the note on "Technical Education" prepared for this Conference by the Hon'ble Mr. A. G. Cardew some account is given of the efforts which have been made by Government during the last 20 years to promote technical education with a view to increasing the industrial prosperity of the country. The failure of these efforts has demonstrated the futility of attempting to promote industrial development by providing technical instruction for non-existent industries and it is only as a last alternative that Government have been compelled to accept the policy that industrial development must precede technical education. The main business of the Conference is to discuss this proposition and, if it accepts it, to indicate the lines on which it should be developed. The existing industries are few, but where they are sufficiently important it is to be hoped that the Conference will be able to clearly indicate what measure of technical education should be provided to promote their expansion. It is also to be hoped that the Conference may be able to indicate in what directions Government can undertake pioneering work and, with the results of the efforts which have already been made in this direction before it, express their approval or otherwise of the principles which have guided our action and of the methods we have perused in carrying them into practice.

Manufacturing enterprise in the Madras Presidency is at the present time very weak and I am not prepared to assent to the proposition put forward that Government has no right to start a factory in India to demonstrate the advantages of improved methods of working in any particular industry. If they can be introduced in any other way I would gladly adopt that procedure, but as a last resource I think it will be in the best interests of the country at large that Government should be at liberty to demonstrate these advantages in a practical way provided always it is willing to retire from the business as soon as that object has been accomplished.

In another place Mr. Simpson states "we have all to pay for our experience in every industry and it is not right or fair that Government should pay for the experience of certain companies." This would seem to imply that Government take up this pioneering work at the instance of existing companies, but in reality I do not think this will ever be the case. It is for the Conference to say in what direction and to what extent assistance may be legitimately accorded to existing industries, but pioneer work must necessarily be an attempt to call into existence new industries, and as yet we have but little experience to go upon as to how they will

be disposed of. Presumably the course followed in the case of the aluminium industry will form a precedent, and if so, it is open to any one to participate in the advantages accruing from the work done by Government by subscribing for shares in the company established to take over the business.

Mr. Simpson asks "What will happen if Government cannot float off projected factories to companies? Will they be bolstered up as the jails are by receiving enforced Government orders to the detriment of all private enterprise?" The answer to this is that if the industry proves a failure, it will have to be shut down and the loss written off. If the industry proves successful, it is hardly conceivable that private enterprise will fail to come forward in some form or other and take it over. It is conceivable that in certain cases an industry, without being a failure, may not be a pronounced success, and should such a case arise we must, I think, presume that Government will deal with it according to the dictates of common sense.

I do not think it is at present worth while to discuss at any length Mr. Simpson's remarks regarding the proposal to start a dyeing factory. The necessity for such has not been seriously considered, and I regard it at present as only remotely probable. If the factory were started it would necessarily be for some very special purpose, and it may be taken as practically certain that those who have already invested capital in the dyeing industry will be consulted before doing so. It will be a question for the Conference to discuss whether the dyeing industry in the Madras Presidency is of sufficient practical importance to necessitate the establishment of a dyeing school either as a separate institution or as a branch of a Technological Institute; or whether it would be preferable to engage the services of a competent expert to make a survey of the existing industry with a view to suggesting what action can be profitably taken to effect developments. Such a report would undoubtedly be communicated to those interested in the trade and any action that would be taken upon it would, I think, largely depend upon the opinions of those interested in the matter.

After carefully perusing not only Mr. Simpson's note, but also the notes submitted by the Chamber of Commerce and the Hon'ble Mr. A. J. Yorke, I cannot help thinking that they have to some extent been under a misconception as to the attitude of Government, so far as I understand it, in regard to industrial enterprise. I am not authorised to speak for Government, but the principle which guides my action in all the work I have so far undertaken is to do everything I reasonably can to assist private enterprise, and I can confidently assert that in no instance have I ever used my position or the powers entrusted to me to further schemes to the detriment of private enterprise. In all this I believe I have acted in accordance with the wishes of Government, and I think I am absolutely correct in saying that the policy which it is proposed to pursue is directed to the encouragement of every legitimate form of private enterprise and that it is the desire of Government in such work as may be undertaken to associate themselves as far as possible with the mercantile community.

The latter part of Mr. Simpson's note in which he indicates certain "lines along which Government might do a great deal to assist in many ways industries that already exist" deals with questions beyond my cognisance and I do not propose to say anything thereon, but I would suggest that if eventually a new department is created to deal with industrial questions, it would be of great advantage both to Government and to private enterprise that the Director of the Department should be invited to become an Honorary Member of the Chamber of Commerce. It would bring him into touch with the mercantile community, and I do not doubt that such association will enable him to perform his duties in a more efficient manner.

Mr. Simpson in his note endorses the opinion expressed by the Chamber of Commerce in its note printed in Paper No. V submitted to this Conference and it will be convenient to quote paragraph 6 of that note:

"As regards the promotion of new industries the Chamber of Commerce does not wish to advocate Government embarking on a manufacturing scale with public funds where commercial men fear to venture their own money. So it would suggest that the Director of Technical Inquiries should devote his attention chiefly to industries that there are grounds for hoping would prove successful known as cottage industries."

A list of such industries is furnished, but I think the majority of them are what might be termed minor industries rather than cottage industries. Mr. Simpson very correctly considers a cottage industry as one for people "which would occupy their spare time and bring them in revenue and be more suited to their habits and their surroundings than factory life". He says "cottage industries would benefit the people materially, increase the wealth of the country and so far as I can see would injure no one". To all this no exception can be taken, but we are faced with the insuperable difficulty that the poorer classes of this country will not take to occupations supplemental to their main avocation in life. The experiment has been tried on many occasions, and I am absolutely certain that any serious attempt on the part of Government to introduce cottage industries will not meet with success commensurate with the expenditure involved. The list of so-called cottage industries furnished by the Chamber of Commerce does not, I think, include any which could be carried on by the people in their own homes. Cottage industries outside those which only give employment to women and children mainly flourish in Europe because there are long winters when there is very little work to do in the fields and when for climatic reasons the people are compelled to remain within doors. In this respect the people of this country are more happily situated, and though cottage industries would undoubtedly be a boon in times of famine, there is, I think, but little hope that they can be successfully introduced. It would, however, I think, be good policy to encourage efforts in this direction, but their economic effect must necessarily be small, and I think it would be a misdirection of energy if the Director of Industrial and Technical Inquiries devoted his attention chiefly to this work. The Chamber of Commerce think that Government should not employ public funds where commercial men fear to venture their own money, but I would submit that in some cases Government may take risks which commercial men cannot afford to do, and that in many cases a Government organization can successfully undertake work at very much less cost than private people. Government has resources at its command which no private individual enjoys, and the prestige of Government is a factor which must not be lightly regarded when success depends not a little upon persuading the people of this country to make a change.

Although I regret that Mr. Simpson wrote his note without a full knowledge of the facts, yet I welcome the same as a valuable contribution to the discussion, and I hope that in my reply thereto I have not passed beyond the bounds of legitimate criticism. I fully recognise that if any considerable industrial development is to be recorded of the Madras Presidency in the next decade it must be by the co-operation of the mercantile community and the people of this country with the Government, and that much more will be done if we can establish a feeling of mutual confidence.

17. Note, dated 14th September 1908, by the Hon'ble  
Mr. A. J. YORKE on Industrial Development.

I would ask in the first place is our aim to be the quick starting of industries by any means, or are we to aim for the sound development of industrial private enterprise?

In the former case, if industrial development by any means be our end, there would obviously be something to be said in favour of Government going in to industry in all sorts of directions as Mr. Chatterton appears to advocate. With the tax-payer to draw on, works could be quickly started and, on the basis of capital say at 3½ per cent., and with Government custom probably reserved for their manufactures, except with gross mismanagement, almost any State industry should pay. But the better it paid and the more it were extended the more it would be deadly to private enterprise. I say this because no private individual or company can possibly compete with the State, whose tax-payers bear any losses. So no prudent man would sink his capital in industry where Government competition could be feared, even remotely. Obviously such competition would spoil all prospects of really large profits and thus will take away the fundamental inducement to run the heavy risks of industry. That is my point. Remove the possibility of big profits and, from a private enterprise standpoint, the soil is unfit for industry building on. Then, if private enterprise hangs back discouraged, Government will continually have fresh openings pointed out for their Industrial Department and thus, if the principle of State industry be once admitted, no limits to its possible extension can be set and the tendency must be for the State to become more and more dominant in the industrial field automatically and inevitably. Mr. Chatterton will reply, I know, that this is not for a moment intended but that Government will be ready to give up any factory that private enterprise desires to take over. If so, then, on what terms? Mr. Chatterton will probably say "on a fair valuation" as in the aluminium case, but I would ask what, to any actual or would-be chrome tanner, would be a fair valuation of, for instance, the Sembium Chrome Leather factory if its water-supply is bad, as seems more than possible? Or what again would be its value, say, to Mr. Theagaraya Chetty or any other tanner who wished to introduce the chrome process into one of his tanneries in existence elsewhere? Both these cases are typical of similar ones that would be for ever cropping up if Mr. Chatterton's views should be generally acted on. In the example named Government would either have to abandon their factory at a more or less heavy loss to the tax-payer or that factory would continue to compete with private tanners until they bought it up on Government terms. It would practically be immaterial to Government if meanwhile Sembium were to work at a loss, even for years, so that Mr. Chatterton would in effect have all private competitors at his mercy. If it be replied that work at a loss would not be allowed to go on, then would arise such points as whether such loss was temporary or exceptional, say, due to bad season or trade depression or any such cause. Those excuses would be put forward, how would their validity be tested? Then the troublesome question of accounts would require investigation.

On this last point it must be borne in mind that Government outlook on, and consequent system of, accounts differ widely from those customary in business. Hence, with no disingenuous intention, results that in business would be recorded as losses might easily escape recognition as such by Government. As cases that appear to be in point I would refer to the accounts now submitted to this Conference in connection with the Aluminium and Tanning works.

Both these concerns show profit balances, *i.e.*—

|                                                | Rs.    |
|------------------------------------------------|--------|
| The aluminium made in seven years, say .. .. . | 29,500 |
| And tanning last year, say .. .. .             | 2,700  |
| Together say ..                                | 32,000 |

But I must point out that no debits are shown for the important items of supervision, interest, fire insurance, or audit fees and, for the tannery, a depreciation of Rs. 590

only *prima facie* appears to be inadequate. Thus, the results shown may be very misleading to the public and have, I think, misled at least a portion of the local Press. Indeed, they are almost bound to give a wrong impression to all except to those accustomed to scrutinise the accounts of Industrial Companies which, before thinking of dividend declaration, have to bear all such charges as a matter of course. It scarcely seems necessary to make detailed reference to those charges at this stage; so I will only say that if only very modest debits under those heads, on the two industrial ventures in question, are made, I am satisfied that, judged from a commercial standpoint, they can then show no fair return on the capital invested in them. Indeed, no return at all, for the supervision cost of Mr. Chatterton's department for last year was over Rs. 30,000, and if the aluminium concern be debited with only one such year (giving it free supervision for the other six years of its life under Government) its working at once becomes a loss without any audit or insurance or interest charges.

In these circumstances, judging him by performance and not by promise, I submit, Sir, that Mr. Chatterton has no title to be taken as a guide to show this country the way to commercial salvation. Possibly one reason of his non-success, in spite of ability and energy for which I give him full credit, may be that the inelasticity of Government red-tape has hampered him. If so, is not that a condition inseparable from State regulation of all kinds, and does it not furnish, in itself alone, a strong argument against Government attempting work for which it is unsuited?

The Chamber fears that if persisted in, the course proposed by Mr. Chatterton may one day possibly be marked by the deserted buildings of Government unsuccessful factories, more likely to act as danger warnings to the public, to avoid the uphill path of industry, rather than as sign-posts showing the way along it to prosperity.

If Mr. Chatterton's industrial attempts to date are not proved commercial successes, what about their other value? Do they open up a vista of industrial progress leading towards an improved balance of trade either by lessened foreign imports or increased Indian exports; or otherwise to an increase, on any scale, of local employment of labour? The Chamber sees no indication that his work to date points to any of those desirable results.

The aluminium work is of insignificant dimensions and is practically only some substitution of that metal for the brass and copper still and formerly worked up in this country from imported materials. Also, it is noteworthy, that the shares of the company which bought this business from Government are quoted at a discount. So investors therein at present stand to lose money. The chrome tanning is an experiment which so far has, I understand, proved a failure as regards export qualities and if, as regards local consumption, it has a future, the extent to which its quality more than counterbalances its greater cost, when compared with country tanned leather, is to the layman still a moot question. The only expert I have been able to consult—a man with chrome tanning experience both in this and other countries far greater than Mr. Chatterton's—is confident that, on the whole, Mr. Chatterton is on the wrong tack. If, perchance however that view is wrong and Mr. Chatterton is right, even then apparently he is obscuring the issue by simultaneously going in for elaborate leather working by machinery instead of confining himself to chrome tanning. The success of the chrome process in this Presidency, if possible, may want proving, but private tanners can be trusted to do that, while that leather working by modern machinery can be made to pay in India has been demonstrated over and over again in Cawnpore and elsewhere. In these circumstances, so far as such leather working goes, Mr. Chatterton appears to be spending or at best playing with tax-payers' money in competing with private industry to no useful end. Indeed the effect may be actually harmful if profits on such leather working by machinery veil losses on the chrome tanning. Here I would point out that the chrome tanning private enterprise founded by some followers of Mr. Chatterton in Coimbatore has ended in failure.

Purchase of oil-engines is another direction in which Mr. Chatterton advocates large State intervention. It would be of interest before going further, in this connection also, to know if Government would really contemplate the suggested giving of crores of Takkavi advances for the purchase of such perishable machinery as oil-engines and the establishing of Government workshops to look after them



wholesale. Against such State Engineering protests may doubtless be expected from all local Engineering works like Masseys, Oakes, The Reliance Foundry, and Dhana kóti Raju. If, as the Chamber imagines, such far-reaching schemes are of a visionary nature, I suggest, in order to avoid waste of time in discussing other and more practical politics, that the Conference be given an idea at once as to the limits, if any which Government would impose on itself in that connection.

*The water-boring work.*—The Chamber believes that Mr. Chatterton's water-boring work and pumping propaganda have been useful but sees no object in further State action in the matter. Private enterprise may be trusted to bring in oil-engine pumps, if suited to the country, no less quickly and thoroughly than unaided by Government, it has introduced, say, kerosine lamps and sewing machines.

Referring back for a moment to my first point that it is profit-making which makes industry attractive to capital, I would like to emphasise that point and to urge further argument thereon against Government industrialism. It is this:—

Every one who has ever made an industrial success in this country knows that once private enterprise makes profits in any industry, Indian and other imitators are but too quick, from the pioneer's point of view, to follow and compete for a share of those profits. But, for such lead to command a keen following, it must be given under obviously normal industrial conditions. Its success must be known to be vouched by accounts kept on commercial lines and it must be recognizable generally as due to no extraneous advantages not open to every one. In this direction Mr. Chatterton's proposals would probably fail to have the desired effect of promoting private industry even if, and when, a successful enterprise were initiated by him, as his conditions would differ widely from those open to a private successor. There is this further serious consideration.

Let us suppose the very best. Let us suppose that Mr. Chatterton starts several good industrial enterprises, that they are all successes under him, are applied for by the public and eventually handed over on mutually satisfactory terms. Is it to be imagined that thereafter all those concerns are going to have unchequered careers of prosperity? It is absurd to suppose such a thing. Most if not all of them must have their ups and downs; and in their "downs," i.e., in their inevitable periods of depression, it is certain, and all Company promoting history shows it writ large in legal records, that the buyers will then come crying to the sellers for relief. On one score or another and sooner or later Government must expect many such appeals if they accept Mr. Chatterton's proposals to start businesses and sell them when good going concerns.

If Government should meet such appeals as I have referred to they will be committed, by precedent, to being perpetual victims of a policy of "heads the buyers win and tails the sellers lose." If, on the other hand, Government stand out claiming, that "a bargain is a bargain," "caveat emptor," and so on, then they would stand to have reproaches thrown at them by disappointed shareholders. The language of the stock exchange would provide such angry people with an unhappily large assortment of idiomatic abuse which they would believe or pretend to be appropriate and would certainly not hesitate to utter to the discredit of Government. I earnestly trust that the present administration will at once refuse the responsibility of committing their successors to a policy either, on the one hand, of unlimited State industry, or, in the alternative, of systematic State Company—promoting, either policy without precedent, I should think, in the annals of any Government. Both would be incompatible with the sound development of private enterprise and certainly the latter would be derogatory to Government.

In conclusion, I would say that the Chamber's fundamental objection to Government going in to industry is based on the general principle that Government should confine itself to governing. We are convinced that departure from that well tried principle will not only fail to be helpful to the promotion of industrial development in this Presidency but will surely militate against it—will discourage private enterprise, be wasteful of public funds and endanger the dignity of Government.

18. Note, dated 15th September 1908, by Mr. ALFRED CHATTERTON, B.Sc., in reply to the above.

Mr. Yorke desired to imply that the quick starting of industries could not be accompanied by the sound development of private industrial enterprise. If in the past the development had neither been rapid nor sound, it was no reason why in the future it should not be both. The main argument of the case presented by the Chamber of Commerce was to the effect that if the State pioneered new industries it must always loom in the background as a bogie driving away the private capitalist who could never be certain what would happen. Mr. Yorke did not deal with facts but conjured up a state of things there was no intention of creating. He assumed that Government was a trader to be allured on by hope of gain. So far as he knew Government had not the remotest idea of embarking in industrial enterprise except on an experimental scale and with a view to creating new openings for capital. Reference had been made to the insignificant character of the work which had hitherto been carried on for the purpose of showing that nothing practical had come of it and at the same time it was contended that Government were embarking on a course in which they would become ultimately dominant in the industrial field. It was asked how these pioneer industries would be made to pass into private hands and all sorts of imaginary difficulties were raised. It was invariably assumed that the only competition to be met is that due to the Government factory, but in reality the competition which had to be faced was due to manufactories situated in Europe and America which worked under the most favourable industrial conditions.

Some of the objections raised by Mr. Yorke had been answered in his reply to the note put in by Mr. Simpson. Mr. Yorke criticised the statements regarding the profit made in the Tanning and Aluminium Departments. He admitted that the profit in the Tanning Department was of an insignificant character, but it showed at any rate that the factory was not being run at a heavy loss and that it was being worked on an economical basis. The profit made by the Aluminium Department in seven years was Rs. 29,500, but in reality the surplus when the business was wound up was exactly double this amount and one-half of the surplus profits was assigned to the Indian Aluminium Company to enable them to carry through the financial operations involved in taking over the business.

Mr. Yorke somewhat unfairly stigmatised the industrial experiments with which he had been connected as failures, and he very kindly let him down gently by saying that the inelasticity of Government red-tape had possibly hampered him. It was true that a Government Department was not an ideal organisation for carrying on industrial work, but the disadvantages might give Mr. Yorke the assurance which he required that Government officers would not unnecessarily interfere with industrial work.

Mr. Yorke stated that the shares of the Indian Aluminium Company were quoted at a discount, but he refrained from saying what dividends had been paid in the past and from explaining, as he could have easily done, the reason why they were at a small discount. The chrome tanning was condemned on the strength of an expert's opinion, but as the measure of success which had already been attained must be explained, the accusation was brought forward that the issues were obscured by simultaneously going in for elaborate leather working by machinery. It was impossible to treat seriously such arguments.

In regard to oil-engines and pumps Mr. Yorke assumed that because energetic action was recommended it must therefore necessarily be conducted on unsound principles. Before condemning takkavi advances it would have been better to have enquired into the system under which they were granted. He was quite certain that the local Engineering firms would not protest against the development of work which in the future would enormously increase their business. Mr. Yorke approved of well-boring but thought that the time had come when it might be brought to conclusion. If he had read the last published reports on the subject which had been

placed before the Conference, he would have understood that the matter was very different from selling kerosine lamps and sewing machines, and he thought it showed a want of grasp of the subject to make such a comparison.

Similarly he would hardly imagine that Mr. Yorke was prepared to defend the arguments put forward in the last few paragraphs of his note. He could understand that the Chamber of Commerce had a fundamental objection to Government interference in industrial development as it meant the breaking down of their monopoly, but Government was bound to promote the welfare of all classes of the community and the lack of industrial enterprise in this country was a serious menace to its continued prosperity.

**19. Note, dated 15th September 1908, by M.R.Ry. L. K. TULSI RAM, B.A., B.L., on the Weaving and the Dyeing Industries of South India.**

The following are among the principal industries of the Presidency which already exist and which may be considered at the present moment to be fit and ready to be further developed by the Government:—

(1) The Hand-weaving Industry including plain and fancy weaving of cotton and silk fabrics.

(2) The Dyeing Industry including bleaching, calico-printing, chrome-dyeing, mercerising and finishing of cotton, silk and woollen yarn and fabrics.

*The Hand-weaving Industry.*

Next to agriculture and the mill industry the hand-weaving industry occupies a prominent place in Indian commercial life. The weaving industry may be said to be yet in a state of infancy, though it has to be admitted that it is carried on practically in every important village in this country. This industry, which is so universal, has not developed in proportion to its importance. The chief causes which have contributed to its present undeveloped and unsatisfactory condition are the following:—

*First.*—Labour-saving devices have not at all been used by the Indian hand-weavers in the preparatory processes of winding, warping and sizing the yarn, and this accounts for the important fact that the cost of preparing the warp and the weft yarn ready for weaving into cloth is very high compared with the actual cost of weaving.

*Secondly.*—The influx of inferior silk warps which are being annually imported in large numbers from Italy has shattered the faith of the buyers in the durability and the excellence of Kornadu, Kumbakonam and Tanjore cloths which are worn largely by the Indian ladies of the middle and higher classes in South India.

*Thirdly.*—The substitution of cheap and fugitive aniline dyes for the dyeing of silk fabrics in the place of the permanent and fast vegetable dye stuffs has seriously affected the trade in silk-bordered cloths for which weaving centres like Salem have enjoyed a reputation. With the increasing knowledge of the unreliable character of those objectionable dyes, the Salem weavers are gradually coming back to the use of their original dye stuffs.

*Fourthly.*—The use of very thin gilt threads imported largely from Paris, Lyons and Marseilles in France by the gold thread merchants of Madura and which measure on an average from 1,800 to 2,100 yards per ounce has affected the cloth trade of Madura in gold-bordered fabrics. The French gold threads were originally measuring from 1,200 to 1,400 yards per ounce. The buyers of gold-bordered fabrics began to calculate the cost of the gold thread used in the cloth by the length of the thread used. This method of calculation induced the weavers to use fine threads running to a great length, say, 1,800 to 2,100 yards per ounce. The proprietors of the Minakshi Weaving Factory at Madura, which by the way is one of the largest hand-loom factories in the south of India, realizing the prejudicial effects of the fine and flimsy gold thread, have adopted the sound principle of using only thick and superior thread measuring from 1,200 to 1,400 yards per ounce. This thick gold thread does not shrink and get twisted in washing as do thin and fine threads.

*Lastly.*—The ignorance of the Indian weaver as to the existence of Jacquards, Dobbies and other mechanisms for fancy weaving suited for attachment to the Indian hand-looms has prevented the manufacture of fancy cloths for which there is a large and an increasing demand. It would not be out of place to mention in this connection that an invention of an improved weaving mechanism by one Kuppusami of Madura, called after His Excellency the late Governor of Madras "Amphill Patent Hand-loom," has effected a revolution in the Madura cloth trade in lace-bordered fabrics.

for the last six years and has reduced the cost and time required for weaving lace-bordered fabrics with fancy designs by nearly sixty per cent. The invention serves the same purpose as a Jacquard Loom and has opened up a fresh avenue for the development of fancy weaving.

The methods for the development of the weaving industry lie not in starting weaving factories or in the introduction of fly-shuttle looms. I would suggest the starting of a well-equipped Central Textile School at an important weaving centre like Madura. Madura is the second important city in the Presidency, and more than a moiety of its entire population follow the profession of weaving. The weavers of that place are anxious to learn and assimilate improvements in weaving and weaving mechanisms.

The bulk of the weaving industry is confined to the production of gold lace-bordered cloths from Madura and Coimbatore and female silk cloths from Kornadu, Kumbakonam, Tanjore and Conjeevaram. The value of the gold lace imported from France and used solely in the border of the fabrics comes to nearly twenty lakhs of rupees. The plain hand-woven fabrics, which do not contain gold lace and which range from the roughest counts up to sixties, contribute only a small percentage of the total value of the hand-woven fabrics of the Presidency. This is owing to the competition with cloths manufactured from power-looms which undersell the hand-woven fabrics. It is, in my opinion, a waste of time and energy to try to compete with Manchester in plain fabrics woven even on the most up-to-date looms. We should encourage the weaving of those fabrics where the power-loom cannot compete, namely, female silk cloths and gold lace-bordered fabrics. This could be done only by the establishment of a well-equipped textile school, which should provide sound theoretical and practical instruction for those who are engaged in the weaving industry.

The courses of instruction should include—

- (1) the nature and study of the textile materials ;
- (2) the principles of textile designing ;
- (3) pattern analysis and calculations ;
- (4) the testing of cops, yarns and fabrics ;
- (5) structural and colour ornamentation.

#### *The Dyeing Industry.*

I have been connected with the development of this industry from its very inception now nearly twelve years ago. The progress of this industry illustrates typically the methods by which similar other industries could be profitably started in this Presidency.

The Madura Red Dyeing Industry has developed to such an enormous extent that the annual export of dyed yarn amounts to nearly thirty lakhs of rupees per annum though yarn dyeing was not even known in Madura before 1895. Previous to 1895 all the turkey red yarn required for the Presidency was imported from Glasgow and Manchester and the counts ranged from 40s. The Indian weaver used to double the yarn to make it equal to 20s. The origin of the industry in Madura dates from the casual visit to Madura of a student of Professor of T. K. Gajjar of Bombay, who explained to me the method of dyeing cotton yarn with alizarine on a large scale. I then visited the dyeing laboratory of the Badische firm at Bombay and developed the industry. Kelp called Umirikhar in Tamil or Sajeekhar in Hindustani was available in large quantities from the islands near Tuticorin, it being obtained by burning the sea-weeds found along the coast in deep pits. The Kaya leaves, which were originally used in dyeing with madder, the predecessor of alizarine, were found useful in dyeing with alizarine and the leaves were procurable in abundance from the hills of the Madura forest. This facilitated the development of the dyeing industry. At present 8,000 cwt. of alizarine is being imported from Germany and 3,000 cwt. from England.

Madura thus stands the first and foremost city in India for the consumption of alizarine.

Along with alizarine two new serine of dye-stuffs called Indanthrene colours and sulphur colours are slowly finding their way in the Madras Presidency. Though synthetic indigo is not yet largely imported in this Presidency, it can be safely predicted that in course of time the coal tar colours will drive the vegetable colours completely out of the market.

Under these circumstances it becomes the duty of the Government to develop the dyeing industry by starting a dyeing school for training young men in the art of dyeing and to arrange for courses of instruction to meet the requirements both of students intending to become practical dyers or dyeing masters and of those wishing to acquire a more thorough acquaintance with the chemistry of the colouring matters and their manufacture with the object of becoming dyers' chemists and dye manufacturers.

Few branches of human industry are more intimately connected with chemistry than the art of dyeing. It is high time that the attention of the Government should be directed to the development of the chemical industries. It is admitted as an axiom that soda and sulphuric acid form the two great pillars of the chemical industries. The dyeing industry requires the manufacture of the following chemicals on a large commercial scale, viz., bichromate of potash, caustic soda, bleaching powder, sodium sulphide, sugar of lead and the three acids. Sulphuric acid is a *sine qua non* in the manufacture of turkey red oil, Kelp or Sajeekhar and the dyeing of aniline black and Indanthrene series of dye stuffs. The disadvantage that we suffer from the lack of the chemical knowledge is discernable in the waste of alizarine. The Madura dyers use nearly on an average 20 per cent. of alizarine by weight of the grey yarn to be dyed for getting the Madura red shade which is a mere waste, as with the use of only 8 per cent. of the colour the very same shade could be obtained.

The actual cheapness of the aniline colours and the great length of time taken up in dyeing with vegetable colours have stood against the use of vegetable dyes. By the introduction of suitable crushing mills and heavy disintegrators dyeing materials can be extracted from dye woods, barks and leaves which are found in abundance in the Presidency.

The substitution of chrome colours on a large scale would check the importation of aniline colours. The German manufacturers of aniline dyes are throwing cold water at the attempts of dyers to introduce chrome dyeing. The Government would do well to start a fully-equipped dyeing school at Madura to train up young men in the art of dyeing instead of sending for a chemical expert to give advice on matters connected with dyeing which is not a satisfactory method. Again the manufacture of chemicals required for purposes of dyeing cannot be carried on on a large commercial scale without technical assistance. The students who were trained in the private laboratory of Professor T. K. Gajjar were largely instrumental in developing the dye-houses of the Bombay Presidency—similarly young men who will be trained in the dyeing school to be started would be very useful in developing the dyeing industry of this Presidency. The lack of hands trained in the art of dyeing is telling upon the development of the dyeing industry. A fully equipped dyeing school with an initial outlay of one and a half lakh of rupees and a recurring charge of Rs. 50,000 per annum would greatly help and develop the dyeing industry.

I would suggest the following methods for the development of the above industries :—

- (1) That an industrial survey be made of the two industries in the Presidency.
- (2) That the railway freights be reduced in the case of dyed yarn, dyes and dye chemicals including sulphuric acid.
- (3) That a textile museum and a library in connection with industrial chemistry be started.
- (4) That offers of honoraria for solution of problems connected with the development of big industries and a supply of laboratory apparatus be freely given to *bona fide* workers engaged in making researches of improved manufacturing processes connected with the above industries.



(5) That all facilities be given to inventors of valuable inventions by the remission of the royalty fees.

(6) That the Patent Law be amended so as to give facilities to an inventor and make him soon reap the fruits of his invention instead of harassing him to establish his rights in a court of law against one thousand and one infringers of the patent and make him spend large sums of money for ensuring his privilege.

(7) That labour saving machinery likely to be of important industrial advantage be supplied free of cost to pioneers of important industries. That industrial loans be given at a small percentage of interest to *bona fide* men who start new industries and prove that they are being successfully carried on. That silk cleaning, silk reeling and silk winding tools and instruments which are in vogue in the silk industry at Lyons be sent for and supplied to the silk weavers of Tanjore, Kumbakonam and Conjeeveram. A special instructor acquainted with the art of preparing silk ready for warp and weft would be of great service to the silk weavers of the Presidency.

A start has been made at Madras by opening a gold and silver thread manufactory by a private firm. The only difficulty the firm experiences at present is the want of orange coloured silk which serves as the bottom over which the silver lametta is twisted. A knowledge of dyeing silk in orange colour would set the matter right. The French manufacturers who are naturally envious of the factory, I am told, have combined together and refuse to supply silver lametta and wooden bobbins for reeling lametta. The firm is now obtaining its supply of reeling bobbins from Madura and Triplicane and lametta is being actually prepared at the factory.

The dyeing industry gives employment to nearly 1,500 females and 800 males per month.

The following suggestions appear to my mind to be most important for the furtherance of the dyeing industry:—

Self driven hydro extractors for hydro extracting the wet yarn and suitable pumps for supplying large quantities of water to dye-houses should be introduced experimentally in some of the big dye-houses.

### PART III.

#### PROCEEDINGS OF THE CONFERENCE.

##### 1. Names of the Members of the Conference.

1. Major D. M. Babington, R.A., C.I.E., Superintendent, Cordite Factory, Aruvankad (The Nilgiris).
2. Hon'ble Dr. A. G. Bourne, C.I.E., F.R.S., Director of Public Instruction.
3. Mr. C. E. Brasier, Conservator of Forests, Central Circle.
4. \*Hon'ble Mr. A. G. Cardew, M.A., I.C.S., Secretary to Government, Revenue Department.
5. A. Chatterton, B.Sc., Director of Industrial and Technical Inquiries.
6. M.R.Ry. C. Y. Chintamani, Assistant Secretary, Indian Industrial Conference, Berar.
7. Mr. M. E. Couchman, B.A., I.C.S., Director of Agriculture.
8. Mr. T. F. Embury, Superintendent, Wesleyan Mission Industrial School, Karur.
9. Mr. W. S. Hadaway, Superintendent, School of Arts, Madras.
10. Hon'ble Mr. M. Hammick, C.S.I., C.I.E., I.C.S., Chief Secretary to Government.
11. M.R.Ry. D. V. Hanumanta Rao Pantulu Garu, Secretary to the National Fund and Industrial Association.
12. Mr. W. H. James, B.Sc., Principal, College of Engineering, Madras.
13. Hon'ble Mr. V. Krishnaswami Aiyar, B.A., B.L., High Court Vakil, Madras.
14. Mr. H. Kühner, Agent and Manager, Basel Mission Industrial Establishments, Calicut.
15. M.R.Ry. P. Lakshmi Narsu Nayudu Garu, B.A., Representative of the Council of Native Education, Madras.
16. Mr. E. S. Lindsey, Acting Chief Engineer, South Indian Railway.
17. Mr. Colin Mackenzie, Planter, Ootacamund.
18. Captain C. L. Magniac, R.E., Deputy Agent, Madras and Southern Mahratta Railway.
19. Hon'ble Mr. B. Narasimheswara Sarma, B.A., B.L., High Court Vakil, Vizagapatam.
20. Sir Frederick Nicholson, K.C.I.E. (retired I.C.S.), Honorary Director, Madras Fisheries.
21. Mr. E. W. Orr (of Messrs. P. & Sons), Chairman, Madras Trades Association.
22. M.R.Ry. N. Pattabhirama Rao Pantulu Garu, B.A., Representative of the South Indian Association, Madras.
23. M.R.Ry. Diwan Bahadur R. Raghunatha Rao Avargal, retired Madras Provincial Service.
24. M.R.Ry. Diwan Bahadur P. Rajaratna Mudaliyar Avargal, C.I.E., retired Madras Provincial Service.
25. M.R.Ry. M. R. Ramakrishna Aiyar Avargal, B.A., B.L., High Court Vakil, Tinnevely.

26. Hon'ble Nawab Saiyid Muhammad Sahib Bahadur, President of the Muhammadan Educational Association of Southern India.
27. Mr. C. B. Simpson (of Messrs. Binny & Co.).
28. Mr. F. J. E. Spring, C.I.E., Chairman, Port Trust Board, Madras.
29. Mr. R. Stanes (of Messrs. Stanes & Co.), Coimbatore.
30. Hon'ble Mr. P. Theagaraya Chetti, B.A., Merchant.
31. Mr. Edgar Thurston, L.R.C.P., L.S.A., F.R.M.S., C.M.B.S., Superintendent, Government Central Museum.
32. Dr. Morris W. Travers, F.R.S., Director of the Indian Institute of Science, Bangalore.
33. M.R.Ry. L. K. Tulsi Ram Avargal, B.A., B.L., Pleader, Madura.
34. Hon'ble Mr. J. Twigg, I.C.S., Acting Second Member of the Board of Revenue.
35. M.R.Ry. Rao Bahadur M. Venkataswami Nayudu, Proprietor of a Tannery, Madras.
36. Mr. R. C. Whitenack, Director of Commerce and Economic Adviser to the Baroda Durbar.
37. Hon'ble Mr. F. J. Wilson, M.I.C.E., Secretary to Government, Public Works Department.
38. Hon'ble Mr. A. J. Yorke (of Messrs. Parry & Co.), also representing the Madras Chamber of Commerce.

## 2. His Excellency the Governor's opening address delivered to the Industrial Conference at Ootacamund on Monday the 14th September 1908.

GENTLEMEN,—I feel some hesitancy in addressing you at any great length this morning. I will endeavour to confine myself to a definition of the objects of the Conference, to point out some of the difficulties (as they occur to me) in the attainment of those objects, and to indicate some of the principles which I think we should bear in mind in our attempts to formulate a policy of industrial development and technical education.

In tackling questions of such magnitude as these a man should have an intimate knowledge of the conditions of the country and its peoples, and familiar acquaintance with the evolution of trade and commerce, and the history of the growth or decline of the various arts and crafts and industries.

To none of these can I lay claim, whereas when I look round the table I see many gentlemen of profound knowledge and wide experience of all these matters.

To them I look for guidance and help in the solution of the difficult problems which present themselves in connection with the two questions which I have mentioned as the subjects for our discussions.

I thought at one time that it might be possible to confine our deliberations to the former question only, but it seems to me that you can advance no distance at all along the path of investigation in the matter of industrialism without being compelled to take into consideration the educational factor.

Therefore though I fear its inclusion means a large addition to your labours, yet I believe that each one here would have regarded the exclusion of this subject with regret seeing of what importance it may be to future generations.

We have gathered here this morning those who are responsible for the conduct of Government in this Presidency. We have some of the most eminent representatives of the educated classes and leaders of political thought among Indians. We have those who are at the head of the mercantile community and represent the trade and commerce of Madras. We have directors of industrial enterprises some of which are business concerns pure and simple, and others again business concerns which are run not so much for profit as for the instruction of the natives of the country and which serve a dual purpose in that, while they are developing the resources and increasing the wealth of the country, they are at the same time inculcating the doctrines of self-help and self-improvement. Then, again, we have those who are either actively engaged or interested in the work of education. Finally, we have some distinguished exponents of engineering science who are engaged even now on great engineering works. From Bangalore Dr. Travers has been good enough to come that he may give us valuable help by way of advice which his experience in educational matters enables him to place at our disposal. We have also visitors from Ceylon and from Baroda, so that I think it may be said that the Conference is as representative as a Conference of this size can well be. To one and all it is my pleasant task to extend a very cordial welcome and the assurance that the Government of Madras appreciate most highly the readiness with which the non-official members of the Conference have come forward to help us in what presents itself to me as an exceedingly difficult task.

I refuse, however, to be daunted by any consideration of the difficulties of the task seeing that the ultimate object of the Conference (an object which we all have at heart) is the betterment of India.

I cannot help hoping that it may be possible for Government to so encourage and foster industrialism in India as to increase the material prosperity and achieve the social amelioration of her people to a considerable degree.

It is to consider such a possibility that this Conference has been summoned, and here it may be convenient if I explain the procedure which I propose to adopt so that we may get through the business before us thoroughly and expeditiously.

Time is a volatile essence, valuable to officials and non-officials alike, and it is desirable that we should be as economical therein as possible. Notes have therefore been prepared and sent beforehand to each member. One of these notes shows briefly existing conditions in the matters of technical education and the various arts, crafts, industries and manufactures.

Another sets forth the suggestions of certain gentlemen for the solution of some of the problems before us and another indicates (by a series of questions) the lines upon which it would seem advantageous for our discussions to proceed. These two notes contain what is really the programme of the Conference. The items form the subject-matters of our discussions. They are both numerous and important and I think that we must make up our minds to limit our discussions to them only and to introduce no fresh questions of which no notice has been given if, that is, we are to achieve finality.

These discussions should, I think, be in the first instance conducted by Sub-Committees.

Five of such Sub-Committees will be appointed, and as soon as my preliminary remarks are concluded it will, I hope, be possible for one or other of the Sub-Committees to begin their work.

Certain gentlemen will be asked to sit on certain Sub-Committees, but the constitution of each Sub-Committee may be readjusted if need be and each Committee will have power to add to its number. Members of the Conference will be free to be present at the discussions of any Sub-Committee.

Each Sub-Committee will draft resolutions which will be submitted to the full Conference as soon as all the Sub-Committees have done their work. Each resolution brought forward by the Sub-Committees will be submitted for adoption or amendment or rejection to the full Conference. I very much hope that we shall so contrive as to arrive at some definite conclusions and complete the work of the Conference before Saturday night the 19th instant.

I think that the time for summoning such a Conference as this is opportune in view of the existing economic and political conditions of the country. I do not propose to enter upon a field so wide and so full of controversy as a review of the economics and politics of India just now, but there are one or two main facts which, I think, it is well that we should not lose sight of. In the last 50 years, the population of India—I speak in round numbers—has practically doubled; the revenue has practically trebled; the volume of trade has increased enormously and is increasing year by year. There has also been a considerable increase in the general prosperity of India. These facts, I think, cannot be gainsaid. At the same time there has been a very great rise in prices of the food-stuffs of the country which has pressed heavily on the labouring classes inasmuch as they have not enjoyed a corresponding rise in wages. I do not propose to analyse the various causes to which this rise in prices may be attributed, but one factor is undoubtedly the great increase in the number of the population. That increase still goes on ever more rapidly, and as it continues it must tend to produce a still higher rise in prices. At the same time the area available for the expansion of the cultivation of food crops is restricted, and I am myself doubtful whether there is any considerable amount of land now uncultivated which could be utilised for the purpose of increasing the supply of food-stuffs. There is another undoubted cause for this rise in the prices of food-stuffs, and that is the tendency of cultivators to raise non-food crops, e.g., cotton, jute and oil-seeds, on account of the larger profit obtainable thereby. Now it seems to me that Government is bound to consider in what way, if any, this very serious state of affairs may be remedied. Possible remedies may be found (1) by increasing the productivity of the soil, and (2) by opening up new fields of industry. To the former end, i.e., to increase the productivity of the soil, we must rely upon the application of scientific methods and the adoption of modern ideas, but before either the one or the other can

be introduced a long period of experiment and research is necessary, and even then if the results are satisfactory, the conservative prejudices of the ryot have to be overcome.

The time is opportune, moreover, because of the *Swadeshi* spirit of the hour, and by this I mean the true *swadeshi* which inspires the patriot to work for progress, prosperity and peace and not the political *pseudo-swadeshi* (the evil genius of India), which inspires the demagogue to work for class hatred, lawlessness and sedition.

To my thinking, *swadeshi* is the dawning of a great idea of the process of which, a description may be found in the words of the Hon'ble Babu Bhupendra Nath Bose who says: "It is becoming more and more apparent that the realisation of our political ideals is to a great extent, if not wholly, dependent upon our progress as a nation in the paths of useful knowledge, industry and commerce, and upon our powers of co-operation, combination and organization".

If, as I think we may, we accept this observation as a sound statement of what the aims of *swadeshi* should be, it behoves us to consider how the lines are to be laid down whereon India is to progress so as to achieve pre-eminence in "Industrialism", to use a single comprehensive word. Government may perhaps do something in the way of developing industries, and bringing within the reach of the rising generation education of a *practical* kind, by which I mean education pertaining to the practice of an art or science. But whatever Government may attempt, it is hopeless to look for success unless the men of this country are willing to use their capital individually or collectively and to insist on their sons acquiring skill in business technique and management.

As Mr. Cumming has pointed out in his recent report on the industries of Bengal, enthusiasm is a wholly admirable quality, but without money and business methods it is "a tale told by an idiot full of sound and fury signifying nothing".

In regard to the development of industries, I should like to make one or two preliminary remarks. We must, I think, make up our minds that the process will inevitably be slow inasmuch as considerable obstacles exist to anything like rapidity in development.

Without educated guidance the successful organization of labour is impossible. In this country you have a very decided disinclination on the part of the educated classes to anything like manual labour. In the paper marked No. III we have a collection of preliminary suggestions which some gentlemen have been good enough to make to assist us in our deliberations, and I should like to call attention to the remarks of Mr. Simpson and Mr. Spring on the question of manual labour which appear in that paper. Mr. Simpson points out that "it is exceedingly difficult to get draughtsmen. They will only stay until they can get Government employment and will not attend work until 10 A.M. If there is urgent work, their superior officer the European Engineer has to do it, the Engineer having been at work from 5-15 A.M. to see his engines at full speed by 6 o'clock."

"The same with Chemical Assistants. At the Buckingham and Carnatic Mills there are six European chemists from Leeds University and Bradford Technical College. These gentlemen attend work daily at 6 A.M. and work at least 8 hours daily; when work is heavy they do not hesitate to work longer hours without being asked. We cannot get a native who has learned anything of chemistry to attend before 10 A.M. There is therefore no grade between the European expert and the coolie, a distinct want and an opening for fairly remunerative positions."

Mr. Spring says: "Such being the case, how are we to expect the wealthy men of a community to combine and put their money into industrial enterprise—other than agriculture—when they are perfectly well aware that the young men of their own class are in a state of abject ignorance of anything of the sort, and that how easy soever it may be to get together a score or a hundred or many hundreds of clever artisans, it is practically impossible to find young men, of their own race and of the educated class, fit to handle and to supervise such labour when collected."

Then again, you have as another obstacle the strong disinclination on the part of the Indian capitalists to invest money in industrial enterprises. It may be that money seems to be more easily made by an agency in imported goods or zamindari or



by money-lending than by manufacture. Anyhow the fact remains that men of wealth have not shown any disposition to risk money for industrial purposes. It must not be forgotten that though you may have at hand the raw-material and a good market and though you may have at your command a capable and scientific management, yet without capital you are nothing worth.

Then again the personal element has to be considered. The character of the operative is to my mind a very important factor. In his review of "Industrial Efficiency in England, Germany and America" Mr. Shadwell tells us:—

"Most of the large concerns of to-day, even in America, were originally 'started by workmen in a small way, and though the practice of establishing works 'on a great scale by subscribed capital has since come into play and is growing, I 'believe it could be demonstrated that even now more manufacturing concerns are 'started by successful and enterprising workmen than by mere capitalists. That it 'was so a hundred or thirty or fifty years ago will not be doubted by any one who 'takes the trouble to inquire into the origin of existing works.

"Now, no men are harder taskmasters than such employers. They are themselves hard-workers, frugal, saving and self-denying; it is the exercise of those 'qualities that enables them to become employers. Then they have a hard struggle 'to succeed, and as they do not spare themselves they are not minded to spare those 'whom they employ. They have the bent for making money and 'getting on, and 'cling tenaciously to all profits they scrape together. Consequently they exact as 'much work and pay as little as possible."

It is to the initiative of a few men of this type, men whom he aptly describes as "untutored geniuses of the Watt, Stephenson, Arkwright, and Hargraves type" that Mr. Spring attributes the transformation in the conditions of life in the civilised world in the last one hundred years and the consequent enormous increase in the sum of human comfort.

Now without going into the relative characteristics of western and eastern workmen, how far can we hope to find men of the type—I won't say of Watt and his co-geniuses, for they were veritable giants—but of the thousands of keen, pushful, and ambitious workmen of Lancashire and elsewhere who have in turn been responsible for the initiation of industrial enterprises which have often been dependent for their success on the particular inventive skill as well as the organizing capacity of the founder?

I have no wish to detract from the good qualities of the Indian workman. It is, I think, universally acknowledged that the craftsmanship of the Indian, his manual dexterity, his delicacy of touch and his capacity to follow accurately the lines of other men's work is unsurpassed. But in initiative and originality, in self-help and self-reliance, and in mental character generally, he is, I fear, deficient and if the development of manufacturing industries is to be in this country what it chiefly was in England, viz., a process of workmen rising to be employers, then if one may judge by the experiences recorded by British employers of labour, either we have to look for a sudden and phenomenal change in the character of the Indian workman or we have to make up our minds to the exercise of infinite patience in working out our industrial salvation.

True! A perusal of Mr. Cumming's report to which I have already alluded and a realisation of the vast amount of industrial work which is now being carried on in Bengal might give grounds for argument that the rule prevailing in England is not necessarily applicable to India, but it would appear that, with the exception of one or two concerns which are entirely financed by Indian capital and managed by Indian brains, all the great enterprises on the banks of the Hoogli were started by European capital, are controlled by European supervision, and run according to European methods.

Mr. Cumming in his report adopts a classification of industries which appears to me to be a convenient arrangement and which, I think, we may also adopt for the purposes of this Conference. He divides the industries into five classes:—

- |                         |                                                |
|-------------------------|------------------------------------------------|
| (1) Factory industries. | (4) Industrial arts.                           |
| (2) Mining industries.  | (5) Industries dealing with economic products. |
| (3) Handicrafts.        |                                                |

Among the papers submitted to the members of the Conference, the one marked No. IV recites briefly the conditions of the various industries in this Presidency. Of the industries falling under classes (1) and (2), viz., factory and mining industries, there are none which have attained to anything like large dimensions in Madras, and we have no such great Government factories as exist in Bengal which employ a vast number of hands and expend vast sums in wages. Of factories those which deal with aluminium, cement, jute, leather, sugar and tobacco, none have assumed large proportions and they all owe their existence almost entirely to European initiative, European capital and European control. There is only one industry which is being carried on as an experiment by Government and that is being conducted with the object of introducing the chrome-tanning process. Whether this policy should be adopted with regard to other industries is one of the most important matters to which you will be asked to give your consideration. We have so few indigenous enterprises—in the way, I mean, of Factory Industries—in this Presidency that the Government need not, I think, be deterred by the fear of competing with private enterprise.

The statistics relating to industries connected with cotton are worthy of study, and though the figures presented to us comparing the state of the cotton industry to-day with that of a hundred years ago are somewhat dispiriting, yet I think we may glean some satisfaction from contemplation of the facts that the area devoted to cotton cultivation is steadily increasing and that the number of spindles and the outturn of cloth from the miles is also on the increase. What we must achieve, if possible, is an improvement of the quality of the cotton grown, as well as the quantity. To inculcate the importance of seed selection is no easy task, but I hope that the Agricultural Department in co-operation with the District Agricultural Associations may do much in this direction.

The Conference need not, I think, be asked to devote much, if any, time to the consideration of the possibilities of developing the mining Industry of this Presidency. It may be generally said, I think, that the mineral wealth of this country and therefore the mining potentialities are from our present knowledge by no means considerable, though it may be that a possible field for indigenous enterprise is lying fallow only because it has never been thoroughly prospected.

Taking next classes (3) "Handicrafts" by which I mean weaving, pottery, carpentry, leather manufacture and iron manufacture, and (4) "Industrial arts" which together comprise the principal indigenous industries of this Presidency, it is sad to realise how rapidly in respect of both of them commercial depression and artistic degradation have gone on from decade to decade. It is shocking to think what havoc cheap European goods, bad European patterns and vile European taste—"unspiritual Gods and miscreators"—have wrought among the arts and industries of this Presidency! Of textile industries, the only one which I think has not withered under the blighting wind of European competition is the reed mat industry.

The beautiful silk carpets of Tanjore and Wallajanagar, the woollen carpets of Ayyampet, the cotton carpets of Arcot, Ayyampet and Rajangudi, the satins of Ayyampet and Ariyalur, the Palampores of Kumbakonam, Manamadurai and Masulipatam, and other hand-painted cottons of Kalabasti, Salem and Madura, the cloths and handkerchiefs of Pamban and Paramagudi, the block printed cloths of Wallajanagar and Arcot, the muslins of Chicacole, the silk fabrics of Peddapuram—these were at one time staple commodities and their manufacture meant the employment of hundreds and thousands of hands. I do not think that I am guilty of any misrepresentation when I say that to-day every one of these industries is gradually vanishing—swept by decay's effacing fingers.

The specimens of arms in the Madras Museum as well as those in the collections of Native Princes and Zamindars show to what perfection the art of the ironsmith was at one time brought. To-day it is but rarely that the ironsmith's ambition soars to a loftier artistic conception than the tyres for a bandyman's wheels or knives for a bandy-man's pocket.

Can nothing be done to arrest decay and to inspire with fresh life the artistic industries of ancient days?

I do not altogether despair. That these industries languish and decay is not, I think, due to a diminution in the capacity of the workman to produce work of the same merit as the work of his forefathers so much as the difficulty of finding, in these degenerate days of cheap machinery, a market for his hand-made wares.

I have mentioned some of the artistic manufactures of Southern India. I believe that if specimens—true not bastard specimens I mean—of Indian art—i.e., Indian material, Indian workmanship and in particular true Indian design—could be exhibited in some London or Paris Emporium, there would be a ready sale therefor—but only so long as the type of goods remained purely Indian, without any trace of the debasing influences of Birmingham and Berlin. After reading the notes of Mr. Hadaway and Mr. Atkinson I cannot help hoping that those who guide the destinies of the School of Arts and of the Victoria Technical Institute working hand in hand and receiving liberal encouragement from the Financial Member, may do much to resuscitate the arts and crafts of ancient India, never forgetting Lord Curzon's dictum, viz., "that Indian art will never be revived by borrowing from foreign ideals, but only from fidelity to its own." They might even form themselves into a Trinity of philanthropic middlemen to open out elsewhere a market for Indian works of art which the Indian artist looks for in vain in his own country.

And if any commercial misgivings arise, let them not be unmindful of the saying of a prophet of more ancient time who bade us "Cast our bread upon the waters to find it after many days" and accept the assurance given by Mr. Hadaway that the artist has only to produce the work of art to be certain of finding a market at some later date.

As to trades and industries generally, I need, I think, do no more than draw your attention to Paper No. II. Therein is contained a number of questions which would seem to form a convenient basis for discussion by the Sub-Committees and on which it is proposed to obtain the sense of the Conference in a series of Resolutions.

Of the only other remaining class of industries, viz., those dealing with economic products, I do not propose to say much although I recognize that inasmuch as it comprises agriculture it deals with the one industry with which almost the whole of the population of the Presidency is directly concerned. You will see, however, from a note which Mr. Cardew has specially drafted at my request for the information of members of the Conference that the Government have adopted a definite policy regarding agriculture and are now giving effect thereto. The note shows what has been and is being done. From its perusal you will see that the lines on which we are working are—

- (1) Experiment and research, and
- (2) Practical education.

They go on side by side not only at the Central Agricultural Institution at Coimbatore but also at the various Demonstration Farms which have been established in various parts of the country wherein the ryots, we hope, will be our pupils. At the former, the theory and practice of scientific agriculture are being simultaneously taught to a certain number of selected pupils while farming experiments of a general nature are being conducted on the spot. In the out-stations experiments are being conducted in the cultivation of particular cereals, sugarcane and other food plants as well as in plants grown for industrial purposes. These experiments are not general but special according to the suitability of the locality—whether in the matter of soil, or of climate or otherwise—for the growth of the particular plant or cereal in which the experiment is being made. The number of these Demonstration Farms is limited owing to the paucity of men scientifically trained and thus capable of intelligently carrying out experiments on scientific lines, though we hope that in a few years there will be no such lack of supervisors as to prevent the opening of fresh experimental stations. If we can discover and demonstrate to the ryot the advantages of new methods, we shall be doing a valuable educational work. It will be seen that, so far as the general agricultural question is concerned, the lines of future development are clearly defined, and I doubt whether any useful purpose will be served by a discussion of our general policy in this direction though it will be evident to any one who has read the paper of questions marked No. I that there are certain

branches of agriculture, some agricultural "side shows"—so to speak—at which you will be asked to take a peep and consider whether they may not be worked up into much more important affairs than they claim to be to-day—such questions for example as those of the more extended utilization of subterranean water for purposes of irrigation, new methods for the treatment of sugarcane and the advancement of the silk industry. There is one other important item which falls within this category to which I have alluded elsewhere on more than one occasion and that is the development of our Fisheries. I felt sure that the subject would interest you, Gentlemen, and a brief note has therefore been written for your perusal showing what measures we have decided to take for the improvement of the Madras Fisheries. We are advised that these are certainly necessary as preliminaries to the successful exploitation of this industry and seeing that we have many other uncertainties to consider, I apprehend that there will be no necessity at this stage to make fisheries a special subject-matter for discussion.

And now I will, with your permission, address myself to the question of technical education which I regard as an integral part of industrial development. It is a question of universal interest though I need hardly remind you that it has only come into prominence during the last forty (I might almost say "twenty") years. In India there has been much talk on the subject but not much in the way of performance. It has been a case of "Much cry and little wool."

The term Technical is an elastic one. It covers all trades, industries and crafts from the construction of an aeroplane to the keeping of bees and from building a Taj Mahal to the baking of a chupatty.

And so Technical Instruction and Technical Schools are vague terms not always very clearly understood and perhaps on that account treated with a reverence which is often accorded to the mysterious and unknown.

May I say here that by "Technical Instruction" I mean special training for imparting skill *through the knowledge of principles* in any handicraft, industry or profession as distinct from "Industrial instruction" by which I mean the instruction mainly in the workshops or in the mill which consists in perfecting the pupil in the practice of the manipulations and operations of skilled workmen in particular trades, without insisting on the attainment by the pupil to an advanced standard of general education. Quite distinct again is manual instruction by which I mean the training of the hand and eye and which is, in my opinion, a necessary part of any liberal education. It is not industrial instruction. It is merely the training of the hand and the eye which should be part of the curriculum in every school. The difficulty unfortunately is to find qualified teachers even in the simple matter of manual instruction which must of course include drawing. From what I have seen of the work in some of the schools which I have visited here, there is room in this particular for enormous improvement. In not a few the free-hand drawing has bordered on the grotesque. We may, however, leave manual instruction alone for the moment.

I have on several occasions been urged to give encouragement to the extension of technical education by the establishment of technical schools in various towns. The request, I think, is often made with only a misty comprehension of what is meant thereby and a hazy notion of what the results have been of the experiments in this direction which have been made in the past. Perhaps the demand is prompted by the feeling that "something ought to be done." I have met these demands with replies which can only be regarded as discouraging, and I will endeavour to explain why I have found it difficult to wax enthusiastic on this theme and to commit myself to a policy of encouraging the establishment of technical schools all over the country.

Let us imagine for a moment that we have established them in various towns. From these technical schools there would, I take it, emerge year by year a number of young men trained in the science and practice of certain arts, industries and professions and according to the number of these schools so would these young men be counted by the score, the hundred or the thousand, and we may assume that their training, theoretical and practical, would be in every way thoroughly

efficient. But I am afraid that, however skilful they might be, to however high a plane of scientific knowledge they might attain, the demand for the services of more than a very small proportion of these highly accomplished persons would be nil owing to the backward state of the industries in this Presidency. The country would then be flooded with a number of young men for whose services, after years of patient work on their part, there would be no demand at anything like an adequate remuneration and to whose consequent disappointment and discontent there would be no limit. That is why I have ventured to lay it down as a principle that Government should rather develop industries in the first instance precedent to the introduction of industrial schools. This has, I think, been the history of industrial schools in other countries, viz., that they follow the establishment of an industry but do not precede it.

The experiments which have been hitherto made here have been in the nature of industrial rather than technical instruction.

The agencies by which this instruction have been made available are :—

- (1) Missionary bodies.
- (2) Railways and other industrial concerns.
- (3) A few schools under public management.

It is with the latter agency alone that we need concern ourselves for the purposes of this Conference, and I am afraid that it must be confessed that as an agency for contributing to the advancement of industrial efficiency in the Presidency our industrial schools must be deemed a failure.

The reason is due to the ridiculously small number of those who have come forward to take advantage of the system, if so it can be described though indeed no "system" can be said to have been ever adopted.

The proposal to increase the number of these schools for industrial instruction on existing lines does not commend itself to me.

But I do not wish to be misunderstood. I have no desire whatever to regard the introduction of some system of technical education as outside the sphere of practical politics. On the contrary, I am very desirous of being associated with any sound scheme for its extension throughout the country, but I think that we must advance with great care and deliberation. Granted that we make up our mind to adopt a scheme of technical education there is no one particular system which we can select as a model and point to as having proved suitable elsewhere and being likely to prove suitable here. Even in the west where technical education is far more advanced than in the east the subject is in a state of confusion. In Germany, England and America, a variety of systems prevails. Germany can lay claim to a systematised scheme, but neither in American nor in England, is there a well-defined organization which you can speak of as being peculiar to either country. Generally the difference between Germany and England is that the technical schools of the former supply the large industries mainly from above. A superior general education is insisted on as a basis and a course of specialised studies is superimposed so as to turn out heads, officials and experts, whereas in England the technical schools supply the industries from below. They educate boys belonging to the working classes—boys at work in the mill or at the forge—into foremen, overseers, managers and experts. \* This is the general rule in England although there are frequent cases of men who after a public school and University career acquire practical experience by real hard work in the foundry, mill or workshop. In Germany the real work of the technical schools is in day classes, whereas in England it is in evening classes. In Germany, it is insisted upon that the pupils shall have had previous practical experience before admission to the schools. In England the pupils are actually the factory and the mill hands, the operatives themselves. In America, the system has been tried of beginning with a theoretical training, the practical work coming after; but there is a general complaint among manufacturers that this system unfits men for the workshop. I believe that the leading manufacturers and managers in all the three countries are unanimous in condemning school training alone unless it is supplemented by practical experience. This does not imply that they would condemn a *ground-work* of pure science for those who would apply it later on.

Now the question which we have to consider is—What is the article which we want to produce, and how is it to be fashioned?

It seems to me that we want, to use a military simile, to create an organised and well-disciplined industrial army.

Very well! We then have to consider the following points :—

(1) How is our recruitment to be carried on? Are we going to begin with the recruitment of our officers, our educated supervisors and experts whose training, practical and theoretical, will enable them to control and direct the labours of the scores or hundreds of operatives under their command? Or are we going to start by recruitment of the rank and file of skilled workmen and operatives?

(2) Where is our training ground to be? and

(3) How are we to provide against our army being and continuing to be an undisciplined rabble?

As to the first question my answer is that I should aim at a simultaneous recruitment of the educated expert overseer and the skilled operative.

For the former I would—to continue the Military metaphor—provide for a system of direct commission as well as promotion from the ranks.

And if provision has to be made for supplying a number of educated captains of industry, we must, I think, establish something in the way of a Technological Institute in which, in addition to the study of engineering, provision would be made for the practical instruction in electrical work and applied chemistry of men who could claim not only to have acquired a sound general education but also to have attained to a certain standard in chemical and physical science.

As to the rank and file the answer is by no means easy. Every person qualified to speak with authority on the subject has laid it down that it is absolutely essential to combine theory with practice, that the skilled workman is made not in the school but in the factory or the mill, and that no amount of theoretical teaching and training can be regarded as a substitute for work in the workshop itself, where real work has to be done on a commercial basis and not merely a workshop carried on for educational purposes.

If that be so, then the factories which exist to-day are to be not only the recruiting areas but also the training ground of our rank and file and then only when each factory has its own school offering to the working hands the advantages of technical instruction. Unfortunately, as I have already pointed out, the number of factories and mills in the Presidency is small, and so the extent of our recruiting ground is limited and progress must be slow. In one of the papers which have been forwarded to you you will have noticed certain suggestions for increasing the number of the weaving schools or factories and of the tanning factories conducted under the auspices of Government. If effect be given to this suggestion, then the area of our recruiting ground would be considerably extended.

To the third question the answer is plain enough it seems to me.

Organization and discipline can only be introduced and maintained by a staff of fully-qualified teachers for the technical, and managers or foremen for the industrial, work.

For some time to come it will, I think, be difficult to supply the want locally and we should probably have to indent considerably on England. But to ultimately meet this demand would, I think, be one of the primary functions of our Technological Institute and surely in time we might hope to have a sufficient and efficient local supply.

I do not venture to do more than to show by these remarks the general directions in which I think we should move and at the same time to point out to you the obstacles by which our progress is likely to be arrested.



I have read with great interest the notes which some members have been good enough to prepare for the purposes of this Conference. The suggestions which they contain are many and various, and it is not indeed because I fail to realize their value that I have not taken them up in detail and dealt with them now but only because I wish neither to take up your time unnecessarily nor to anticipate the work of the Sub-Committees, who will, I hope, be able to submit to us some practical suggestions for the spread of technical education.

But however admirable may be the schemes which we devise do not let us forget that there is a consideration inseparable from all schemes of this nature, and that is the question of "ways and means." The coffers of Government are not inexhaustible. It seems not improbable that the amount now annually expended upon ordinary elementary education will in the near future be very considerably increased, and I do not think that we can fairly ask that in the educational budget the amount to be expended on ordinary education may be reduced in order to enable us to make experiments in the direction of industrial and technical education. In America, vast sums of money have been given by private individuals for technical schools of very various kinds. Perhaps it is not too much to hope that this most praiseworthy custom may become the fashion here also, for, after all, does not the fact emerge that no great advancement can be made either in industrialism or in technical education, unless the men of this country are prepared to come forward and give their brains and their time and their energy and their money for firstly the initiation and then the carrying out of schemes of industrial enterprise and at the same time of building up around those enterprises allied educational institutions—the factory and the school being the one the complement of the other?

Government may do something to advance the economic movement known as *Swadeshim* and to promote the growth of industrialism in India. The summoning of this Conference indicates, I hope, a recognition on our part of the obligations of Government in this respect and a desire that these obligations should be fulfilled, but it is only by Indians themselves that any real improvement in the economic condition can be effected.

If India is to take her place as an *industrial* nation, strong in the strength which industrialism and all that it betokens brings, she must demand of her sons (and especially of those in the higher ranks of society) great sacrifices—the uprooting of prejudices long cherished, the demolition of barriers which caste and custom have set up, the manifestation of courage and patience in resolutely striving to achieve not by the eloquence of pen or tongue but by the sweat of the brow and the labour of the hand. She must ask from them the sacrifice and subordination of self.

And when she has taught them the dignity of labour, she must develop in them the capacity for combination and organization; she must insist on the maintenance of a high standard of commercial integrity, she must compel the introduction of scientific reform to all phases of life.

The way will be long and the road rough, but the goal is worth the winning.

It is my earnest desire that the deliberations of this Conference may result in the formulation of some practical scheme whereby it may be possible for the Government and the peoples of this land to advance hand in hand towards the attainment of that ideal which, as I have already said, we all have at heart, and that is the "Betterment of India"!

### 3. Recommendations drawn up by the Sub-Committees of the Conference.

#### SUB-COMMITTEE No. I.—INDUSTRIAL DEVELOPMENT.

1. There should be a special department under a special officer to deal with industrial questions and control industrial instruction and technical education.

2. One of the functions of this department should be the supply of advice in regard to new industries and the introduction of new methods and processes. The second function of the department should be the carrying out of investigations and experiments. The third function of the department should be the development of selected industries.

3. This department should be directed by an officer to be styled the "Director of Industries." It is desirable that he should possess experience of the country and should be an Engineer with a knowledge of chemistry and an acquaintance with industrial work.

4. In any case in which the department is involved in any special expense in the giving of advice, a fee may be charged for such advice.

5. The Government may undertake, as a pioneer, the introduction of new industries or industrial processes for the purpose of training students or apprentices or for demonstrating that such industries will be commercially successful:

Provided—

(1) that no such undertakings be engaged in without prior consultation with an Advisory Board upon which Indian interests and the leading commercial and trading interests in the Presidency should be represented;

(2) that no such undertaking, if used for demonstrating any process as commercially successful, should be engaged in unless, after careful enquiry, the Government arrives at the conclusion that it is one in which the private capitalist does not already exist nor is willing to venture;

(3) that it should be a principle of such undertakings that the fullest possible publicity should be given by the periodical publication of reports and by a full statement of the accounts of the undertakings; and

(4) that, looking to the principle that such undertakings, if used for demonstrating that any process is commercially successful, should be directed to the assistance of private enterprise, it should be a rule that Government should withdraw from any such undertaking as soon as it is clear that it has sufficiently demonstrated the advantage of the improved methods of working in that particular industry.

6. The Conference considers that under the Department of Industries a bureau of information and an industrial museum should be provided from which information could be given and obtainable on points of commercial importance and interest.

7. The Conference is not prepared to give an opinion on the point whether money grants or subsidies for the assistance of new industries or industrial schemes are justifiable further than that they consider that such a course may be taken under special circumstances.

8. In order to encourage the development of industries, the following methods may be used by Government:—

(1) Substantial rewards may be offered for inventions likely to be of important industrial advantage.

(2) Exhibitions should be encouraged and liberal prizes offered for products, methods and appliances.

(3) Information as to new industries should be disseminated through the Press, both vernacular and English, and advertisements may be freely resorted to.

(4) Lectures may be usefully arranged for, the lectures being, where possible, accompanied by practical exhibitions, either of products, appliances, or improved methods.

(5) Government may on a small scale make grants-in-aid or presents or loans of machinery for particular industries.

9. The action of Government should be directed to the promotion both of cottage industries and the development of industries on the factory system.

10. Experiments may be carried on in jails, under the advice of the Director of Industries, in new industries or industrial processes.

11. In indenting for experts in particular industries or in departments of technical education Government should generally engage them for particular terms and on condition of their training a certain number of Indians qualified to perform their duties after them.

#### SUB-COMMITTEE No. II.—TECHNICAL EDUCATION.

12. This subject should be divided into two parts—

(i) Industrial Instruction.

(ii) Technical Education.

13. The object of technical education is to train a student to apply theoretical principles to practical purposes and to make use of theory in solving such problems as arise in carrying manufacturing processes. Technical education must be based upon scientific education.

14. The object of industrial education is instruction in the performance of definite operations and need not necessarily involve the teaching of general principles but only of their application.

##### (i) *Industrial Instruction.*

15. Industrial instruction should arise out of and be developed to suit the needs of some existing industry or an industry started for experimental purposes.

16. It is desirable that a list should be made of the trades and manufactures in this Presidency which are of sufficient importance to justify the establishment of special industrial schools in relation to them.

17. The Conference is of opinion that industrial schools should be located in a centre where the connected industry is carried on, and there is no objection to two or more industries being taught in one institution. It is desirable, where an industry has been started for experimental purposes, that industrial classes should exist in connection with it.

18. The number of industrial schools in the Presidency should be increased and the status of those already established should be improved.

19. The primary object to be aimed at by industrial schools should be the improvement of the quality of the work of the hereditary artisan classes. A secondary object will be the instruction of others than these, who may submit themselves to training. Such schools need not necessarily be self-supporting, but the courses of instruction should direct attention to the importance of efficient and economical manufacture and of arriving at the true cost of the work turned out. The success of a school, in the matter of grants-in-aid, should be judged of largely by the economy of the outturn even if such outturn should not contribute appreciably to reducing the cost of the working of the school itself.

20. In industrial schools it is not objectionable to employ workmen with whom the boys may be associated in the execution of orders. It should be an important function of such schools to provide advanced courses of instruction for craftsmen and artisans who have already learnt their trade in the bazaar or village. No general education classes should be attached to these schools, but, as far as possible, only pupils who can read and write their own vernacular fairly well should be admitted. Those who cannot may be admitted as half-time pupils. The work in them should be more intimately connected with the requirements of the people of the country than has hitherto been the case.

21. The management of industrial schools other than those started by private agencies should be vested in the department, and the appointment of a whole-time Inspector of Industrial Schools is recommended.

22. Scholarships or stipends may be given to students in industrial schools, but such scholarships or stipends should be confined to members of the artisan castes or to others whose families are already engaged in the trade. Wages may be paid to those who are capable of doing remunerative work.

23. In view of the expected increased use of machinery in agriculture and in village industries, the Conference is of opinion that efforts should be organised for passing large numbers of the hereditary village artisans—chiefly smiths and carpenters—through the well-equipped workshops which are usually to be found at district head-quarters, whether in charge of the Public Works or the District Board Engineers, and that the suitable equipment of such shops, for the purpose in view, under the advice of the Director of Industries would be a proper outlet for the expenditure of public funds.

24. It is also desirable that skilled mechanics qualified to instruct village artisans in accuracy of work, in the use of special tools, and in the repair or manufacture of simple machines, such as iron ploughs and agricultural implements, iron and sugar-cane mills, etc., should tour in the villages and hold free instructional classes at various centres.

25. The Conference recommends that a few simple text-books relating to the industries of the Presidency may be prepared and translated into the vernaculars and made available to the public on payment.

26. The Conference is of opinion that provision should be made in the curriculum of studies of all secondary schools for males for compulsory manual training including the use of tools during certain hours in the week.

27. It is desirable that local industrial committees consisting of persons in the trade or especially interested in industrial work be formed for assisting the Director of Industries with their advice.

##### (ii) *Technical Education.*

28. The Conference is of opinion that it is desirable that the control of any Technological Institute and of technical education should be under the Director of Industries.

29. The College of Engineering in Madras should be expanded into an Institute of Technology with complete laboratory and workshop equipment; and education should be imparted in it in Engineering in all its branches, in Applied Chemistry and such other technical subjects as are suited to the needs of the country.

30. It is desirable that arrangements should be made to enable students from this Presidency to take full advantage of the facilities offered by the Indian Institute of Science at Bangalore.

31. Scholarships should be provided to enable young men in the Presidency to take advantage of facilities for technical education in other parts of India.

#### SUB-COMMITTEE No. III.—TEXTILES AND DYEING.

##### (i) *Weaving.*

32. The Conference considers that a review of the condition of the hand-weaving trade indicates clearly that it is in the main suffering from complete lack of organisation and that the most hopeful method of improving the condition of the weaver is to encourage the establishment of private hand-loom factories.

33. The Conference considers that six weaving institutions, approximately similar in character to the Manchester or Bradford Textile schools, but on a moderate scale, be established at Vizagapatam, Masulipatam, Jammalamadugu, Conjeeveram, Coimbatore and Madura (as alternatives Kumbakonam, Tanjore, Trichinopoly or Palghat) each under the superintendence of an Indian expert in textile manufacture.

34. The Conference considers that the harness used in pattern weaving, especially for bordered cloths, seems capable of considerable improvement and that it is therefore desirable that an expert in jacquard weaving should be employed by Government to demonstrate the advantages of modern methods of doing this work.

35. Whilst the Conference is of opinion that the most likely solution of the weaving problem lies in the direction of small factories, it considers that efforts should be made in other directions, especially by other agencies than Government, and it suggests that attempts should be made to form weavers' guilds and co-operative societies on the lines of the Sholapur Weavers' Guild. It also considers that the experiment should be tried of supplying individual weavers with improved weaving appliances on the hire-purchase system and that the holding of local weaving competitions is a promising method of influencing the individual weavers.

36. The Conference considers that a list should be prepared under the orders of Government of the weaving centres in the Presidency which have more than fifty looms, so that useful information regarding improved appliances and methods of weaving may be disseminated to those centres as decided by sub-committee No. I.

(ii) *Gold-thread Trade.*

37. The Conference considers that it is desirable that the gold-thread trade should be re-established in India, if possible, but that no action should be taken by Government in the matter, pending the results obtained from the experimental factory recently started in Madras.

(iii) *Silk Industry.*

38. The Conference considers that it is desirable to make enquiries regarding the state of the silk industry in Kollegal and Ganjam, that in the first instance a departmental report should be prepared, and that if it is found that there are prospects of improvement and development a competent expert should be appointed by Government to study the matter in detail and to suggest what action should be taken.

(iv) *Dyeing.*

39. The Conference considers that a dyeing expert should be engaged to report on the state of the industry throughout the Presidency and that, after his report is received, he should be employed in carrying out such of his suggestions as appear feasible; that in particular he should be instructed to consider the question of establishing one or more trade dyeing schools in the Presidency on the lines of the Leeds and Bradford colleges.

40. The Conference thinks that the indigenous vegetable dyes should be the subject of investigation and study in a suitably equipped tinctorial laboratory.

(v) *Other Textile Industries.*

41. The Conference considers that the Agricultural Department should be requested to report on the possibility of improving the supply of wool.

42. The Conference is of opinion that, in respect to hand cotton-printing, it is unnecessary to interfere with or supplement the efforts to improve that industry now being made by the Council of the Victoria Technical Institute.

SUB-COMMITTEE No. IV.—SUGAR, CHEMICALS AND LEATHER.

(i) *Sugar.*

43. The Conference considers it unnecessary that Government should take any action at present to start an experimental sugar factory for testing or demonstrating new processes in sugar manufacture, but that it should be at the discretion of the department to render all possible assistance free of charge to private individuals who may wish to experiment in this direction.

44. The Conference considers that, in view of the great difficulty which ryots experience in crushing their cane, efforts should be made to introduce small power-mills driven by oil-engines, and that one or two model crushing stations should be

established by Government and placed as soon as possible at the disposal of the ryots who may avail themselves of the facilities offered by the machinery.

45. The Conference considers that steps should be taken to improve the present native method of treating the juice by boiling it into jaggery.

(ii) *Chemicals.*

46. The Conference is of opinion that the possibility of producing industrial alcohol at a price which would enable it to compete with petrol might usefully be investigated by the Government department.

47. The Conference is not in a position to formulate any definite proposals for the establishment of chemical industries in the Presidency, but it considers that the question should be investigated by a small committee of experts under the department and that the report should be published.

48. The Conference thinks that Government can assist the introduction of chemical manures (1) by undertaking analyses of artificial fertilizers for private individuals free of charge, (2) by experiments on Government farms, and (3) by supplying small quantities free for experimental purposes to selected ryots. It understands that steps in this direction are already being taken by the Agricultural Department.

49. The Conference recommends that the incidence of railway rates on chemicals and artificial manures be enquired into by Government with a view to their being reduced to the minimum rate accorded to any class of goods.

(iii) *Leather.*

50. The Conference considers that the leather trade in the Madras Presidency is of sufficient importance to justify the establishment of a leather trade-school which should be associated with a small tannery in which efficient practical instruction can be given, that provision should also be made for technical education in tanning, and that in the leather trade-school experiments may fitly be undertaken to determine whether or not the status of the Madras tanning trade can be improved. In this connection it would observe that there is a large market in India for finished leathers. It also considers that it is not necessary to establish other Government tanneries in the Presidency and that, in view of the very large number of tannin-yielding trees in the Madras forests, it is desirable that experiments should be undertaken with the object of producing tannin extracts.

SUB-COMMITTEE No. V.—OTHER INDUSTRIES.

(i) *Metal Work.*

51. The establishment of an institute of experiment in the metal industries would serve no useful purpose at the present time.

52. Work in metals may well form a subject for instruction in industrial schools.

53. It is understood that art metal work is being dealt with in the School of Arts.

54. Arrangements should be made to obtain efficient instructors in metal work and for the training of teachers.

(ii) *Oil.*

55. Having regard to the enormous export of oil-seeds and the desirability of retaining the cake in the country for purposes of manure, food for cattle and other purposes, and to the fact that the present methods of extracting oil are susceptible of improvement, the Government may be advised to draw public attention to the field open by the offer of a reward for the design of a suitable oil-extracting plant, and, if necessary, otherwise to encourage the introduction of improved oil-presses and mills.

(iii) *Miscellaneous Industries.*

56. The Government should cause an investigation to be made by competent experts into the possibility of developing or starting the following industries in the



Madras Presidency, and should publish the results of the same in English and the vernaculars for general information:—glass, pottery paints, paint and varnish brushes, matches, buttons and beads, umbrellas, jute, plantain and other fibres, coir and cordage, tobacco, plantain meal, pebbles for spectacles, etc.

57. Meanwhile, encouragement should be afforded to private enterprise in such manner as may seem possible to Government.

58. Instruction in button manufacture should be provided in a suitable locality under a competent instructor and with up-to-date plant.

(iv) *Forest Produce.*

59. With reference to Mr. Brasier's note, Government should cause a report to be published on the prospects of a paper mill in the three Northern districts, and offer liberal concessions to private enterprise.

60. In regard to Mr. Brasier's note on the lac industry, the Government should be requested to cause the Forest Department to report fully regarding the localities where the lac industry might successfully be introduced. The information thus obtained should be published in English and the vernaculars, and facilities in the shape of favourable forest leases for the encouragement of private enterprise in this direction should be granted.

(v) *Railway Rates.*

61. The effect of existing railway rates on indigenous industries in their competition with imported goods should be enquired into by Government and an adequate reduction of them secured where they may be found to be excessive. In this connection the Conference invites attention to the restrictive effect of railway rates on the transport of bulky forest produce of small value, such as wood, fuel, fodder and charcoal and, to a minor extent, timber.

(vi) *Water-power.*

62. The possibility of utilising water-power for the generation of electricity or other industrial purposes should be investigated.

(vii) *Oil-engine Irrigation.*

63. The Conference is of opinion that there is a large field for extension of oil-engine irrigation, especially from rivers and canals. When such irrigation is from wells, attention should be drawn to the danger of reducing the manure supply by lessening the number of cattle.

64. The Conference recommends that (i) oil-engine installations may be taken as part of the security for advances under the Land Improvement Loans Act; and (ii) that for this purpose the value of the installation should not be taken as more than 50 per cent. of its cost.

65. The Conference is of opinion that, in cases where oil-engine pumping is done by private enterprise from river banks to irrigate land not irrigable from an anicut, the Government should be requested to consider the question of reducing the water assessment.

66. Efforts should be made to encourage the provision of oil-engine installations by joint action of interested ryots.

67. The Conference recommends that Government should keep in view the desirability of Government gradually withdrawing from the work of erecting oil-engines while retaining in the hands of the Director of Industries the duties of a Consulting Engineer.

(viii) *Well-boring.*

68. In view of the success of the well-boring operations in the Chingleput district, they should be gradually extended to the rest of the Presidency until the whole of the subterranean water-supply has been explored, and that with this object a sufficient staff, including an Economic Geologist, should be employed under the Director of Industries.

4. Proceedings of the final meeting of the Conference on  
Saturday the 19th September 1908.

*Present:*

The Chairman (His Excellency the Governor) and all the Members of the Conference and the Hon'ble Mr. G. Stokes, the Hon'ble Mr. G. S. Forbes, Mr. A. Y. G. Campbell (Private Secretary) and Captain Vesey (Aide-de-Camp).

In opening the Proceedings His Excellency addressed the Members of the Conference as follows:—"Gentlemen, thanks to the readiness with which the members of the Conference have thrown themselves into their work and to the zeal with which they have devoted themselves to the solution of the problems submitted to them, I am glad to say that the objects with which this Conference was summoned have been achieved. The Government have now in their hands over sixty resolutions dealing with almost every matter which could come under the head of either Industrialism or Technical Education. These resolutions represent in a crystallised form the opinions of the gentlemen present, on which opinions, I may say, we as Government set a high value. In addition to the resolutions themselves we have reports of the proceedings of these various sub-committees and arguments which have been brought forward either for or against each subject-matter for discussion. The Government will then be in a position to formulate a policy and will, I hope, be able to give effect to some of the resolutions which may commend themselves to the Government. In this connection I would remind you that not only is our approbation to be sought and found, but also that of the Government of India and the Secretary of State. Now, this Conference, I may remind you, Gentlemen, is really purely an advisory body. And I lay some emphasis on this, because I am anxious that our proceedings during the week and especially our proceedings this morning should not be misunderstood. For instance, I think it would be unfortunate if the public were to take it for granted that the resolutions passed here this morning were necessarily binding upon the Government or that these resolutions necessarily define the policy of the Government, which of course they cannot do. The suggestions that have been made in the various sub-committees are very numerous, and if effect were given to them all the expenditure involved would be something enormous. We, as Government, shall have to decide in due course which of these various measures recommended are to be adopted, what is to be the order of their execution, and upon what scale they are to be carried out; and these considerations will be very largely affected, I need hardly remind you, by a consideration of what means may be available for enabling us to give effect to these recommendations. To assist us in coming to a decision, we have, as I said just now, the resolutions of the various sub-committees, a record of the proceedings, and, in addition to that, we have also a number of minutes, memoranda and notes, which the various members of the Conference have been good enough to put forward. These minutes and the notes are, in my opinion, of great value, and if the Conference has to do nothing else, I think the mere compilation of these notes would be an achievement of considerable worth. I understand that the various members of the Conference, who were good enough to furnish us with suggestions and to write notes on the position generally, have been good enough to say that they have no objection to the publication of these notes and memoranda. We, therefore, propose to make them public with certain other papers connected with the proceedings of the Conference. I have been given to understand that one or two members of the Conference have expressed their expectation that I should make some definite pronouncement this morning as to what the policy of Government is likely to be. Well, Gentlemen, as I said just now, the resolutions of the various sub-committees number over sixty. There has been barely time for their mere perusal, and therefore certainly we have had no time to give anything like adequate consideration to the very difficult questions which many of these resolutions raise. It is, therefore, not only not possible for me to make any definite

"pronouncement as to what decision the Government has come to on these resolutions, but it is even impossible for me to hint at what our policy is likely to be. Now, this morning, if we were to start a "full-dress" debate on each one of those resolutions *seriatim*, we should begin the work of the Conference *de novo* and we should traverse ground which has already been well trodden. Moreover, the work of the Conference would be unduly prolonged, and there would be no hope whatever of our getting through it to-day. I therefore propose to put these resolutions formally to the Conference, and I will ask members to refrain from speaking to them unless any member wishes to bring forward some fresh argument against resolution which has not yet been brought forward in the sub-committee. I take it that we may regard these resolutions as the sense of the various sub-committees and a record of what took place in the sub-committees. We have also various minutes of dissent, and in this connection I should like to say one word in regard to what appears to me to be a matter of no very great importance, though I think it has exercised the minds of one or two members of this Conference, *i.e.*, the publication of the speech which Mr. Yorke addressed to the sub-committee which met on Monday afternoon. I think it was understood by the members of the Conference that the proceedings of the various sub-committees would be regarded as confidential, and one or two members of the Conference have called my attention to and taken exception to the publication of the speech of Mr. Yorke. I am perfectly certain that it is only owing to the fact that it was not generally understood that we proposed to regard all the sub-committees' proceedings as confidential. What is represented to me is this, that Mr. Yorke's speech alone goes out to the public and has not been traversed or refuted or controverted in any way. So I would ask that any member of the Conference who feels that he would like to set his views forward to the public also will be good enough to forward to the Secretary of the Conference any note of dissent from Mr. Yorke's which he might wish to bring before the public. There has also just recently been put into our hands a further note of dissent by Mr. Yorke, Mr. Orr and Mr. Simpson. I would in the same way ask any member of this Conference who wishes to make any objection to or to quarrel with any of the principles laid down therein—I do not say necessarily that he will do so—but if he does, will be good enough also to put in a minute or note or memorandum to the Secretary which will be submitted to the Government together with Mr. Yorke's note? I do not think it is necessary to raise a debate on this particular point, because, after all, this minute, which Mr. Yorke and other gentlemen have submitted, is really only what the Government wants and that is an expression of opinion by those who are in the best position to judge what is likely to be the effect of the policy proposed, and to give a frank and free expression of their views for the consideration of Government. Now, I need hardly say that such an expression coming from Mr. Yorke representing the Chamber of Commerce, from Mr. Orr representing the Madras Trades Association and Mr. Simpson of Messrs. Binny & Co—all of whom we regard as very fully qualified to speak—is of great importance. I can assure those gentlemen that the representations they have made will receive the very fullest and most careful consideration by the Government. If any assurance at this stage is likely to be of value, I think, I may say clearly, that the Government have no intention of embarking on any wild-cat schemes with the tax-payers' money, nor do they propose to embark upon schemes which will only enter into competition with existing industries. Clearly I think that neither the one course nor the other is likely to help us in effecting our object. Our object is to aid industrial enterprise and not to injure it, and I hope that Messrs. Yorke and Orr will not be unduly alarmed by the turn which the discussions took in the committee nor forget that there is a Government who have the fullest sense of their responsibility and are not likely, in my opinion, to embark upon any wild-cat project or upon any projects that are likely to damage existing industries. With these remarks, I think I may proceed to formally put the resolutions to the vote, unless any member of the Conference deems it advisable to interpose any remarks at this period. I will simply ask that if any member of the Conference dissents from the principles laid down by Mr. Yorke in his minute, he will be good enough to let us have a written memorandum which we may consider at our leisure. Otherwise, it will be impossible to take the resolutions *seriatim* and pass, amend or reject them as may seem good to the Conference assembled within the time available to-day."

The resolutions 1 to 68 were then put *seriatim* and carried. All were carried *nem. con.* except the following, the names of dissentient members being noted in each case:—

- No. 2—one dissentient (Mr. Yorke);
- No. 3—two dissentients (Messrs. Orr and Yorke);
- No. 5—three dissentients (Messrs. Yorke, Orr and Simpson);
- No. 28—twelve dissentients (Mr. Hammick, Dr. Bourne, Mr. Wilson, Mr. James, Mr. Couchman, Mr. Lindsey, Mr. Hadaway, Mr. Thurston, Mr. Yorke, Dr. Travers, Mr. Pattabhirama Rao and Mr. Kühner).
- No. 34—one dissentient (Mr. Hadaway);
- No. 44—one dissentient (Mr. Yorke);
- No. 55—two dissentients (Mr. Simpson and Mr. Yorke);
- No. 59—one dissentient (Mr. Lindsey);
- No. 65—one dissentient (Mr. Chatterton).

The Hon'ble Mr. A. J. Yorke said:—"Before this Conference adjourns, I should like to return the thanks of the Chamber of Commerce and the industrial public generally for Government's convening this Conference, and for the patient consideration that it has given to the views that have been put forward from my personal standpoint and that may appear novel to many of those who have listened to me. I only wish to thank your Excellency for presiding to-day as well as for having convened this Conference."

Sir Frederick Nicholson said:—"I do not think that this Conference should disperse without our making some acknowledgment of thanks to a gentleman who has done so much to assist the members of the Conference, whether as the Chairman of the Committees or as an individual member. I allude to the Hon'ble Mr. Cardew; and speaking for myself and for the members generally, I am quite sure that this is not a mere courtesy vote, but one of real thanks. I do not think this resolution needs any formal seconding. Even if it does, I call upon all members present to second it."

Diwan Bahadur R. Raghunatha Rao, on behalf of the Indian community, thanked His Excellency as follows:—"I beg to offer hearty thanks to the Government and to His Excellency the Governor for the interest he has taken to help the country at a time when such help is absolutely necessary. Our trades have been neglected, from whose fault it is unnecessary to mention. It requires a great deal of support from Government and from people interested in it. At such a juncture that the Government should come forward and ask us to tell them what we want and to say what could be granted to us for the good of the country is a thing for which no British subject can but be thankful for to the Government. It is with great pleasure that my countrymen have attended this Conference with a view that they should express their idea of obligation to the Government, and to His Excellency in particular, for the interest he has taken for the good of the country."

His Excellency, in reply, said:—"Gentlemen, before this Conference closes, I should like to say a few words only. May I, in the first place, endorse the remarks which fell from Sir Frederick Nicholson. Nobody knows better than I do what immense work has for the past few weeks, especially during the last week, been thrown upon the shoulders of Mr. Cardew. If this Conference should eventually prove successful and if any of the objects with which we have assembled here is ever attained, a large measure of gratitude will be due to him from those who will benefit by the action which may be taken. Now, may I say on behalf of the Government how much we appreciate the words which fell from Mr. Yorke and from Mr. Raghunatha Rao. Mr. Yorke represents the interests of the British merchants and of Englishmen generally in Madras. Mr. Raghunatha Rao is looked upon by Anglo-Indian officials and non-officials alike and by Indians as a true friend of India. I can assure you that I think that it was extremely kind of him to make the great physical effort, which to a man of his years it must have been, to come up here

"to assist us in our deliberations. Gentlemen, we as Government appreciate the spirit which has been manifested by every one of the non-official members present. You have had a great deal of work to do, but you undauntedly tackled it and have helped us enormously. We are really sincerely grateful. We hope that this Conference is not going to be barren but will bear good fruit in the future. We hope that we may, every one of us, officials and non-officials alike, be able to show that the Southern part of India at all events can still imagine, can still create, and do. I hope, Gentlemen, that the work of this Conference will not end in words, but in deeds, which will benefit the whole community and future generations. I thank you one and all for having come here and for the real assistance which you have rendered us in carrying out the objects which we had in view when we invited you to take part in the Conference."

His Excellency then declared the Conference dissolved.

A. G. CARDEW,  
*Secretary to the Conference.*

#### PART IV.

#### PAPERS RECORDED SUBSEQUENT TO THE CONFERENCE.

1. Minute of Dissent, dated 19th September 1908, recorded by the Hon'ble Mr. A. J. YORKE, representing the Madras Chamber of Commerce, Mr. E. W. ORR, representing the Madras Trades Association, and Mr. C. B. SIMPSON.

We beg leave to record our formal dissent from the findings of sub-committee No. I appointed to consider Industrial Development (General Principles).

The papers submitted to the Conference (especially Paper No. 1) indicate so clear a bias on the part of the Director of Industrial and Technical Enquiries towards State Industrialism that, in the absence of any express and official disclaimer on the part of Government against such tendency, we cannot shut our eyes to a danger of its being allowed to creep in and develop.

Our fears are increased on consideration of the fact that the post of the Director has been allowed to evolve out of a purely educational appointment and has resulted in his having already actually started two industrial factories and run them on a commercial scale.

He now claims, on insufficient grounds, to have made these businesses commercially profitable and suggests the large extension of his department with a view to develop the industry of the Presidency by further action on the lines which he incorrectly asserts to have proved financially successful.

As the Director has been allowed to put forward such ill-founded claims and unprecedented proposals, with the knowledge of Government, their approval seems to be implied; so we cannot but think that Government has been misled in the matter or has failed to see a danger very apparent to us, and might again overlook it.

Therefore, on the general principle that State industry is undesirable in the interests of the country, we record this minute, although, as a result of our stand in connection with Resolution No. 6, some important provisos have been passed which afford valuable safeguards against the danger referred to. However, the danger to some extent still exists in connection with some of the resolutions which were passed in spite of our opposition although no full reply has been made to our arguments and no material refutation of the facts or statements on which they were based has been adduced.

Our said arguments and objections based on our own experience have been fully stated in the letter of the Chamber of Commerce, in the speeches of Mr. Yorke, and in the note by Mr. Simpson, copies of which are attached for ready reference, and which may be summarised as follows:—

- (1) Government factories are wrong in principle. The State is necessarily unsuited to work them, and we consider that sound industrial development can only be secured by private enterprise.
- (2) State industry is unfair to the tax-payer who will have to bear all losses.
- (3) Private enterprise will inevitably suffer as it cannot compete with Government institutions provided with unlimited capital at low rates of interest.
- (4) The floatation of companies by Government is undesirable.
- (5) The proposal to start industries and hand them over as going concerns is a very dangerous one for the new proprietors, as, without the experience gained in building them up from small beginnings, they would almost inevitably come to grief.



(6) The suggestion that Government should provide capital for starting factories is also uncalled for as Indians are ready enough to invest in industry when they see good prospects of greater returns therefrom than from money-lending or agriculture.

(7) Adequate safeguards cannot be suggested by us against the unlimited extension of State industry if the principle be once admitted.

(8) Sufficient scope for technical education and industrial instruction to meet the needs of established industries already exists without Government starting factories to create openings for students.

(9) Government should confine any assistance to commerce to matters of research, technical education, industrial instruction, and the dissemination of industrial information. Technical education and experiments should not be carried further than the laboratory or model institute, and industrial instruction should not go further than the industrial school.

(10) Competition for outside work by industrial schools should be guarded against.

(11) The Department of Industry is being obviously created for an executive officer, an Engineer or a professor, whereas in our opinion its head should be a Civilian and the appointment of the nature of Secretary to a local Member for Commerce and Industry. Government will find it extremely difficult to work with their primary adviser if he is also the principal executive officer. In our experience the difficulty is to know when to withdraw from an unsuccessful venture, the temptation, especially for the originator of an enterprise, always being to continue, and to expand operations, in the hope of reducing cost. If the Government adviser is also the executive adventurer, it will be very difficult for Government to know when to stop.

(12) The Madras Presidency should be treated as an integral part of India when considering the possibility of Government competing with private enterprise.

(13) Agriculture, which after all is the principal tax-payer, requires more assistance than industry which will automatically improve with agricultural development.

(14) The improvement of roads and canals, extensions of railways and revision of railway rates are the directions in which the industries of the Presidency specially require Government assistance and involve no risk to the tax-payer.

## 2. Replies to the foregoing Minute of Dissent.

(1)

The fears expressed by a small section of the Conference in a Minute of Dissent are more imaginary than real. No recommendation that any of the sub-committees has made appears to lend colour to their view that there may be unfair competition between Government and private enterprise. Nor do we recognise it as an immutable law that "State industry is undesirable in the interests of the country." The measures that may have to be taken by Government to stimulate the development of industries must depend on the circumstances of each country. Even in the most advanced countries it is now an accepted policy that industry and commerce cannot always thrive without Government assistance in one shape or another, and appeals for aid in various forms are made by those engaged in them to their respective Governments whenever a neighbouring nation takes a step forward in the field of industry. In Hungary, according to a report recently published by the Minister of

Commerce,\* £257,908 were given by the Government in the first nine months of the past year for the establishing of 29

\* *The Indian Trade Journal*, May 14, 1908, pages 262-3. new factories, £115,125 for the enlarging of 27 existing factories, £39,190 for the supply of machinery to 61 factories, and £1,187 for the education of apprentices in two factories. State favours, such as exemption from taxation, etc., were granted to twelve industrial concerns (including a screw factory, hemp bleaching and weaving factory, a celluloid factory, three farm distilleries, etc.), and promised to nineteen others (amongst which were a shipyard, a factory for producing electric plant, a cloth factory, two wool-weaving mills, a factory for producing chemical manure, etc.). The State assisted the smaller industries during the same period by a grant of £72,035 and by gifts of machinery valued altogether at £39,747. In Japan the Government has "tried to encourage old industries by model factories and by "obtaining foreign experts." "It has maintained model works and industrial "laboratories, it has hired out the latest machines of a costly character, it has "sent experts round the provinces to encourage enterprise by lectures or practical

† *The Educational System of Japan* by W. H. Sharp, page 262. "experiments . . . it has imported "foreign experts by the hundred."† One wonders what the signatories to the

Minute of Dissent would have said of such action on the part of the State if they had been Hungarians or Japanese. The whole attitude of these gentlemen seems to be determined by the fact of their being foreign merchants doing business in India. Their point of view is not that of Indians who are permanently interested in the welfare and advancement of this country. They say in regard to some of the resolutions "which "were passed in spite of our opposition," that "no full reply has been made to some of "our arguments and no material refutation of the facts or statements on which they "were based has been adduced." There are those who cannot be convinced because they will not be.

We come now to the dissentients' fourteen propositions, which are stated almost as if they were aphorisms which must be accepted, but which in reality are mostly one-sided assertions betraying the bias of the signatories.

It must be remembered in a consideration of what the State may do in India in the matter of industrial development, that the circumstances are peculiar—that it is a foreign Government much in advance of the people in industrial methods and ideas, that it has a mission to uplift the people committed to its care and that it occupies not only the position of ruler but of teacher. The capacity of the people to do without Government assistance and the state of industry must also be borne in mind. There is no analogy between countries whose Governments are of the people with ideas of industrial work little in advance of the people's conceptions and India lifted to the level of a higher material civilisation with her resources undeveloped. When the real

facts of the situation are remembered, we have no fear that any fair-minded person will stigmatise as unreasonable any of the requests made to Government in the resolutions of the sub-committees.

It is another assumption not founded on facts which the signatories make when they speak as if State industry is bound always to entail a loss on the tax-payers. The Government own and work at present several factories, such as the Harness and Saddlery Factory at Cawnpore and the Alipore Clothing Factory, but we are not aware that these have been losing concerns. Even when they remain unremunerative for a period, the tax-payers derive advantages in the training which the workers receive, in the introduction of a new industry into the country, and in the development of those moral qualities which enable the possessors to battle successfully against adverse circumstances—advantages which more than compensate any losses of the first few years.

When the authors of the Minute of Dissent speak as they do of private enterprise suffering in competition with Government industry, they perhaps mean no more than that one or two European firms may lose the practical monopoly which they have been enjoying or are likely to enjoy in particular industries or trades. We dare say there are those engaged in commercial enterprise who are interested in preventing, if they can, the entry of others into the field, but it is their own look-out and not a consideration to which either the people or the Government can be expected to pay much heed. The Government is bound in the interests of the consumers, the tax-payers of the country, to point the way for the destruction of that monopoly. The solicitude of the dissenters for the interests of those who may take over as going concerns industries that have been worked by the Government, is somewhat out of place as they can well look after their own. The argument has no more validity than the caution against all enterprise because concerns very flourishing at one time have often subsequently come to grief.

Perhaps the signatories and other successful business-men in India can afford to be sarcastic at the expense of the people as the former seem to be in stating their proposition No. 6, but their attitude cannot be imitated by those who understand the various causes of the present highly unsatisfactory condition of indigenous industrial enterprise, and these will agree that, on account of want of technical skill, trained men and co-operative effort and the drawbacks arising from the fiscal policy of the country being often dictated by British merchants, they do stand in urgent need of Government help more than the advanced people of foreign countries.

The danger of unlimited extension of State industry is purely imaginary as any one in touch with the realities can tell. In this matter, as in others, the dissenters are fighting against shadows and not striving to combat present or even prospective difficulties.

We can only think that the Hon'ble Mr. Yorke and his friends do not intend to be taken seriously when they make the rather startling assertion that "sufficient scope for technical education and industrial instruction" already exists in the country. It is hardly necessary to seek to prove that this is far from being so, and that there is the utmost necessity for further steps being taken.

The authors of the Minute of Dissent think that "Government should confine any assistance to commerce to matters of research, technical education, industrial instruction, and the dissemination of industrial information". We could wish that at least in these non-contentious matters the support of bodies like the Chamber of Commerce could be counted on. On the other hand, we have in mind the instance of a mercantile body up in the north which told the Local Government there not very long since that Indians did not stand in need of technical education and that Government should not trouble itself about it. How far the dissenters are prepared to go even in this direction becomes apparent from the very next sentence in which they seem to say that no workshop or factory training is an essential part of either technical education or industrial instruction. We may be wrong, but will anybody tell us that in Western countries it is merely theoretical? What is done in industrial schools at present is that the articles which the boys make in the course and as part of their training are sold and the proceeds credited to the funds of the school.

What is there wrong about this? Should they be taught to make curios and not articles by meeting the demand for which they will have to eke out a subsistence in after-years?

It is really difficult to please some critics. When a Civilian is appointed as Member and Secretary for Commerce and Industry in the Government of India, English merchants have attacked the principle of officials possessing no real living knowledge of the mechanism of trade and industry being so appointed. Now that it is proposed to do otherwise in Madras, they attack the very principle which has been contended for on other occasions.

We know of no resolution passed by the sub-committees which runs counter to the dictum that the Madras Presidency should be treated as a part of India, although there would be nothing wrong if its needs were considered apart from the state of affairs in other provinces. But the proposition comes with bad grace from Mr. Yorke who resisted in committee any suggestion that Government should do something for the extension of sugar manufacture on the ground that imports of foreign sugar into this Presidency were inconsiderable and who refused to take into account the growing and enormous influx of the foreign commodity into India as a whole.

That agriculture requires assistance and more assistance is a long-standing article of faith with many, and in the sub-committees several members showed their genuine solicitude for it in pressing for measures for the retention of oil-cakes in the country for purposes of manure in the face of opposition from Mr. Yorke. But the dissenters will fail to get intelligent support from any disinterested quarter when they state what we cannot help characterising as a curious proposition "that industry will automatically improve with agricultural development." Perhaps we shall be told where this has been so. But Mr. Yorke, who argued in committee that it was better for the country that oil-seeds should be exported instead of oil, cannot perhaps think otherwise than that Government should leave the development of Indian industry severely alone.

The entire argument of the authors of the Minute of Dissent is practically given away when they make the admission that in deference to their wishes valuable safeguards have been introduced by way of qualification to certain of the propositions, to which a considerable number of the members of the Conference would not have yielded their assent but for their regarding them as put in by way of compromise to conciliate the opposition of Mr. Yorke and his friends.

V. KRISHNASWAMI IYER.  
SYED MUHAMMAD.  
M. R. RAMAKRISHNA AIYAR.  
C. Y. CHINTAMANI.

19th September 1908.

(2)

The Government of India is a trustee of the wealth of the British Indian Empire. As such it is bound to educate its subjects to enable them to contribute to its wealth. Education, in order to be complete, should be both theoretical and practical. Theories should be taught in schools and they should be demonstrated in workshops. The details to make the students efficient should be left to the Director of Public Instruction alone subject to the supervision of Government.

Education should not be altogether godless.

This education should have two main objects in view, viz., development of agriculture and that of industries. These can never be separated as the neglect of one is sure to materially interfere with the other.

When the educated subjects are declared competent to give effect to their education, they should be utilized in the carrying out of the administration of the country.

Some of them or most of them should make use of the knowledge gained in pioneering the development of the resources of the country. If they require some small aid from Government, it should be given to them. When it is found that subjects are unable to pioneer any new improvement or that they have failed to do so, the Government should step in and pioneer it.

These appear to me the important points which should be declared as sound by this Conference.

Without the use of machinery India cannot compete with other nations. The use should be popularised by Government on the principles above referred to. The mode of popularization should be left to Government who have got in their service and among its subjects men competent to offer suggestions.

All the rest are details with which the Conference need not trouble itself.

19th September 1908.

R. RAGHUNATHA RAO.

(3)

The dissenting members have summarised their arguments and objections to the findings of sub-committee No. I under 14 heads, and although it is very difficult to refute a general proposition as briefly as the same can be put, I propose to indicate very briefly the nature of the argument which may be used in reply.

(1) This proposition may be accepted with certain qualifications. Most civilised nations maintain large factories to provide naval and military equipment. France has large factories in which such State monopolies as tobacco and matches are manufactured. There are State factories maintained by Germany at Meissen in Saxony and at Berlin. France maintains State factories at Sevres and Gobelins. It is admitted that all these are special cases and it is contended that the pioneer factories in Madras are equally special cases and justified by the peculiar condition of the country.

(2) State industry is not unfair to the tax-payer if it is properly and within reasonable limits conducted. The gains may outweigh the losses, and the tax-payer may receive an adequate return for the money expended.

(3) It has never been proposed that Government institutions should be started with unlimited capital.

(4) It has not been proposed that Government should undertake the floatation of companies. The only company that has taken over an industrial enterprise which owed its inception to Government was started entirely by private enterprise and no Government officer had anything to do with it. This practice will, I presume, be followed in the future.

(5) If industries started by Government are handed over to private enterprise as going concerns, it is presumed that those who take them over will possess a sufficient elementary knowledge of business to make it a condition that they secure the services of the staff hitherto carrying on the business if they are unable to secure equal experience elsewhere.

(6) It has never been suggested that Government should provide capital for starting factories other than those necessary to pioneer new industries which will only be started if private enterprise is unwilling to embark in them.

(7) The conditions under which Government may embark in pioneer industries have been clearly laid down, and there is not the least suggestion in any resolution of the No. I sub-committee sanctioning the unlimited extension of these industries. It cannot be admitted that the established industries, which are very few, provide sufficient scope for technical education and industrial instruction, the main proposition being that industries must be established or be in course of development before any useful purpose can be served by providing facilities for technical education which would be useful in those industries.

(8) It is admitted that this proposition would find acceptance in a country where industrial development is firmly established and private enterprise strongly

developed. It can hardly be stated that this is the condition of the Madras Presidency, the industries of which are either in the hands of a few Europeans or are in a totally unorganised condition.

(9) This proposition is fully accepted and has been recognised in the administration of such industrial schools as already exist.

(10) It is suggested that the department of industries is proposed to meet the immediate needs of the country and that as local enterprise develops its functions will gradually change. It should be pointed out that the resolutions of the sub-committee do not contemplate the pioneering of new industries as the sole or only work of the department. It has to control technical education and industrial education and to render assistance to commerce in the way very clearly stated in paragraph 9. If an analogy may be permitted, it may be pointed out that the War Department in England with a Civilian at the head is advised in military matters by executive officers the chief of whom are the Commander-in-Chief and the Adjutant-General.

(11) This proposition is fully admitted.

(12) Whilst admitting that agriculture requires a large measure of assistance, it cannot be accepted that industry will automatically improve with agricultural development. Through irrigation works and other means agriculture has made immense strides during the last fifty years, and the spending power of the people has been enormously increased. This is indicated by the growth of imports, and it is contended that unless industrial development is stimulated by Government there will be mainly an increase in imported manufactures from foreign countries.

(13) This proposition is admitted, but it should be pointed out that the authority which the dissenters consider is capable of expending large sums of money in the improvement of roads and canals and the extension of railways can surely be trusted to expend with equal prospect of success the comparatively small sums which the pioneering of industries will involve. If in larger matters there is no risk to the tax-payer, it may be assumed that there will be no risk in smaller. If, on the other hand, it is contended that in the administration of roads, irrigation works and railways there is a risk of mistakes for which the tax-payer will have to suffer, it may be admitted that there is a proportionate risk if the proposals of No. I sub-committee are accepted. But it may be fairly pointed out that the possibility of mistakes being made has never been used as an argument against the cessation of expenditure in the cases cited. If roads, canals and railways are absolutely essential to the development of the country, it may equally be contended that without Government initiation the Indian capitalists are not likely to embark on industrial enterprises.

In concluding these remarks, which are only intended to indicate the line of argument which may be used to refute the propositions put forward by the dissentient members of the Industrial Conference, it should be pointed out that the resolutions of No. I sub-committee meet with some justification from the measure of success which has already attended the work that has been accomplished along the lines laid down. It may also be pointed out that the dissentient members have not been able to indicate any direction in which private individuals have suffered from Government intervention in industrial matters, nor have they suggested that hitherto there has been any waste of public money. The experience of the past is some justification for the course which it is recommended should be pursued in the future.

19th September 1908.

ALFRED CHATTERTON.

(4)

The policy of absolute non-interference by the Government and open-door has been tried for upwards of a century after settled Government has been introduced into this Presidency, and the result has been the complete effacement of several indigenous industries, the partial displacement of many, and the non-introduction of any new industries or new processes and methods worth the name.



2. Indian conditions differ widely from those prevailing in Europe trade and commerce are in this Presidency, so far as Indians are concerned, chiefly in the hands of men whose caste customs prohibit foreign travel, capitalists labour under the same disadvantage, and to wait till social reform effects a change in the case of such a conservative class would end in the complete ruin of Indian commercial and manufacturing interests.

3. The States in Europe encourage industries in numerous ways, and State factories for the purposes indicated in the resolutions as well as other purposes are, I believe, not uncommon; assuming that there is no precedent, Indian conditions are widely different from those prevailing elsewhere, and the history of industrialism during the last century is so bitterly disappointing that a considerable departure in policy is justified and necessary.

4. The State is the owner or co-owner of a large portion of the land, of railways, salt factories; the people are backward industrially and socially; hence special State duties and obligations.

5. European merchants in this Presidency have done practically nothing in the way of introducing new industries or new methods and processes during the last one hundred years have been chiefly engaged in import and export trade bringing in large returns, and even in this direction been largely employing Indian money, and no merchants, British or Indian, can legitimately complain that the policy of *laissez faire* has not had a fair trial.

6. The interests of merchants engaged in the import trade and export trade of raw materials are diametrically opposed to the introduction of manufactures into the country.

7. It is acknowledged on all hands, including the Madras Chamber of Commerce, that once an industry is demonstrated to be commercially practicable and successful, Indians are but too quick from the pioneer's point of view to follow and compete for a share of the profits; permanent residence and contentment with small profits are also necessary conditions; hence it may be that the Europeans have not been pioneers hitherto, and the imperative necessity for the Government stepping in and being pioneers. The efforts of Government would not fall on barren soil.

To give an example, there were but two or three rice mills in the Circars a few years ago; and when the venture was demonstrated to be successful, capital was forthcoming and within the last six or seven years upwards of fifty mills have sprung up.

8. The Government are not asked to be merchants and engaged in manufactures and trade; but small factories have to be erected by them for educational purposes and to demonstrate to the people that a particular industry or industries can be commercially successful. The student in Europe can complete his training in the numerous factories close by; there are no such facilities in this country, and small factories or large workshops are therefore needed to make the education and training efficient and real.

9. To entertain any fear that the Government, whose sole object is to promote private enterprise, would compete and interfere therewith is idle. Hides and skins valued at about four crores of rupees are being exported from this Presidency; there is not a single leather manufactory with improved appliances; and to assert that a small Government factory purchasing skins worth a few thousands, or even say a few lakhs, to be worked up into finished goods or tanned for demonstrating to the people improved processes and the commercial possibilities in the leather trade would be competing with private enterprise, is extremely unreasonable. Even the continuance of a single such factory cannot affect trade, and when the Government would withdraw once the demonstrative or experimental purpose is achieved, there cannot be the slightest objection to the erection of such a factory. The exports of raw produce and the imports of finished articles are on such a huge scale that the observation would apply to many another industry.

10. The conditions under which the Government works would be slightly different from those under which a private individual would; but to demonstrate that an industry would be commercially successful necessarily means that it has to

be shown that the venture can be successfully undertaken by a private individual; if the interest charges would be heavier, there would be better supervision and control, greater economy in purchases, etc., and the necessary adjustments and calculations can and would be easily made.

11. All are agreed that the agriculture of the country should be improved and that facilities should be given to the ryot for the disposal of his produce; but the large exports of agricultural produce in a raw state shows that the import and export trade may have been and may be benefited, but that industrial development has not followed in the past and does not necessarily follow and that efforts should be made to develop industries. Industrial development would benefit agriculture in numerous ways and would materially reduce the pressure on the soil.

12. The tax-payers' money cannot be better spent than in developing industries and far-sighted policy dictates such a course; when crores are spent on various objects to assert that the expenditure of a few lakhs in industrial development or attempts at industrial development is waste would be an interested argument and does not require any special notice.

13. Mistakes may be made, and several experiments may prove unsuccessful; the success or failure of past experiments is not therefore very relevant. The fact, however, that a private company has undertaken the aluminium industry and is paying a fair dividend argues success, and the chrome-leather experiments are yet in the initial stage.

14. The rapid development of industries consistent with soundness is necessary to improve the economic condition of the Presidency. No technicalities and unsuited and misleading precedents should be quoted or allowed to stand in the way; and no measure of the Government is so calculated to promote contentment and happiness as its efforts to improve the industries of the country.

21st September 1908.

B. NARASIMHESWARA SARMA.

(5)

As remarked by me at the sitting of sub-committee No. II, the real question for consideration is whether it is not the duty of the State to do all in its power to assist in the industrial development of the country. There can be no two opinions upon the point. Even in the more advanced countries of Europe and in the United States of America and Japan, where private enterprise is much more strongly and fully developed, the principle of State intervention is fully recognized. In India, where the mass of the people are ignorant and private enterprise among them is practically non-existent, it seems to me all the more incumbent on the State to take the initiative and afford all possible facilities for promoting their industrial advancement. The Hon'ble Mr. Yorke and Messrs. Orr and Simpson are, however, apparently not inclined to recognize such a duty on the part of the State, and seriously contend that the Government should not lift a finger to do any thing to give the people of the country the necessary stimulus and practical training to improve their industries, but should leave that work entirely to private enterprise. This is a position which cannot be accepted by the Government, especially considering that whatever private enterprise there is in the land is confined to a few foreign firms, whose aim is naturally to make as much profit as they can out of their venture and who cannot reasonably be expected to assist the people in achieving that "pre-eminence in Indian Industrialism" that is necessary for the prosperity of the country. That help must necessarily come from the Government who alone are in a position to give the people the benefits of sound technical education combined with practical industrial training. For obvious reasons, this object cannot be attained merely by the establishment of schools for technical education and industrial instruction, as contended by the Hon'ble Mr. Yorke. It is absolutely necessary that factories or institutions for practical training should go hand in hand with technical and industrial schools, if industrial development is to be successfully carried out. The Hon'ble Mr. Yorke states (clause 8) that sufficient scope for technical education and industrial instruction to meet the needs of established industries already exists, without Government starting factories to create openings

for students. I am not aware of any Government institutions in this Presidency where such scope exists (I refer of course to "Established industries"), but if the Hon'ble Mr. Yorke means that adequate scope exists in the mills and factories owned by European firms, I regret I cannot accept the statement. Messrs. Parry & Co. have been maintaining sugar factories for several years and Messrs. Binny & Co. have been carrying on bleaching and dyeing operations in their mills. But I am not prepared to admit that any facilities are afforded in these factories and mills for the training of Indian youths so as to befit them for developing even "established industries". Judging from Mr. Simpson's note, the reply would probably be that natives who have received some education generally despise manual labour such as is exacted in factories and mills and that they can never be induced to attend before 10 A.M. I am in a position to assure Government that the dislike to manual labour on the part of our educated youths has greatly disappeared and, at the present moment, there are several Brahman students and sons of gentlemen of high position in Chengalroya Naicker's Technical Institute, who take to manual labour in workshops and in the working of oil-engines, etc., quite as readily as ordinary workmen. As regards the difficulty about securing early attendance, this arises solely from the fact that the natives of this Presidency are not accustomed to take food at the factory or mill and they must have their food prepared by some one with whom they can inter-dine. The Railway authorities have long ago solved this difficulty by providing residential quarters for their subordinates near the stations and the men are at their work at any hour of the day or night. It may not be possible for mill and factory owners to provide similar facilities for their subordinates, but they ought to be able to give them an hour or an hour and a half recess for meals, after 10 A.M. or 11 A.M. If they do this, they will find no difficulty whatever in getting natives to attend even before 6 A.M. and work as hard as others and even longer hours.

In enunciating the policy to be adopted towards industrial development, the Government have given distinct assurances that no undertaking would be carried on which would affect private enterprise in any way, and, in deference to the strongly expressed wishes of the representatives of the Chamber of Commerce and the Trades' Association, special provisions have been introduced at the Conference to safeguard private interests. The Hon'ble Mr. Yorke and others admit that the "important provisos" added to Resolution No. 6, "afford valuable safeguards against the danger 'referred to,' but they fear that 'the danger to some extent still exists.' What that possible danger may be they do not say. They admitted to me that the action of the Government in the past has in no way affected private enterprise and they have given no reasons whatever for apprehending that the future policy of the Government would be in any way different. By introducing the provisos the Government have conceded all that was necessary—perhaps more than was absolutely necessary in the existing condition of "Indian Industrialism". It should be borne in mind that the development of Indian industries suffers not merely from the want of initiative and enterprise on the part of the people generally, but also from the fact that they do not enjoy the advantage of a system of protective tariffs and special bounties such as are granted in all other countries, England alone excepted. Germany's action in bolstering up the beet-sugar industry which is ruining the cane sugar industry in this country is well known; so also the action of France in regard to the import of oils and of America in respect of tanned skins. From the *Indian Trade Journal* for April last, it would appear that under this system of bounties, "cotton goods, especially hosiery made in Japan, have an advantage over 'goods made in India,' and that 'the large hosiery department of Bomanji Patel Mills of Bombay has had to be closed on account of Japan underselling her goods 'in India.'"

Considering the various difficulties set forth above, it seems somewhat amusing to be told that "State industry" is unfair to the tax-payer and that "sound industrial development can only be secured by private enterprise." I have already stated that Indian enterprise is practically non-existent, and the few European firms that are found in this Presidency have done practically nothing to promote "Indian Industrialism" during the past half a century and more. It is time, therefore, that the Government should intervene and hold the people in the directions indicated at the Conference.

The Government may rest assured that the tax-payers of this Presidency, at any rate, are not likely to object to the establishment of as many State industries as possible (combined with technical schools and factories or workshops), as they have an implicit faith that the Circular will do what is good for them, though there may be occasional blunders and failures in carrying out experiments.

22nd September 1908.

P. RAJARATNA MUDALIYAR

(6)

Before I reply the various points of the dissent I should like to mention that I take it for granted Government has no intention whatever of interfering with private enterprise, and in cases where the Director of Industrial and Technical Enquiries has already gone too far in running existing Government Industrial Schools on commercial lines, Government will be pleased to investigate and protect existing private industries.

The dissent is quite correct in saying that State industry is undesirable as long as this statement is to be applied generally. It is surely more natural that industries should be started by private enterprise, and according to my knowledge in no other country Government had ever to interfere with development of local industries, but private individuals were always at hand to undertake this.

However in India quite exceptional conditions seem to prevail.

In no other country except India, Mission Societies found it ever necessary to start industries, to provide work for their people so as to make living possible to them and to raise the standard of the community.

The Government of India has until now more or less refrained from interfering in the development of industries, probably waiting for private enterprise to undertake this. Time has, however, fully proved that on account of exceptional conditions in this land private enterprise does not, or in many cases cannot, sufficiently come forward to open the country and to develop industry.

Leaving aside certain big centres where brains and capital are at hand to do all that is needed, I wish to draw attention to various districts, in which, owing to certain social systems, it is almost impossible for private capital to be invested in any industrial undertaking. Caste and family systems are the greatest obstacles in the way of a healthy development of the country. It seems to me an absolute necessity for Government to open such districts, in which, owing to caste and family system, no private enterprise will or can experiment and start industries. Especially so if it is evident that by opening industries, the wealth of the country can be much increased and the poverty of the people be much reduced.

The district of Malabar, which is usually considered to be a land where milk and honey flows, could be really a wealthy country if only various industries would be started. The greatest difficulties, however, are in the way of any individual belonging to a Taravad who wants to invest money in any industrial undertaking. Those who could do it have as a rule none, and consequently all that could be done is left undone. "Beautiful Malabar" is a wealthy country, but its people are poor and will remain so until Government will be pleased to step in where it is impossible for private enterprise to do the needful.

1-2. Government factories are right and even necessary where private enterprise cannot come forward to develop industries. Tax-payers will gain and not lose.

3. I understand that Government will not start branches of existing industries and consequently not interfere with private enterprise.

5. Careful enquiries and the employment of men of such "handed over" factories will guard against this danger.

6. This does hardly apply to all districts of the Presidency.

7. Sufficient safeguard seems to be included in the statement that factories started by Government will be handed over whenever private enterprise is ready to take them over.

8. No sufficient industrial instruction and technical education exists to develop already existing industries.

9. With reference to existing industries this statement is correct, but experimenting only with new industries seems to be not sufficient, if such are meant to bring about the development of a certain district.

10. If industrial schools are meant to assist existing industries, they should on no account be allowed to be run on commercial lines.

11. I agree with this statement.

12. *Nil.*

13. Though agriculture is no doubt most important, it is industry that India very much needs to improve the destitute condition of the people.

14. I agree fully with this statement.

28th September 1908.

H. KÜHNER.

3. The Hon'ble Mr. A. J. YORKE'S note on the reply of the Hon'ble Mr. V. Krishnaswami Aiyar and three other Members to the Minute of Dissent.

Explanatory memorandum of—

The Hon'ble Mr. V. Krishnaswami Aiyar.  
Nawab Syed Muhammad.  
Mr. M. R. Ramakrishna Aiyar.  
Mr. C. Y. Chintamani.

In the explanatory note referred to in the margin there appears to be misunderstanding on three points.

As to sugar, the argument against State factories in this Presidency was: "As private enterprise already more than met the best paying local demand, that further development here could only be for the less profitable export to other Presidencies to which higher freights have to be paid from here than from Mauritius for instance. Consequently further local development must either be at the expense of existing factories or would be unprofitable as proved by the failure of many small factories that had started to compete with the older established ones in this Presidency".

Recognising the soundness of this reasoning Mr. Chatterton himself proposed the resolution against State sugar factories for Madras.

2. As regards oil-seeds, the argument against State intervention was that private enterprise had given every trial to up-to-date processes of oil extraction, but that they had failed to make progress in this Presidency. The probable causes pointed out [(a) and (b) by the Chamber of Commerce and (c) by the Director of Agriculture] were:—

(a) that tariff, freight and packing difficulties were against any export trade;  
(b) that the country mills being very cheap and fairly efficient were not uneconomical;

(c) that the agriculturist in this country was not yet willing to pay the price for cake necessary to prevent that now made here from being largely exported to Java and elsewhere;  
consequently he cannot be said to suffer from want of local oil mills.

3. No sarcasm was intended in the assertion that Indians at present give more time and attention to agriculture and its finance than to industrial enterprise. That they are ready enough to take to the latter without Government pioneering is corroborated by Mr. Sarma's remarks about rice milling.

Reference to these matters is only to show that opposition to proposals apparently for the good of the country was not due to mere selfishness, as imputed, but in every case was founded on good argument which have not yet been controverted.

It may be pointed out that those referred to in the explanatory note, though not Indians by birth, are no mere birds-of-passage, but, industrially speaking, permanent denizens of the land.

The businesses they manage involve the payment of thousands of rupees to Indians for every single rupee profit that may ever be saved and taken away. They are essentially Swadeshi enterprises utilizing Indian labour and products in every way possible, and long after their European initiators may have departed the businesses should remain for the permanent benefit of the country whether as examples for Indian friends to copy or as warnings for them to avoid. In neither direction could State enterprise be equally efficacious, so credit is asked for opposition to it as conceived *bona fide* in the interests of Madras industrial development whether by Europeans or by Indians. That credit should the more readily be given if the facts are considered that admittedly no Government enterprise at present contemplated should damage any existing business and that the Chamber of Commerce and Trades Association consistently supported at the Conference all proposals to better fit Indians for industry by educational improvements.

28th September 1908.

A. J. YORKE.



## PART V.

## ORDERS OF GOVERNMENT ON THE RESOLUTIONS OF THE CONFERENCE.

## 1. G.O., No. 2894, Revenue, dated 17th October 1908.

READ—the following papers :—

(1)

G.O., No. 1421, Revenue, dated 20th May 1908.

ABSTRACT.—Convening an Industrial Conference in September 1908 to consider and discuss the directions in which the industrial development and technical education of the Presidency may best be promoted.

(2)

Resolutions of the Industrial Conference, dated 19th September 1908.

Order—No. 2894, Revenue, dated 17th October 1908.

In the first of the papers read above, His Excellency the Governor in Council, after reviewing the work done during the previous two years by the Director of Industrial and Technical Inquiries, resolved to summon a Conference of gentlemen either concerned or interested in the conduct of the chief industries of the Presidency in order to consider whether, and if so how, the industrial development of the Presidency could be further promoted. This Conference met at Ootacamund on the 14th September last, and its resolutions, which form the second of the papers read above, bear witness to the earnestness with which the members of the Conference applied themselves to their task and to the successful manner in which they performed it. The deliberate opinions of so representative a body cannot but be of very great value, and His Excellency in Council gladly acknowledges the excellent work done at the Conference and desires to express his obligations to those who, at the sacrifice of much time and trouble, took part in it.

2. His Excellency the Governor in Council recognizes 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, His Excellency in Council has no hesitation in accepting the conclusions arrived at by the Conference. With the restrictions which the Conference has laid down, the Government are convinced that private enterprise has nothing to fear while it may have much to gain from the association of the State in the work of promoting the industrial development of the country.

3. The Government accordingly approve of the recommendation of the Conference that there should be a special department under a special officer to deal with industrial questions. There will also be entrusted to this officer the control of industrial instruction as defined in the 14th Resolution of the Conference, that is, instruction in the performance of definite operations, not necessarily involving the teaching of general principles but only of their application; but the Government consider that technical education, as defined in the 13th Resolution of the Conference, should continue to be under the direction of the Director of Public Instruction. The officer at the head of the new department will be styled the Director of Industries. He will correspond direct with Government in the Revenue Department, but not through the Board of

Revenue. Orders will be issued in the Educational Department as to which of the industrial institutions now connected with that department shall be in future placed under the Director of Industries, and the Director of Industries will prepare and submit for consideration by Government his recommendations as to—

- (1) the constitution,
- (2) the functions, and
- (3) the curriculum

of the industrial institutions under his control and also a budget estimate for 1909–1910 providing for the grants to be made to them.

4. In carrying out the work of industrial development regarding which the Conference has submitted a very comprehensive series of resolutions, it is obvious that the work of the new department can only advance gradually and that its action must largely be determined by the experience it may gain. It is impossible that action should be taken at once regarding all the subjects dealt with in the recommendations of the Conference. But there are some directions in which immediate action is possible, and these will now be noticed. The formation of a bureau of industrial information and an industrial museum (Conference Resolution No. 6), the preparation of a list of industries which are of sufficient importance to require the establishment of industrial schools in relation to them (Conference Resolution No. 16), and the formation of local industrial committees (Conference Resolution No. 27) are matters in which action may be at once taken by the Director of Industries. The Director will also submit proposals for giving effect to Resolutions Nos. 33, 39 and 50, *i.e.*, No. 33—the establishment of weaving institutions, No. 39—the employment of a dyeing expert, and No. 50—the development of the Sembien tannery into a leather trade school, as well as for the offer of a reward for a suitable oil-extracting plant (Conference Resolution No. 55) and for the extension of the well-boring operations which have already produced such important results in the Chingleput district (Conference Resolution No. 68).

5. The proposal to constitute such an Advisory Board as is contemplated in the 5th Resolution of the Conference commends itself to Government, though it would appear to His Excellency in Council essential that this Advisory Board should not be a standing body of fixed and unchanging composition but should be constituted afresh for each occasion on which a reference to it is desirable, so that it may always include the best expert opinion on the special subject under consideration. The Director of Industries will meantime be requested to submit proposals for the constitution of a Board to which the consideration of the condition of the chemical industries of the Presidency may be committed in accordance with Resolution No. 47 of the Conference.

6. The work indicated in the foregoing paragraphs is, in the opinion of His Excellency in Council, as much as the new department can at present with advantage undertake. It forms a substantial instalment of the scheme of activity contemplated by the Conference, and that body's other recommendations for industrial development will be brought under review by the Director of Industries and considered by Government from time to time. The Government hope that the action now to be taken will prove of substantial advantage to the people of this Presidency and that it will form a lasting memorial of the labours of the Industrial Conference of 1908.

(True Extract.)

A. G. CARDEW,  
Secretary to Government.

To the Educational Department.  
" the Financial Department.  
" the Board of Revenue (Land Revenue).  
" the " (Revenue Settlement).  
" all Members of the Conference.  
Editors' Table.

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**2. G.O., No. 2921, Revenue, dated 20th October 1908.**

READ—the following papers:—

(1)

*G.O., No. 249, Revenue, dated 2nd February 1907.*

ABSTRACT.—Defining the duties of Mr. Chatterton as Director of Industrial and Technical Inquiries.

(2)

*G.O., No. 2894, Revenue, dated 17th October 1908.*

ABSTRACT.—Passing orders on the Resolutions of the Industrial Conference held at Ootacamund in September 1908.

*Order—No. 2921, Revenue, dated 20th October 1908.*

Miscellaneous.

The Director of Industrial and Technical Inquiries will be the head of the new department of industries created

by paragraph 3 of G.O., No. 2894, Revenue, dated 17th October 1908, and will in future be styled "the Director of Industries."

(True Extract.)

A. G. CARDEW,  
Secretary to Government.

To the Educational Department.  
" Financial Department.  
" Board of Revenue (Revenue Settlement, etc.).  
" (Land Revenue).  
Editors' Table.

