

A SURVEY  
OF  
THE INDUSTRIES AND RESOURCES  
OF EASTERN BENGAL AND  
ASSAM

FOR  
1907-1908]

BY  
G. N. GUPTA, M.A.,  
INDIAN CIVIL SERVICE.



SHILLONG :

PRINTED AT THE EASTERN BENGAL AND ASSAM SECRETARIAT PRINTING OFFICE.

1908.

## INTRODUCTION.

THE primary object of the present survey has been to ascertain the existing condition of the indigenous industries of the province, with the object of enabling Government to determine what practical measures might be adopted to encourage and develop the most promising amongst such industries. But as the birth of modern industrial enterprise amongst Indians of the province is of a very recent date, and as it is not unlikely that the resources of the country will be exploited by them to a far greater extent in the future, than has been the case in the past, a short account of its resources and industrial possibilities, and the actual achievements of European enterprise, has not been considered out of place in this report. Besides, no hard-and-fast division of the spheres of indigenous and foreign enterprise actually obtains in practice, and the whole trend of the advance of modern India has been for the Indians to follow in the footsteps of the material conquests of the West.

A similar survey for the Upper Provinces and for Bengal have just been completed; and the excellent reports of Mr. Chatterji and Mr. Cumming are now before the public. Indeed, the brilliant and clear-sighted elucidation of the present day industrial problems of India, by those and other writers like Mr. Chatterton, has left me very little more to say about the broader aspects of the question. As regards the industries of this province, there already exists a far more numerous literature on the subject, in the shape of Monographs, Gazetteers, Administration Reports, etc., than is generally supposed to be the case. The line which I have followed therefore has been to collect as much first-hand information as possible, and to engraft this on the body of information already available, and thus to present a self-contained note on each subject. Perhaps this report would have gained both in brevity and incisiveness, if I had made it less descriptive and more critical, but having regard to the limited character of my own personal observations, and the want of any expert training, I decided to adopt the less ambitious plan of making this note more a synopsis of all the information to which I had access, than a criticism of existing methods and institutions.

The report has been divided into two parts. The first contains a detailed account of the industries, and possible industrial openings of the province. In the second, I have attempted to offer a few suggestions about the measures which might be adopted by Government, for the encouragement of indigenous enterprise, chiefly in the light of the recommendations already made by the Governments of Madras, United Provinces and Bengal. I have not, however, hesitated to recommend deviations from any line of policy laid down for the other provinces, where the special requirements and possibilities of this province seemed to demand an independent or a more cautious plan of action. The last part also contains information on the subject of the existing system of "Technical Education" of the province, with some general observations about the economic and industrial condition, and industrial capabilities of the people inhabiting the province. I have also thought it my duty to be quite outspoken in pointing out, that it would be impossible for Government to undertake any far-reaching and comprehensive measures in this matter, unless there is greater co-ordination between the leaders of public opinion in the country and the Government, than is unfortunately the case at present.

As regards the treatment of "industries" in the first part of this report, I have not followed any scientific or economic principle of classification. For whether we base our classification on the materials consumed by the industries, or the method of work followed, it is impossible to adopt any principle of subdivision in which the major heads will not overlap. Besides, any scientific principle of classification seems quite unnecessary for the purposes of this report. I have, therefore, dealt with the industries more or less in the order of their importance, from an indigenous point of view. Naturally also, prominence has been given, and more space allotted, to describing the existing indigenous industries of the province, amongst which "weaving" is by far the most important, than in outlining either the resources, or the possible industrial openings of the province.

Lastly, I have to express my gratitude to all District Officers, for their ready assistance in furnishing me with much useful information about the industries of their districts. The notes prepared by Babu Shitala Kanta Ganguli, Deputy Collector, on the industries of Dacca were specially full and instructive.

## TABLE OF CONTENTS.

| INTRODUCTION.   | Page.      |
|---|------------|
| <b>PART I.—INDUSTRIES AND RESOURCES.</b>  |            |
| <b>Chapter I.—Textile and connected Industries—</b>   |            |
| 1. Cotton           ...           ...           ...           ...           ...                       | 1—23       |
| 2. Silk           ...           ...           ...           ...           ...                         | 23—35      |
| 3. Dyeing           ...           ...           ...           ...           ...                       | 35—37      |
| <b>Chapter II.—Metal Industries—</b>  |            |
| 1. Brass, Copper and Bellmetal wares           ...           ...           ...           ...          | 38—42      |
| 2. Iron and Steel work           ...           ...           ...           ...                        | 42—45      |
| <b>Chapter III.—Leather Industry           ...           ...           ...           ...</b>          | 46—50      |
| <b>Chapter IV.—Carpentry           ...           ...           ...           ...</b>                  | 51—53      |
| <b>Chapter V.—Pottery and Earthenware           ...           ...           ...           ...</b>     | 54—55      |
| <b>Chapter VI.—Industrial Arts—</b>   |            |
| 1. Gold and Silver           ...           ...           ...           ...           ...              | 56—57      |
| 2. Ivory work           ...           ...           ...           ...           ...                   | 57         |
| 3. Conch Bangles           ...           ...           ...           ...           ...                | <i>ib.</i> |
| 4. Embroidery           ...           ...           ...           ...           ...                   | <i>ib.</i> |
| 5. Horn-carving           ...           ...           ...           ...           ...                 | 58         |
| 6. Glass churis           ...           ...           ...           ...           ...                 | <i>ib.</i> |
| 7. Mother of Pearl Buttons           ...           ...           ...           ...           ...      | <i>ib.</i> |
| <b>Chapter VII.—Mat and Basket-making           ...           ...           ...           ...</b>     | 59         |
| <b>Chapter VIII.—Fish Industry           ...           ...           ...           ...</b>            | 60—62      |
| <b>Chapter IX.—Industries in Agricultural products—</b>   |            |
| 1. Jute           ...           ...           ...           ...           ...                         | 63—64      |
| 2. Sugar           ...           ...           ...           ...           ...                        | 64—70      |
| 3. Mustard           ...           ...           ...           ...           ...                      | 70—72      |
| 4. Tea           ...           ...           ...           ...           ...                          | 72—73      |
| 5. Tobacco           ...           ...           ...           ...           ...                      | 73—74      |
| 6. Rice and wheat           ...           ...           ...           ...           ...               | 74—75      |
| 7. Fruit industry           ...           ...           ...           ...           ...               | 75—79      |
| <b>Chapter X.—Industries in Forest products—</b>  |            |
| 1. Rubber           ...           ...           ...           ...           ...                       | 80—81      |
| 2. Lac           ...           ...           ...           ...           ...                          | 81—84      |
| <b>Chapter XI.—Mineral Industries—</b>  |            |
| 1. Coal           ...           ...           ...           ...           ...                         | 85—86      |
| 2. Petroleum           ...           ...           ...           ...           ...                    | 86—87      |
| 3. Lime           ...           ...           ...           ...           ...                         | 87—88      |
| <b>Chapter XII.—Possible Industries—</b>  |            |
| 1. Match           ...           ...           ...           ...           ...                        | 89—90      |
| 2. Paper           ...           ...           ...           ...           ...                        | 90—91      |
| 3. Glass           ...           ...           ...           ...           ...                        | 91—92      |
| 4. Chemical works and alkalies           ...           ...           ...           ...                | 93         |
| 5. Miscellaneous           ...           ...           ...           ...           ...                | <i>ib.</i> |
| <b>Chapter XIII.—Miscellaneous Industries—</b>  |            |
| 1. Soap           ...           ...           ...           ...           ...                         | 94—95      |
| 2. Dairy           ...           ...           ...           ...           ...                        | 95—96      |
| 3. Stationery           ...           ...           ...           ...           ...                   | 96         |
| 4. Printing Presses           ...           ...           ...           ...           ...             | <i>ib.</i> |
| 5. Aerated water and Ice machines           ...           ...           ...           ...             | 97         |
| 6. Manufacture of Bricks and Mortar and Tiles           ...           ...           ...           ... | <i>ib.</i> |
| 7. Poultry           ...           ...           ...           ...           ...                      | 97—99      |
| <b>PART II.—CONCLUSIONS AND SUGGESTIONS FOR IMPROVEMENT.</b>  |            |
| <b>Chapter I.—Preliminary           ...           ...           ...           ...</b>                 | 100—103    |
| <b>Chapter II.—Economic and Industrial condition of the people           ...           ...</b>        | 102—105    |
| <b>Chapter III.—Existing Technical and Industrial Schools           ...           ...</b>             | 105—112    |
| <b>Chapter IV.—Proposed "scheme" for the Province           ...           ...</b>                     | 112—220    |

## CHAPTER I.

### TEXTILE AND CONNECTED INDUSTRIES.

#### 1. COTTON.

##### SECTION I.

##### ASSAM.

—Mr. H. F. Samman, I.C.S., in 1897, drew up a most exhaustive and luminous monograph on the cotton fabrics of Assam. In 1885, Mr. Darrah had also written an excellent note on the same subject. I have made free use of the information collected by these writers.

Literature.

Special characteristics of the industry in Assam.

2. A few special points about this industry in Assam may be noted.

- (1) The first is that in the Brahmaputra Valley, and to a great extent amongst the hill tribes, "weaving is not a profession nor is it, strictly speaking, an industry. It is carried on, almost exclusively, by women and girls of all classes, and weaving amongst the Assamese forms a part of a woman's ordinary duties." The reason for this is to be found in the fact, that castes or guilds of professions were never stereotyped to any very great extent in Assam, as was the case in other parts of India. Things were, however, different in the Surma Valley, where the ethnological and industrial conditions were more allied to those of Bengal, and weaving amongst the plains people of the valley was never a household industry, but was confined only to the Tantis and Jugis (or Natus).
- (2) The Assamese women wear peculiar kinds of dress : the *mekhalá* for the lower part of the body, the *rhia* for the upper, and the *khania* or the *paradyá kapar*, as a sort of wrapper for the body. These dresses are not as yet manufactured to any extent outside Assam.
- (3) In the Brahmaputra Valley silk competes very largely with cotton in supplying the wearing apparel of the women, chiefly of the higher classes.
- (4) Then again among the hill tribes, not only do some tribes have peculiar national dresses of their own, but even amongst the same tribe different communities have different dresses. Amongst the Nagas, each village or group of villages is distinguished by the colour of its cloth, and the peculiar arrangement of the stripes.
- (5) Accordingly, we find that foreign manufactured articles meet with special obstacles in Assam.

But the stress of competition, and the advance of new ideas, are slowly wearing down these barriers. The women of the more well-to-do classes are giving up weaving, except for ornamental stuffs. They are also giving up in some cases their own special apparels, such as the *paradyá kapar*, for Benares saris, etc., and among the middle-class women the cheaper Manchester cloth is largely in vogue. The cotton fabrics used by the men are mostly of foreign manufacture. Even the hill tribes are giving up their peculiar gaudy dresses, and adopting the costumes of the plains people.

3. From what has been said above, it follows that the numerical strength of the weaving castes in Assam, specially in the Brahmaputra Valley, had never much direct bearing on the volume of the weaving industry. From the census tables it appears that the weaving castes, such as Jolaha, Jugi, Kapali, etc., most of whom are immigrants, numbered 213,950 in 1891, and 195,842 in 1901.

The census reports also give statistics of the persons actually engaged in the industry. In 1891, 52,544 persons, or less than 1 per cent. of the total population of the province, were returned as employed in cotton industry. In 1901, 57,617, or '94 per cent.

of the population, were so returned. This population was distributed as follows :—

| Occupation.                                  | Total supported by it. | Actual workers. |          |                           |          | Dependents. |
|--|------------------------|-----------------|----------|---------------------------|----------|-------------|
|  |                        | Total.          |          | Partially agriculturists. |          |             |
|  |                        | Males.          | Females. | Males.                    | Females. |             |
| 1  | 2                      | 3               | 4        | 5                         | 6        | 7           |
| Cotton cleaners, pressers and ginners ...    | 3,276                  | 24              | 2,981    | ...                       | ...      | 271         |
| Cotton weavers, hand industry ...            | 31,301                 | 1,602           | 23,239   | 191                       | 112      | 6,400       |
| Cotton carpet and rug-makers ...             | 27                     | 7               | 8        | 1                         | ...      | 12          |
| Cotton-spinners, sizers and yarn-beaters ... | 22,112                 | 146             | 18,656   | ...                       | 14       | 3,310       |
| Cotton yarn and thread-sellers ...           | 530                    | 108             | 269      | ...                       | 4        | 153         |
| Cotton-dyers ...                             | 34                     | 11              | 14       | ...                       | ...      | 9           |
| Dealers in raw cotton ...                    | 277                    | 103             | 44       | 5                         | 2        | 190         |
| Tape-makers ...                              | 33                     | ...             | 29       | ...                       | ...      | 4           |
| Tape-sellers ...                             | 27                     | 16              | 9        | ...                       | ...      | 3           |
| Total ...                                    | 57,617                 | 2,017           | 45,309   | 197                       | 132      | 10,291      |

The remarkable fact about the above figures is the manner in which the females outnumber the males.

4. The following tables show the import of cotton fabrics, both European and Indian, to Assam through Bengal :—

Imports of cotton fabrics.

(i) For the Brahmaputra Valley, including Naga and Garo Hills—

| —            |     | Average per year, 1881—86. | Average, 1891—96. | 1906—07.       |
|--------------|-----|----------------------------|-------------------|----------------|
| 1            |     | 2                          | 3                 | 4              |
| European ... | ... | Mds.<br>80,579             | Mds.<br>61,115    | Mds.<br>51,465 |
| Indian ...   | ... | 258                        | 213               | 4,366          |
| Total ...    | ... | 30,837                     | 61,328            | 55,831         |

(ii) Surma Valley (Manipur and Lushai Hills)—

| —            |     | Average, 1881—86. | Average, 1891—96. | 1906—07.       |
|--------------|-----|-------------------|-------------------|----------------|
| 1            |     | 2                 | 3                 | 4              |
| European ... | ... | Mds.<br>44,487    | Mds.<br>71,148    | Mds.<br>60,659 |
| Indian ...   | ... | 1,127             | 2,338             | 7,882          |
| Total ...    | ... | 45,614            | 73,486            | 68,541         |

The points of interest in the above figures are—

- (1) That the import of foreign goods greatly increased throughout Assam during the decade following 1886, but while the imports into the Brahmaputra Valley nearly doubled in quantity during the first decade, those into the Surma Valley increased by about 61 per cent. This was due no doubt to

**PART I.**  
**INDUSTRIES AND RESOURCES.**

the fact that even at the earlier period the Surma Valley depended chiefly upon imports for its supply of clothing, whereas in the Brahmaputra Valley it is only of recent years that imported cloths have been rapidly supplanting local fabrics.

- (2) Imports of Indian manufacture appear to have gained ground within the last few years, for whereas the import of Indian piecegoods doubled in quantity in the first decade, the import of European goods appears to have actually lost ground in 1906-07.
- (3) The total import of cotton goods was less in 1906-07 by nearly 10,000 maunds than during the period 1891-96. If the figures are correct, the inference must be, that there has been a partial revival of the local industry in the province in recent years. This inference is, however, disputed by several who have local knowledge of the past and present condition of the industry.

5. There are no reliable figures to show the actual quantity of cotton fabrics turned out by the local hand-loom. Mr. Samman, following Dr. Royle (Culture and commerce of cotton in India), calculated that about 3 maunds of cotton fabrics are required to clothe 100 people annually, taking the average of the rich and poor, children and adults. If we adopt this method of calculation, and take into account the last census figures for the population, and the imports in 1906-07, we ought to expect the manufacture of 30,000 maunds of clothes by the hand-loom of the Brahmaputra Valley, and 23,388 maunds for the Surma Valley, or a total of 53,388 maunds of locally woven fabrics, against a total import of 124,372 maunds from outside Assam.

But Dr. Royle's basis of calculation is for the whole of India, and the people of Assam as a whole are perhaps more sparsely clad than in other parts of India. It should also be remembered that silk still supplies the wearing apparel of a large section of the women of the Assam Valley. So, before drawing any conclusions from the above figures, we may turn to the figures for the import of yarn into the province.

6. These figures are—

*Import of yarn (European and Indian).*

|                           | Average,<br>1881--90. | Average,<br>1891--96. | 1906-07. |
|---------------------------|-----------------------|-----------------------|----------|
| 1                         | 2                     | 3                     | 4        |
|                           | Mds.                  | Mds.                  | Mds.     |
| Brahmaputra Valley ... .. | 7,996                 | 19,020                | 20,485   |
| Surma Valley ... ..       | 428                   | 2,156                 | 5,150    |
| Total ... ..              | 8,424                 | 21,176                | 25,635   |

From the above figures it would appear that although the importation of cotton piecegoods into Assam has enormously increased recently, the import of yarns has more than kept pace with it; and as the total consumption of cotton fabrics could not have increased to any appreciable extent, the only inference from the above figures is that the local weavers are giving up spinning their own yarn in favour of imported yarn.

From the figures in paragraph 5, it would appear that nearly  $\frac{1}{3}$  of the total consumption of cotton fabrics is produced locally in Assam in the hand-loom. There is nothing surprising in these figures as they stand, because for the North-West, Mr. Chatterji has calculated (paragraph 12 of his note) that fully  $\frac{1}{3}$  of the total cotton goods in weight, consumed in that province, is turned out by the local hand-loom; and for the whole of India the produce of the hand-loom has been calculated to be more than  $\frac{1}{3}$  of the total consumption of cotton fabrics. But if we accept the above figures, and also take into consideration the total import of yarn in 1906-07, it would appear that the hand-loom consumed as much locally-spun yarn as foreign yarn, which

conclusion however is not borne out by the actual facts. For although a good deal of local yarn is consumed in Assam, specially for the coarser home-spun fabrics, yet its consumption cannot be much more than about 25 per cent., if so much, of the total demand of the hand-loom. In any case, there cannot be any question that the hand-loom weaving industry specially in the Assam Valley is still very important, for even if we neglect local yarn altogether, and take the figures for the import of piecegoods and import of yarn in 1906-07, we find that fully 27 per cent. of the cloth required by the Valley was turned out by hand-loom.

|            |     |      |        |
|------------|-----|------|--------|
| Piecegoods | ... | Mds. | 55,834 |
| Yarn       | ... |      | 20,477 |

7. For about 70 per cent. of the cotton fabrics turned out in Assam, the coarser counts from 20's to 30's are used, and it is in the production of such coarse materials that home-spun thread or yarn from Indian mills competes with European yarn. All the higher counts in use from 40's and upwards, are imported from Europe.

While on the subject of yarns, I might note that one Asgar Ali, a small shop-keeper of Silchar, has invented a small spinning wheel, to be worked by the feet, which spins much faster than the indigenous *charka*, and the yarn spun is fairly uniform. Although hand-spinning as an industry has no future, and is bound to be completely obliterated by the machine-spun yarn, whatever might be the fate of hand-weaving, yet it cannot be denied that as there is still a fair amount of consumption of home-spun yarn in Assam, the introduction of a cheap machine like the one exhibited by Asgar Ali, ought to serve, at least temporarily, a very useful purpose.

8. Having got some idea of the volume of the indigenous industry, we may now turn to consider the raw materials. Mr. Darrah calculated the total area under cultivation to be 7,132 acres for plains districts, and 31,683 for the hill districts, or, roughly, 40,000 acres for Assam. The area for the whole province including East Bengal is estimated at 78,000 acres. The yield per acre is, roughly, 4 maunds of seed cotton; the total yield is therefore something like 160,000 maunds.

In the Garo Hills cultivation of cotton is on what is known as the *jhum* system. About 80 per cent. of the cotton is sold in the uncleaned state, but a small quantity is also ginned by the women, with the help of primitive ginning machines, consisting of two rough made wooden rollers, and costing about Rs. 1-8 each. Attempts have been made to introduce better appliances, but the people are conservative, and prefer their own simple methods. The cotton is sold at Tura, and at upwards of 30 markets on the borders of the Mymensingh and Goalpara districts, whence it is carried to the various Brahmaputra ghâts, for shipment, either in large flats or in country boats, to Calcutta and Narayanganj. The prices fluctuate according to the Calcutta rates, and range from Rs. 6 to Rs. 9 per maund for uncleaned cotton, and from Rs. 25 to Rs. 29 for cleaned cotton.

The total quantity of raw cotton shown to be exported from Assam in 1906-07, amounted to only 22,142 maunds, but as the total export from the province was 101,428 maunds according to the official figures, it is quite clear that a good portion of Assam cotton has been shewn to be exported from the Dacca and Rajshahi blocks.

All the varieties of cotton grown in Assam have a short coarse staple, but are very rich in lint, and are valued in Europe for mixing with wool. The only foreign country which produces this kind of cotton, I was informed, is China, and it was due to the low rate of exchange prevailing in China that Assam cotton has fetched comparatively low prices in recent years. The Santal country produces similar cotton, and it appears to have been successfully cultivated in the Chenab Colony (Agricultural Journal, Volume III, Part III, July 1908). An account of the different varieties of cotton grown in Assam is to be found in Mr. Darrah's report (1885), in Dr. Watt's Dictionary of Economic Products (iv, 141), and in the Agricultural Ledger, No. 8 of 1895, in which Mr. Middleton gives the results of some experiments with Assam cotton, and describes seven varieties.

9. As most of the cotton grown in the province comes from Assam, it will be more convenient to anticipate the industry in raw cotton of East Bengal, and treat the subject together here. Most of the raw cotton is exported unginning to Europe, and chiefly from the port of Chittagong. The quantity of kapas or unginning cotton handled in Chittagong is estimated by the firm of Nityanando Ray, at about two lakhs of maunds.



The different firms who export cotton from this province are—

- (1) Abdul Gaffur, Saodagar,
- (2) Krishna Das Nityanando Ray,
- (3) Har Mullik Amlak Chand Ray Marwari,
- (4) Ralli Brothers,
- (5) Naju Mian.

(1) and (5) send unginced cotton to Calcutta; (2) has started a ginning factory and is shipping to England direct; (3) ships to Calcutta where he has a ginning factory, (4) have a ginning factory at Narayanganj.

10. Only last year the firm of Krishna Das Nityanando Ray has started a ginning factory at Chittagong, which was opened by Sir Lancelot Hare. In the address presented to His Honour the new ginning mill in Chittagong. it was stated, "At present the number of gins in work is 20, to work which 50 horse-power is needed. The engine is capable of 150 horse-power; so there is a wide margin for extension if results are encouraging. Buildings and machinery apart from land have cost, roughly, rupees seventy-five thousand. The situation of the mill gives both river and rail communication, and every effort will be made to ensure its success. Success will encourage further developments of the business."

I visited the mill and found it to be by far the most important power mill set up by Indian enterprise and capital in the province. Unfortunately the mill was not working at the time. There was sufficient stock of cotton, but I was told that there was some difficulty in getting a market for ginned cotton in Calcutta, and that the firm was therefore negotiating to ship direct to Europe. It struck me, however, that the business was not under sufficiently expert management. I think it will be an advantage to have some other form of industry (oil pressing or cotton-spinning) attached to the ginning mill, to utilize the power of the engine to the full, and find work for the mill when the ginning season is dull.

I was told that the firm intend to press oil from cotton seed, but up to now all the seed has been sold locally unpressed.

11. There is a small power ginning mill at Mirpani in Golaghat Subdivision, owned by Messrs. Möll Schutte & Company, and managed by Mr. T. F. Severin. The capital of the concern is about 50 thousand rupees. They have a 16 horse-power double-cylinder portable engine, supplied by Marshall and Company of Calcutta. The ginning business brought a profit of 6 or 7 thousand rupees during the ginning season, but the concern as a whole (which includes lac business) was not profitable. The manager told me that the firm could not make larger profits, because they could get only about 5 thousand maunds of cotton instead of 20 thousand which they expected to get. In this mill an attempt was also made to extract oil from uncleaned cotton seeds, by applying hydraulic pressure of over 13 tons per square inch, with the result that only about 8 or 9 per cent. of oil (to total weight) could be extracted, and it was found more profitable to sell seed at Gauhati, for cattle food, at Rs. 2 per maund.

Messrs. B. N. De of Calcutta have opened a ginning factory at Chandpur, but the concern has not yet started work. At Narayanganj Messrs. Ralli Brothers have a ginning mill. They gin annually 4 to 7,000 bales of cotton of 400 lbs. gross. The cotton seed is despatched to Calcutta for disposal.

According to Mr. F. Noël-Paton, the extraction of oil from cotton seed as an industry has a bright future in India, and for full information on this subject readers are referred to the Indian Trade Journal pamphlet published this year. But as far as this province is concerned, I think it will be advisable for us to await the result of the experiments which are about to be tried in the United Provinces, with the help of the latest delinting, decorticating and pressing machines.

12. It is notorious that the successive efforts of the Government of India to introduce superior varieties of cotton into Bengal have all met with uniform failure (see Mendlicott's Cotton Hand Book for Bengal.) It may be true that the famous *Photee* cotton was perhaps once grown successfully near Dacca, but from figures now available it appears that the raiyat even in the palmy days of the cotton industry only earned about Rs. 8 per acre from this crop, whereas he now makes at least five times that profit in jute. And having regard to the fact that for good varieties of cotton, both regular and only very moderate rainfall is necessary, it is extremely doubtful, whether finer staples of cotton will ever be a success in this province, or succeed in replacing any of the more valuable crops already grown here. I think, therefore, our wisest course would be to develop and improve our own short-stapled hill cotton, for which there is a growing demand in Europe and also in other parts of India.

13. All the weaving in Assam is done with hand-looms, and there is not a single cotton mill in the whole of Assam. The hand-looms are also of the plainest description, and none of the recent improvements have been adopted. The successive processes of cleaning, bowing, spinning, sizing and finally warping and weaving, together with the instruments used at the different stages, have been minutely and graphically described by Messrs. Darrah and Samman. The different local varieties of spinning and weaving machines used in different parts of the province, have also been clearly explained. It is interesting to note the difference between the comparatively more complex posted loom in use in the plains, and the loom of the Bhutias and other hill tribes, in which the warp is tied up in a split bamboo, to the ends of which are fastened a leather strap, which passes across the back of the weaver. It is quite clear that this latter loom is not suited for the production of fine fabrics even of small size, for the method of working this loom causes a considerable strain on the warp, and the constant jerks occasioned by the weaver leaning back is sufficient to break any but the most substantial threads. In fact the process in the plains is a stage distinctly in advance of that of the hills. The former has reached the stage of machinery, the latter has not.

14. The product of hand-looms in Assam—

Trade in cotton cloth. (1) supplies home demands to a fairly considerable extent ;

(2) but does a very insignificant amount of work for sale in the market.

In the Brahmaputra Valley, Nowgong, Kamrup and Goalpara are the only districts in which locally-made cloths come to the weekly markets or *hāts*, or the several *melas* or *sobhas*. The stuff sold is of the roughest make, such as *borkapar* and *gamchas*, and the purchasers are chiefly Garos. In Kamrup the sales at the *hāts* are both direct to the villagers and also to the Naga and Kyan traders. Phalangis is the local name for middlemen, who collect cloth from the homes of the weavers and then hawk them about for sale. Messrs. Saraswati & Company of Gauhati are manufacturing coarse *chudders*, of which the warp is of imported yarn, and the weft of home-spun yarn, and these have a fair amount of sale in the East Bengal districts.

Trade in locally-made cloth is brisker in the hills. The hill tribes take cotton cloth from the plains, and occasionally sell some made by themselves. The bartering of cloths between neighbouring tribes is very frequent, among the hill tribes, of whom by far the most enterprising as they are by far the most skilled in weaving are the Manipuris. The cloths made by these people, specially the well-known Manipuri *khesh*, have always found a sale beyond Manipur.

15. The difficulty of calculating the daily wages of weavers lies chiefly in the fact that so few cloths are sold, that it is difficult to assign any market value to them.

Wages earned by the weavers.

After comparing the figures received from various parts of Assam, Mr. Samman ascertained that the wages of the weavers of ordinary cotton cloth came, roughly, to half-an-anna a day ; and after making enquiries in different parts of Assam I could not come across a single case in which the wage of the weaver comes to more than 6 pice a day. The case of ornamental and embroidered cloth, however, is different, as there are only very few families, in one or two centres, who can make *paradiu kapar* or *gutibulla kapar*, and they can demand fancy prices ; but the richer class of Assamese are giving up the locally manufactured embroidered apparel, in favour of the cheaper and handsomer stuff manufactured at Benares.

16. In North Lakhimpur, the Kacharis of the Kadam Mouza are considered the best weavers. In Golaghat and Jorhat the Miris are celebrated for weaving a kind of rug called Mirigin. In Jorhat, the Noras make a sort of bag (*thung*), and some Mussalmans of Jorhat town make a special kind of embroidered shawls. In Kamrup, Sualkuchi and Kamar-kuchi of Hajo, Lashkarpara of Rangri, and Barpeta are famous centres. In Goalpara, Cachari women make cotton cloths elaborately decorated with flowered borders. In the Surma Valley the Manipuri settlers of Ruperibuli and Lakhimpur in Cachar, make *janek*, and those of Ambicapur and Hamnagar mosquito curtains. In the Sunamganj Subdivision in Sylhet plain *gelap* is made chiefly in Budhrail, and *gelap* striped with red in Dohatia.

Different kinds of cloth.

17. The cotton fabrics of Assam were divided by Mr. Samman into the three following classes—

- (1) Those of the Assamese.
- (2) Those of the professional weavers of the Surma Valley.
- (3) Those of the hill tribes.

There is nothing of any special interest in the weaving of the Surma Valley, but some of the fabrics turned out by the Assamese and the hill tribes men are distinguished by a variety of very artistic ornaments. A long list of fabrics, both ornamented and plain, is given in Mr. Samman's book.

18. Amongst the cotton fabrics of Assam embroidered and ornamented cloths deserve special notice. Ornamentations are either knitted by needles on the fabric after the weaving, or the ornamentation is worked along with the weaving. The embroidery is done chiefly in *Muga* silk or gold and silver wire.

In former days the gold and silver wire (*guna*) used for embroidery, was made within the province, by a class of workmen called Gunakati, but nowadays the imported gold and silver wire from Europe has completely extinguished this industry. The use of the needle for working ornaments on cloth and silk appears to have been known in Assam from very ancient times. Designs for the ornamentation of cloth during the process of weaving are of various kinds; the designs and patterns used have been described by Mr. Samman in detail.

For the Assam Valley, besides ornamented cotton fabrics the only other kinds which deserve notice, are those made of mixed materials; cotton mixed with silk. Cotton is very rarely combined with *Pât* silk, but very often with *Muga*, and in Jorhat, *churia* and *riha* of such mixed materials (cotton weft and *muga* warp) are very often manufactured. *Endi* also is sometimes woven with cotton.

"Among the fabrics peculiar to the tribesmen, many are of the poorest possible description, coarse, plain, indifferently woven, some, however, are much more interesting. The sheets of the Nagas are unequalled for durability and careful weaving, the *fauek* of the Manipuris for the beauty of their embroidery, their puggris for fineness of texture. Some again, exhibit varieties of weaving unknown to the people of the plains, the bags of the Noras and Turungs, the rugs of the Mikirs and Kukis, the honey-combed towels of the Manipuris have no equivalents among the fabrics of the Assamese, or the professional weavers of the Surma Valley."

But the chief interest of these fabrics lies in their quaintness.

General condition of the cotton-weaving industry in Assam.

19. In 1897, Mr. Samman wrote :—

"To sum up, the cotton weaving industry in Assam is, at the present time, in three distinct stages among the different classes of the people. Among the civilized inhabitants of the Surma Valley, the industry may be said to be extinct, and there is little probability of its revival, unless mills be established. Among the Assamese proper, weaving still holds an important position, even in the manufacture of the coarser cloths. It will probably be long before these are altogether superseded by imported fabrics, and the weaving of delicately ornamented cloths will, no doubt, long continue to be a favourite pastime for the wives and daughters of the well-to-do. In the hills also and among the hillsmen who have settled in the plains, weaving is still largely practised. But here the industry is rapidly declining and there is little doubt that its decline will continue. The rough hillsman does not, like the Assamese, disdain to labour on the soil at a daily wage. More and more every year are resorting to the tea gardens, where both men and women can earn a wage far in excess of what they could possibly earn by the most assiduous application to the loom. Others, too, though not caring to work on the gardens, are turning to agriculture, which they find a more profitable occupation, and buying their scanty clothing from the bazar."

With the exception perhaps of Sylhet and Kamrup, where some revival of this important industry is visible, due no doubt to the wave of industrial enthusiasm which is passing over the country, the above remarks still furnish a faithful picture of the situation.

20. It will be more convenient to discuss the possible improvements which can be suggested to the weaving industry of Assam, after noting the condition of the industry in Eastern Bengal.

But here I may note, that the only likely channels which to my mind afford any scope for commercial enterprise in cotton goods in Assam are :—

(1) The production of coarse cloths and *chudders* like those manufactured by Messrs. Saraswati & Company for East Bengal. There is a large demand for such articles amongst the tea-garden coolies.

Commercial openings in the cotton industry of Assam.

(2) The production of mixed fabrics—

(a) Cotton and *endi*, particularly if the wool can be blended before being spun; such a blend ought to produce a very fine kind of cloth suitable for suitings.

- (b) Cotton and wool, for coarse blankets. I hear the idea has been taken up by Messrs. Khetra Mohon De & Company, of Calcutta, and they are about to start a weaving mill at Chandpur to turn out such stuff. There is a very great demand for such cheap blankets in the tea-gardens.
- (3) The production on a fairly large scale of the best types of the hill fabrics like those of Manipur. If properly advertised there ought to be a fair demand for such fabrics, both amongst Europeans and amongst Indians of such parts as Madras, where the artistic blending of colour is appreciated.
- (4) The improvement and cheapening of the present ornamental cotton fabrics. There is a growing demand for such cloths amongst the richer classes of Indian ladies. They may also be used by English ladies for dress pieces, if the ornamentation is really artistic, and the price more reasonable than it is at present.

## SECTION II.

## BENGAL.

21. In the transferred districts from old Bengal, are to be found some of the most important centres of the weaving industry in Bengal; and amongst these Dacca, of course, stands pre-eminent.

Unlike Assam, in Eastern Bengal, weaving is a profession, which is carried on by only certain castes, which include both Hindus and Muhammadans.

Altogether 35 castes and hill tribes are reported to take part in the manufacture of cotton fabrics.

But of these the Tantis (Hindus), Jugis (Hindus), and Jolahas (mostly Muhammadans), are the principal castes engaged in the industry. The persons actually employed in weaving are regarded as being more or less inferior in social position, but the status of the industry cannot be said to be absolutely low. The Tantis who are the weavers of all the finer qualities of cloth, enjoyed a considerable amount of affluence in the palmy days of the weaving industry, but their material condition is far from being satisfactory now. The Jugis and Jolahas generally weave the coarser kinds of cloth.

22. From the census figures of 1901, it would appear that of the three important weaving castes in the transferred districts from Bengal, the Tantis numbered 61,063, the Jugis 264,812 and the Jolahas 292,747, making a total of 618,622 weavers of all classes.

But, as pointed out by Mr. Gait, in Chapter XII of his report, detailed and correct information cannot be obtained as to the industrial organization of a country by the machinery of a general census. In fact, the elaborate and costly occupation table tends to obscure the main facts, which a less elaborate method might have brought out. From the figures quoted above it is impossible to come to any definite conclusion, because the figures do not show separately what numbers of each caste still follow their old profession of weaving, and what proportion have given up their old occupation and taken to agriculture, for it is well known large numbers of the weaving castes have given up their caste occupation and taken to agriculture, and only about 38 per cent. are supposed to be still engaged in the industry. For the whole province of Bengal the weaving population during the two decades ending in 1891 and 1901 stood as follows:—

|               | Population supported in 1901. | Population supported in 1891. | Percentage of variation. |
|---------------|-------------------------------|-------------------------------|--------------------------|
| 1             | 2                             | 3                             | 4                        |
| Cotton ... .. | 1,124,876                     | 1,178,130                     | —5                       |

From the above figures it would appear that there was a decrease during the last decade of 5 per cent. of the population engaged in the industry.

The following figures of the census of 1901, give details of the persons engaged in the industry in the transferred districts, together with the total of all the classes engaged in the industry :—

|                                       | Actual workers. |               |                          |            | Dependents,<br>both sexes. |
|---------------------------------------|-----------------|---------------|--------------------------|------------|----------------------------|
|                                       | Total.          |               | Partially agriculturist. |            |                            |
|                                       | Male.           | Female.       | Male.                    | Female.    |                            |
| 1                                     | 2               | 3             | 4                        | 5          | 6                          |
| Cotton-weavers ... ..                 | 90,952          | 17,467        | 15,566                   | 175        | 196,195                    |
| Cotton-spinners, etc. ... ..          | 185             | 18,381        | 16                       | 21         | 6,887                      |
| Cotton yarn and thread-sellers ... .. | 1,229           | 274           | 64                       | 2          | 1,667                      |
| Cotton-cleaners, etc. ... ..          | 307             | 406           | 14                       | ...        | 448                        |
| Cotton-dyers ... ..                   | 78              | 15            | ...                      | ...        | 170                        |
| <b>Total ... ..</b>                   | <b>92,751</b>   | <b>31,543</b> | <b>15,660</b>            | <b>198</b> | <b>204,117</b>             |

Total of all classes depending on cotton, 344,269.

23. Mr. Collin when he made his survey of the industries of Bengal in 1889, found that "the importation of Manchester cotton goods had in many places caused the weaving of the country cloth to cease." But he held the opinion "that in spite of foreign competition, such of the weaving classes as had survived, were as well off as they were at the beginning of the century." Before Mr. Collin's survey, Sir W. Hunter in his Statistical Accounts notes an almost universal decline of the indigenous weaving industry in all the districts of East Bengal. The case of Noakhali may be cited as an example. In this district, the East India Company had flourishing cloth factories at Jagdia and Collyanbi, where large quantities of *baftas* were manufactured, and where trade in this article amounted to £120,000 a year. But gradually this extensive weaving industry died out on account of the competition with Manchester goods. The Jugis of Noakhali were thus found in 1876 to have taken themselves to cultivating the soil and to other callings. Mr. N. Banerji, in his monograph on the cotton fabrics of Bengal, which appeared in 1898, makes similar observations about the decline of the industry in most parts of Bengal. He makes the following interesting quotation from Taylor's Descriptive and Historical Account of Cotton manufacture of Dacca. "At one time Dacca was the great emporium of trade in cotton fabrics in Bengal. It had commercial intercourse with China on the one hand, and with Turkey, Syria, Arabia, Ethiopia, and Persia on the other. A little later on, Dacca sent its muslins and embroidered fabrics to Provence, Italy, Languedoc and Spain. When Surat became the principal emporium for the goods of Europe and India, Dacca carried on a considerable traffic with that place. At the close of the last century, the annual investment made by the East India Company and by private traders for Dacca muslins was estimated at 25 lakhs of rupees; but in the beginning of the present century the industry rapidly began to decline under the competition of cheaper piecegoods from Manchester. In 1785 no less than 500,000 pieces of muslins were manufactured in England. By 1813 the value of the private trade had fallen to two lakhs of rupees, and four years later the commercial residency of the Company was abolished, the trade gradually languished, and in 1825 received a severe shock from the introduction of British thread, which has since been used almost to the entire exclusion of country yarn."

24. It looks, however, as if the downward course taken by this, the most important indigenous industry of the province, has at last been checked, and a slow but perceptible improvement is visible everywhere. Mr. Cumming, in his recent report remarks, "The *swadeshi* movement of the last two years is a new factor stimulating production and creating a demand. I find that this has led to the improvement of the weavers in parts of the Presidency and Burdwan Divisions, that is to say, many weavers who had given up their caste occupation have returned to it." The same phenomenon has also been noticed in Madras by Mr. Chatterton, who says, "The

Present condition and revival of the hand-loom industry.

interest in hand-weaving is mainly due to the *swadeshi* movement, and most of the hand-weaving factories owe their existence to the enthusiasm engendered at the birth of a new political movement." It is fortunate that a similar revival of the hand-loom weaving industry is also noticeable in the principal centres of the weaving industry in East Bengal. There are no reliable figures, however, to show what the real increase in the volume of this industry has been, but the following figures for the import of foreign and Indian cotton piecegoods and yarn, taken from the Divisional reports (Statement A) throw some light on the point :—

## Imports.

|                             | 1902-03. | 1903-04. | 1904-05.   | 1905-06.   | 1906-07. |
|-----------------------------|----------|----------|------------|------------|----------|
| 1                           | 2        | 3        | 4          | 5          | 6        |
| <i>Chittagong Division.</i> |          |          |            |            |          |
|                             | Mds.     | Mds.     | Mds.       | Mds.       | Mds.     |
| European P. G. ... ..       | 23,511   | 29,447   | 41,854     | 31,368     | 12,389   |
| Indian P. G. ... ..         | 554      | 592      | 1,555      | 2,515      | 11,005   |
| European T. & Y. ... ..     | 14,358   | 11,465   | 11,234     | 6,960      | 10,273   |
| Indian T. & Y. ... ..       | 256      | 1,603    | 9,194      | 7,139      | 3,674    |
| <i>Dacca Division.</i>      |          |          |            |            |          |
| European P. G. ... ..       | 112,874  | 111,383  | 122,591    | 123,573    | 94,718   |
| Indian P. G. ... ..         | 6,972    | 4,040    | 5,269      | 12,253     | 9,394    |
| European T. & Y. ... ..     | 19,492   | 19,756   | 22,638     | 21,125     | 14,385   |
| Indian T. & Y. ... ..       | 3,258    | 3,939    | 5,492      | 3,566      | 3,866    |
| <i>Rajshahi Division.</i>   |          |          |            |            |          |
| European P. G. ... ..       | 268,510  | 2,58,204 | 20,511,427 | 16,628,022 | ...      |
| Indian P. G. ... ..         | 7,931    | 10,643   | 79,292     | 716,263    | ...      |
| European T. & Y. ... ..     | 14,814   | 14,926   | 21,833     | 18,356     | ...      |
| Indian T. & Y. ... ..       | 16,249   | 14,111   | 19,765     | 18,882     | ...      |

From the above figures it would appear—

- (1) That in the Dacca and Chittagong Divisions, the import of European goods greatly diminished in 1906-07; whereas a similar decline was prominently noticeable in Rajshahi Division in 1905.
- (2) The import of yarn, though fluctuating, also showed a marked increase, specially in 1904-05 when the total import of yarn, Indian and foreign, was 2,000 maunds in excess of the imports in 1902-03. The increase in the import of Indian yarns was specially noticeable in Chittagong: it rose from 250 maunds in 1902-03, to 3,674 maunds in 1906-07.

From the report on the trade of this province in 1906-07, it would appear that 5,26,943 maunds of cotton piecegoods were imported into Eastern Bengal districts of the province, whereas 1,31,219 maunds of yarn were imported in the same year. It would thus appear that at least one-fourth of the total demand for cotton fabrics was supplied by the hand-looms.

25. Taking individual districts, we find that the development has been the greatest in those districts which have been able to supply any expanding demand for any special class of goods. For instance, the industry seems to have progressed most in Noakhali, Comilla, Pabna, and Faridpur. All these districts, besides producing the usual *saris* and *dhutis*, turned out a very large quantity of checks and chintzes, both thick and thin, and suitable for the making of coats, shirts, *panjavis* and other wearing apparel mostly in vogue now. In Comilla the increase is reported to be fully 33 per cent.; whereas the total export of the cloth from that district to other parts of Bengal amounted hardly to a lakh of rupees before, now the exports come to over a lakh and a half. I myself went to the Thursday *hât* at Comilla, and found that stuff valued at 2,000 rupees at least was bought up chiefly for export. There are two such *hâts* in a week at Comilla itself.

In the divisional report of Rajshahi for 1906-07 the following occurs: "The Collector of Pabna reports that cotton-weaving has lately received an impetus, and weavers are hardly able to meet the growing demand of the foreign and local

markets. It is said that the number of hand-looms has increased in Pabna, and members of the weaving class who had taken to other pursuits have now returned to their caste profession."

In Noakhali it was found that the import of European cotton piecegoods had gradually fallen off from 2,856 bales in 1905-06 to 942 bales in 1907-08, whereas that of the Indian piecegoods had gradually increased from 453 bales in 1905-06 to 4,653 bales in 1907-08. The export of locally manufactured cloth also greatly increased during this period till it reached 720 maunds in 1906, though it fell off again to 380 maunds in 1907. It is reported that, taking advantage of the large increase in the demand for their goods, the weavers of Noakhali tried to impose upon the public by selling cloths made of very inferior yarn, with the result that the demand for these goods was reduced by nearly half during the next year.

26. We may now describe some of the principal products of the hand-looms of the country. The most notable as well as the most artistic are the fine and ornamental fabrics of Dacca. Of these however the weaving of the renowned Dacca muslins has now practically ceased, because there is no demand for these articles, though the art is not yet quite lost, and comparatively coarse muslins with yarn of 350's and 400's counts can still be woven. The special yarn necessary for muslins used to be spun locally in Dacca, but this art is now completely forgotten, and all the yarn now used is machine made.

Weaving centres and different class of fabrics woven.

(1) Special and ornamental Dacca muslins.

After muslins, *kasidas*, or embroidered muslin pieces, chiefly used by Muhamadans during prayer time, and as turbans, etc., may be mentioned. The ground work of the *kasida* cloth is generally woven in mofussil villages, such as Shanora, Biliswar, Matail, Dagar, etc.; but the ornamentation is generally done at Dacca, or at Matail, in the suburbs of the town. The ornamentations on *kasidas* may be either with the plain *muga* silk thread, or with twisted silk thread, in which latter case the work is known as *chikan* work. The ornamental work on the *kasida* cloths is knitted by hand on a pattern, which is stamped on the cloth, and is done almost entirely by women, most of whom are Musalmans. The designs are strongly Persian in feeling and conception. The income of an average weaver, who weaves the groundwork comes to Rs. 8 a month, whereas the knitters don't make more than about Rs. 4 a month. Jadu Nath Basak, of the well-known firm of Messrs. Madan Mohon Basak and Brothers of Dacca, informed me that the export of *kasidas* had greatly diminished since the decline of the Turkish power. Previously every Turkish soldier used to wear a *kasida pagree*, but nowadays it is only the higher officers of the Army who wear such *pagrees*, whereas the common soldiers have a *jes* only. Large quantity of *kasida* cloth is now also woven at Aleppo and Bagdad. The profits of the *kasida* merchants, of whom there are about a dozen in Dacca, have also declined owing to a fall in the demand for the cloth and a rise in the price of silk thread. *Muga* silk of Assam, which previously sold at Rs. 6 a seer, now sells at Rs. 12, and Murshidabad silk which sold at Rs. 15 a seer now sells at Rs. 25.

There are 50 or 60 sorts of *kasida* cloth. The prices range from Rs. 50 to Rs. 80, according to quality. In Dr. Taylor's time about 120,000 pieces of cloth were annually worked at Dacca. The total value of the *kasida* cloth now exported from Dacca comes to about 2 lakhs.

These embroidered fabrics of Dacca when properly bleached are fine specimens of the weaver's art, and ought to have a far larger sale amongst Indian noblemen, specially amongst Muhammadan nobles, in up-country and in Hyderabad. Perhaps the necessary advertisement and pushing of the market is wanting. I think it will also be a move in the right direction if the women who now do *kasida* work be taught to make lace, for which there is a growing demand in the country.

Next we may mention the Jamadani *saris* or figured muslins of Dacca. In these the embroidery is done in the process of weaving with needles of bamboo or tamarind wood, by the help generally of a pattern on paper which is pinned beneath. A special feature of the Jamadani *saris* is their fine ornamental borders of gold and silver thread, with large bold corner pieces. These Jamadani *saris*, *dhutis* and *uranis* have still a fair amount of sale. But their demand is limited, as the price of the fabrics ranges from Rs. 8 and 10 to Rs. 100.

A species of highly ornamental *sari* in which the warp was of cotton and the weft of *muga* silk and gold thread, particularly attracted my attention. Its price was Rs. 200, and I was told that only a few were woven annually for the use of the family of the Raja of Tippera and other rich noblemen,

The price asked for one Jamadani *sari*, the ground-work of which was of blue-black thread, and the whole body was ornamented with gold thread, was Rs. 400.

The Jamadani *saris* of Dacca are now also very largely woven in the interior of the district, in villages Nantee, Demra, Sidhiganj, Katchpur, Dhamrai, etc., where the weavers can combine agriculture with their caste occupation, and consequently sell these fabrics slightly cheaper than the weavers of Dacca town itself.

The ordinary Dacca *sari* has got a very fine embroidered border either of gold thread or of dyed thread, and is supposed to be an unique production. These *saris* also are fairly highly priced from about Rs. 4 and Rs. 5 to Rs. 30 or Rs. 40, and therefore their sale is also limited. The *swadeshi* movement has not enhanced the demand for these finer *saris*, in anything like the same proportion, as in the case of coarser and cheaper fabrics. The Dacca *saris* also suffer by competition with the products of villages like Abdullapore, Kagmari, Baliati and Dhamrai, where the weavers can combine agriculture with weaving, and thus afford to sell their cloths cheaper than Dacca weavers, whose sole occupation is weaving.

Beside Dacca, Kishoreganj town, and the village Bajitpur in Kishoreganj, and Bajitpur in Tangail, also produce embroidered and higher class of *saris*. The Kishoreganj Tazeb was at one time as famous as the Dacca muslins, and the finer *dhutis* and *saris* now manufactured at Pathrail and Bajitpur, are palmed off on unsuspecting purchasers as Dacca *saris*.

27. The next class of fabrics are the ordinary *dhutis* and *saris*. Pabna, Faridpur and Barisal produce a large quantity of *saris* for the use of the Hindu women of better classes. Tangail also produces a fair quantity. These *saris* are priced from Rs. 3 to Rs. 8 per piece. They compete with the *saris* of Farashdanga, Santipur and Howrah.

The ordinary *saris* for the wear of females is produced in almost all the important centres of industry, but at least 75 per cent. of the demand for this class of goods is supplied by the power mills.

A species of coloured *saris* known as *jam saris* has lately been introduced in Noakhali, and a similar kind is woven in Moynamati and are now being largely used by Muhammadan women. It is said that at Choumahani, in Noakhali, about Rs. 1,000 worth of these *saris* are sold on every *hat* day.

28. Striped and checked cloth pieces and *chintzes* suited for coats, shirts, and *panjavis*, and such other wearing apparel, which are now in fashion both amongst the Muhammadan and Hindu men, of practically all classes, form the next class. As already noted before, there has been a very marked development in the production of this class of goods; the Moynamati checks and the Pabna *chintzes* are to be found in large quantities in every cloth shop in the province. Faridpur, specially the subdivision of Goalundo (Rajbari) also produces a fairly large quantity of *chintzes*. As many as 28 varieties of checks were shown to me at Comilla. Their prices range from about Rs. 2-8 to Rs. 6 or Rs. 7 apiece, according to the quality of the cloth. The pieces are 10 to 13 yards long and 22 inches wide.

Twill-weaving and cross warp-weaving have also been introduced. The weft in some cases is composed of 2, 4 and even 6 separate threads twisted together. This gives thickness and substance to the stuff woven. Some new patterns have been recently introduced by the enterprise of Sarat Nath, the largest dealer in this class of goods in Comilla, and by the skill of one Mahesh Nath who learnt weaving at Serampur at the expense of the District Board. There is room for a still greater expansion of this branch of the cotton industry. The Ludhiana and Cannanore checks are still considered to be finer and cheaper than anything produced in the province, and consequently have a very large sale. Both the superior patterns and the finer weaving of the Cannanore fabrics might be studied by the weavers and the dealers in this class of goods. In the jails of Rajshahi and Dacca some fine patterns of checks have been introduced.

29. Amongst miscellaneous fabrics may be mentioned the famous mosquito nets of Choumahani, which are mostly coloured, but some are white, being of an inferior quality, whereas the white ones of Moynamati are of superior quality. Bed-sheets of very fine quality are produced in Rajbari (Faridpur) and Pabna. Dusters and *pardus*, with red and black stripes, are manufactured in Comilla. Special class of *loongis* with fast colours, is being manufactured in Noakhali and is competing successfully with the imported, *loongis*



from Holland and Burma. The supply of *loongis* is however still far short of the demand for these articles, which are very largely worn by the Muhammadans of Chittagong and Noakhali, and it will pay any firm to make a speciality of manufacture of *loongis* of fast colours. In fact, there is a very good market for all the fabrics of this class, as they are coarse, and the hand-loom is specially adapted for the production of these articles.

30. Several hosiery factories for the manufacture of socks and banyans have been established in different parts of the province. There is one hosiery mill at Tezpur, belonging to the Assam Valley Trading Company. After several experiments with automatic knitting machines, the company brought an improved automatic machine in 1906, and also a small oil engine. The machinery is working satisfactorily and the Company has now five body machines, with accessories. Hose can be manufactured by the machines now in stock. About 20 employes, including females, find work in this small factory. The sale for the better quality of articles is not very brisk, and therefore the Company is going to start the manufacture of cheaper goods with inferior yarn. The daily outturn is about 3½ dozen half hose per one body machine, and a dozen per hand machine. The capital of this department is about Rs. 15,000, and price is from 4 annas to Re. 1 per dozen half hose according to quality. Socks and stockings, both of wool and cotton, with high special heels and toes and with double sole and high heels, and also knickers are made here.

I saw several hand-driven machines at Rajshahi. At Pabna, the Silpa-Sangibani Company have also a hosiery factory. The machinery is driven by a gas engine of 3 horse-power, but it is not in working order now, and the machines are being worked by hand.

There are also 7 hand-driven factories at Dacca. The first is Gupta & Company's Hosiery Factory, Patuatally. It is managed by a graduate, who is the son of a respectable pleader. Up to now Rs. 15,000 have been laid out in the business. The firm has several Foster's hand machines, and a suitable building has just been constructed. The business worked at a loss for the first two years, but is just beginning to pay. The yarn is dyed in the factory, and it is thus possible to sell the socks slightly cheaper than can firms who buy dyed yarn. The other firms are Das Brothers Company, Farasganj; De Sarkar & Company; Bengal Hosiery Supply & Company; De & Company's *Swadeshi* Silpalay; Ganguli & Company, Wari; and Basu Rai Chowdhury & Company, Patuatally. None of these firms has enough capital to do the business on a sufficiently large scale to make it profitable. The yarn has to be bought cash, while the stock has to be disposed of mostly on credit. As much as Rs. 800 worth of yarn is required to feed even one hand machine for the year.

Two improvements can be suggested—(1) the formation of joint stock companies and the investment of larger capital in the business; (2) the introduction of oil engines to drive the machines instead of hand power. The oil engine used at Tezpur is an inexpensive and most useful piece of machinery, and the capital of the concern is only Rs. 1,500.

31. Amongst miscellaneous cotton fabrics mention may be made of the *satranjis* or *durris* of Rangpur. It is now a declining industry, and hardly 100 families are supported by it. Most of them also cultivate land. The yarn is imported, but dyed locally. A special kind of *durri* and *chat*, made of jute and cotton yarn, is manufactured near Dimla. The weavers are reported to earn on an average, about 15 rupees per month.

Cotton carpets are woven in some of the local jails, and a cheap kind of carpet, made out of strips of waste cloth, recently introduced in the Dacca Jail, ought to have good sale.

32. The yarn used for the weaving of the above fabrics is all machine-spun, and except in Pabna and Dacca and Rangpur, I did not come across any other place where thread is dyed locally. The weavers complained of the rise in price of yarn compared with prices which prevailed some years ago, and they are unanimous in suggesting that if by any means, the prices of dyed and undyed yarn could be reduced, that will be the only practical way by which they (weavers) could hope to make larger profits and improve their position.

33. Mention has already been made of the two ginning power mills of the province. There is not a single spinning mill in the province, and there is only a small weaving mill in Jalpaiguri, known as the Pioneer Weaving Mill. Its nominal capital is Rs. 50,000 and it was started in 1906, though it did not commence work till December 1907, and, even after it did

it had to close work for want of a competent manager, as a matter of fact, there was some division of opinion amongst the promoters themselves. It has just started work again, but the goods turned out are coarse, and the borders are not properly woven. It is up to now a losing concern, and it is quite clear that the want of proper expert management is the cause of the ill-success which this most creditable venture has met with up to now.

As regards hand-loom weaving, there is no division of labour, as far as I am aware, in the preliminary processes of sizing and warping the yarn, and the later process of weaving. Warping and sizing are done by the same family of weavers, and the sizing is put on generally with a brush after the warp has been stretched. The weaving is almost universally still done by the old hand-loom, and only from three districts have reports reached me of the adoption of fly-shuttle looms by professional weavers to a very limited extent. In Barisal, the Serampur fly-shuttle looms are said to have been adopted about ten years ago, and are now being used by nearly 200 families of weavers. A certain Maulvi of Hasthisunda of Gournadi thana, in Barisal, prepares fly-shuttle sley, at a cheap rate of Rs. 10 to Rs. 15 each. In some parts of Faridpur, the Serampur looms are reported to have been adopted from the neighbouring town of Kushtea, where such looms are in use. There are 20 such looms in Sadardi village in Bhanga, district Faridpur. In Comilla, by the exertions of one Mahendra Nath Nandy, about 20 weavers are reported to be using fly-shuttle looms.

31. In spite of the undoubted increase in the demand and the production of hand-woven cloth fabrics of the province, it cannot be said that any marked improvement in the condition of the weaving classes is to be found at most of the centres of the industry. The first point that strikes one is that the earnings of the ordinary weavers are lower than the profits of even the smaller peasant proprietors tilling their own lands. The weavers' earnings on an average do not come to more than Rs. 8 a month in Eastern Bengal, and Rs. 4 in Assam, whereas the wages of even the landless agriculture labourers never come to less than Rs. 8 a month, and very often it rises to Rs. 15 inclusive of food, etc. The village carpenters and blacksmiths are better remunerated, and earn from Rs. 10 to Rs. 15 a month. That weaving therefore as a profession has not fewer followers than it actually has, is almost entirely due to the fact that a very large percentage, perhaps 80 per cent. of the weavers, are also engaged in agricultural pursuits.

Weavers may be broadly divided into two classes, *viz.*,

- (1) those who work with their own capital ;
- (2) those who are dependent on mahajans for the materials of their industry.

The number belonging to either class varies in different parts of the province, but, roughly, for the whole province it may be said that quite 75 per cent. of the weavers are dependent on mahajans. It is this last fact more than anything else that has prevented a general rise in the wages of this industry. We thus find that although the impetus imparted by the *swadeshi* movement has not yet resulted in any marked improvement in the material condition of the weaver, yet enterprising shop-keepers and wholesale dealers in country-made cloth, have made quite decent profits out of their business. As examples might be quoted the firm of Saraswati & Company in Gauhati, and Saranath in Comilla. I have already referred to the poor remuneration of the weavers of Assam. In spite of the favourable circumstances now prevalent, the condition of the ordinary Dacca weavers in Eastern Bengal appeared to be much more unsatisfactory than those of the weavers of Pabna or Comilla for instance. It may be that the *swadeshi* movement has not caused much increase in the demand for the finer fabrics of Dacca, but I think the real explanation is to be found in the fact that only one anna of the weavers of the Dacca town are free from the clutches of the mahajans, and the rest are steeped in debt, and receive artificial wages fixed by their creditor-mahajans. They therefore do not earn more than 2 to 3 annas a day. Weavers with their own capital, however, admitted that they earn on an average from Rs. 15 to Rs. 20 a month. The unfortunate women who do the needle-work for the *kasida* cloth, a fairly exacting and troublesome work, do not earn more than 4 to 6 pice a day. For special work, however, such as the weaving of silk and gold thread *saris*, valued as high as Rs. 200 apiece, the wage of the labourer comes to Rs. 50 a month. But as the demand for such articles is so extremely limited, such cases might well be left out of account. In Comilla, the wages of the weavers were reported to have risen from Rs. 6 to Rs. 7 a month before the present movement, to Rs. 8 or Rs. 9 a month, after it. The steps which might be taken to ameliorate the condition of the weavers will be considered in the next section.

## SECTION III.

## SUGGESTIONS FOR IMPROVEMENT.

35. The question of the improvement of the cotton industry of India is not synonymous with the improvement of the hand-loom industry; and a controversy has been carried on between the supporters of the hand-loom cottage industry and the advocates of the power-loom factories. But the discussion appears to be more or less academic. Under the existing industrial conditions of the country, there can be very little doubt that neither the Government nor the patriotic public interested in the industrial development of the country, nor even business men, can neglect the claims of the hand-loom industry. Mr. Chatterji, following the note of the Government of India on hand-loom industry, has ably pointed out the reasons for holding that the hand-loom industry has a special vitality in India. It has been shewn that the industry has all the advantages of a cottage home industry, it can be combined with agriculture, the plant is inexpensive, the hand-looms are specially suited for the production of durable coarse cloth, for which there is such a large demand in India; and, finally, the weavers have a low standard of living and are satisfied with comparatively low wages, and therefore labour is cheaper.

The great advantages possessed by steam factories, and production on a large scale, do not need any advocacy.

36. The most practical way of approaching the question therefore seems to me to see what the actual consumption of the produce of both methods is, and what special advantages, if any, each possesses for the production of particular class of fabrics. Much useful information on this point is to be found in the article of Mr. Patel on hand-loom weaving in India, submitted to the Calcutta Industrial Conference in 1906. He gives the following table to shew a probable estimate in millions of yards, of the different classes of cloth consumed in the country with their sources of production:—

| No. | Class.         | Warp counts. | Weft counts. | Indian hand-loom supply, million yards. | Indian mill su. ply, million yards. | Foreign imports, million yards. | Total consumption, million yards. | Percentage. |
|-----|----------------|--------------|--------------|---|-------------------------------------|---------------------------------|-----------------------------------|-------------|
| 1   | 2              | 3            | 4            | 5                                       | 6                                   | 7                               |                                   | 9           |
| 1   | Coarse ...     | 6's to 16's  | 6's to 20's  | 900                                     | 60                                  | 300                             | 1,260                             | 26          |
| 2   | Coarse, medium | 20's to 26's | 20's to 40's | 150                                     | 500                                 | 1,170                           | 1,750                             | 37          |
| 3   | Medium ...     | 26's to 40's | 30's to 50's | 450                                     | 40                                  | 750                             | 1,250                             | 26          |
| 4   | Fine ...       | Over 40's    | Over 40's    | 150                                     | ...                                 | 370                             | 500                               | 11          |
|     |                |              | Total ...    | 1,650                                   | 600                                 | 2,500                           | 4,750                             | 100         |

Mr. Patel adds "The bulk of the very coarse classes is woven on Indian hand-looms from Indian mill-yarn. This yarn is made from very inferior cotton, and is not given a proper twist for warp. Some of the Bombay mills tried to produce this class of cloth, but the yarn could not stand the speed of the power-looms, without a sizing of from 50 to 100 per cent., and as the people wanted cotton rather than size in the cloth they bought, the mills had to give it up as a bad business. This cloth is very thick, warm and durable, and is made everywhere in the country for local sale. *This class may, therefore, be considered as coming within the absolute sphere of the hand-loom.* Foreign cloth of this class in coloured designs and checks is being imported, but the weavers in Gujarat, Northern India and most other parts of the country, including Assam, are now producing such cloth, and with increased local production, the foreign article may, for the most part, be supplanted.

The main bulk of the coarse medium class is made up of imported shirtings and Indian mill-made shirtings, *chudders*, tea-cloths, etc. This class forms over one-third of the total cloth consumption of the country, and the supply is almost equally divided between the Indian and foreign power-looms in grey goods, while bleached and coloured goods of this class come mostly from the United Kingdom. Coarse medium yarn is very strong, and can stand any amount of rough usage in the power-loom *and the hand-loom has therefore no ultimate chance against it.* The yarn required for this class can all be produced from Indian cottons, and the question of relieving the foreigner is one of time only.

The medium class consists mainly of *dhutis, saris, etc.*, consumed by the large body of the Indian middle class. Indian cotton is unsuited to produce warp yarn of this class, while the weft yarn produced by the Indian mills is used up in weaving cloth of the coarse medium class by power-looms. Competition in this class is between the foreign looms and Indian hand-looms, both using foreign yarn. A cheap machine, cheap home labour and the production of stronger cloth on account of proper dressing of yarn are in favour of the hand-loom workers, while the power-looms cannot work so fast on this yarn as on the coarse medium. *If, therefore, the hand-loom can be made to produce 2½ times as much as it now produces, the extra production will cover all the grey goods of this class imported, leaving the supply of bleached and coloured or printed goods to foreigners.* The *swadeshi* protection can help the hand-loom workers in this class a great deal towards passing over the period of transition. The production of the fine class is restricted to hand-loom and foreign power-looms, and the speed at which the power-loom can work on fine yarn being still further restricted, the hand-loom ought to be supreme in this class of work."

Line of future progress.

37. The obvious line to follow therefore will be to develop both power-looms and hand-looms.

The increased production from power-looms will replace not the products of Indian hand-looms, but the imported manufactures of foreign countries, as from the table quoted above it will be seen that the import of foreign piece-goods is still about four times the quantity of the outturn of the Indian power-looms.

The first suggestion I have to offer therefore is to start one or two power-loom factories in this province, on a large scale, with modern and up-to-date appliances, and under suitable expert management. The most suitable site in every way for the first pioneer weaving factory in the province, would of course be Dacca. There is a very large weaving population in the town, and there is already a considerable amount of industrial enterprise amongst the people. While dealing with the subject of cotton mills, it should be pointed out that spinning mills are perhaps more important than weaving mills, and there should be easily room for two spinning mills in the province, one at Sirajganj or some place between it and Goalpara, and a second one at Dacca. It is needless to point out that these power mills instead of competing with the hand-loom industry, would by supplying cheaper yarn give a powerful impetus to that industry. It is much to be hoped that the firm of Nityanando Ray, which has already started the ginning factory in Chittagong, should open a weaving and spinning mill also. The success attained by the Bengal Lakhmi Mills should encourage all patriotic and keen-sighted business men and capitalists in this province to take advantage of the favourable circumstances now prevailing, and to float joint-stock companies with the object of establishing cotton mills.

Power mills.

38. Turning now to the hand industry, it might be pointed out that an improvement in this industry is likely to follow :—

Factors for improving hand-loom industry.

- (1) An increase in the demand for the products of the industry.
- (2) Improvements in the methods of production, resulting in an improvement in the quality of goods or in the cheapening of their price.
- (3) Relief of the industry from its present artificial condition, by a more equitable adjustment of the shares of labour and capital in the profits of the industry.

As regards an increase in the demand for the produce of the industry, it should be pointed out that the recent symptoms of improvement are entirely due to this cause. Mr. Cumming has laid great emphasis on this point, both in his recent report, and in the opinion he expressed at the deliberations of the All-India Weaving Conference, held this year in Madras, when he said "In Bengal I find that in all places, with the exception of Serampur, the only help which the weavers as a body have been receiving is on account of the increased demand for locally made goods." The increased demand, it should also be clearly understood, is not the result of any improvement in the material condition of the classes consuming the article, nor in an improvement in the quality of the fabrics or the cheapening of their price, but solely as a result of the desire of the people to use fabrics manufactured in the country. The very great importance of an artificial protection of such a kind in building up or supporting a growing national industry, is too well known an episode of the economic history of every nation to need expatiation here. But it is very unfortunate that political rancour has darkened such a patriotic movement, and that a mistaken notion has gone abroad that the Government wish to

Increase of demand

discourage all legitimate desire of the people to help their own industries. In the very forefront of any scheme for the improvement of indigenous industries should be placed a solution of this difficulty.

39. As far as the hand-loom industry is concerned, we can only improve the mechanical processes of weaving, for the industry must depend entirely on machine-made yarn. It might be noted however that the yarn sold by the Indian mills, has been found in many cases, to be not so good as the yarn used by them for their own manufactures, and it will be an advantage if some spinning mills could be started, as suggested by Mr. Havell, to feed hand-loom only. As regards improvements in the mechanical processes of weaving, it seems to be generally admitted that such improvements will

be of very little use without a corresponding progress being made in the methods of the preliminary processes of sizing and warping. Properly sized yarn improves the durability of the cloth, a well laid and well-sized warp makes quick weaving much easier. Besides, under the existing conditions of the industry, unless the weavers' family can learn a quicker method of getting through the preliminary processes, it will hardly be of much use to the weaver to learn to weave much faster than he does now. Mr. Chatterton calculates that the average cost for various kinds of cloths, for the preliminary processes of warping and sizing, beaming and winding comes to 17.6 per cent., whereas the cost of weaving comes to 26.2 of the total cost, the remaining 56.2 being the value of the warp and weft. But I think in the indigenous methods, the percentage of the cost of the preliminary processes as compared with the cost of weaving is considerably higher, because I have everywhere found that when a fabric takes a day to weave, the preliminary processes for the same cloth takes at least a day and-a-half. The results of the preliminary processes followed in the province are admitted to be fairly good, but they are time-consuming. In Serampur, where the weavers have adopted fly-shuttle looms a quicker method of warping, by which 100 threads can be laid simultaneously, is reported to have been adopted. At the proceedings of the All-India Weaving Conference it was generally admitted that the methods followed in South India are the most advanced in all India. I have seen the process followed at Salem, where the weavers size and warp the yarn for the Salem factory. Sizing is done by a brush after warping, and the yarn is warped and leased with the help of a drum-sized warping mill, composed of a bamboo frame 9 to 10 yards in circumference. By the to-and-fro revolution of this drum 18 warps, 9 to 10 yards long, with leases at intervals of 1 yard, are made simultaneously by 18 single threads, supplied by 18 bobbins. Mr. T. Chettiar thus describes the advantages of a warping mill which appears to be coming into use in Madras, but I am not sure if it is the same that I saw at Madras—"A boy of twelve years of age is able to wind on this warping machine 600 hanks a day, or 15 lbs. of yarn of 40s, and the warp can be made 100 yards long or even 150. Thus a boy on 3 annas a day, can prepare warps which now require six women costing about a rupee. A machine of this kind costs Rs. 50, and can supply warp sufficient for 50 looms. It may therefore be advantageously introduced into all villages where weaving is carried on to this extent."

I also noticed that there is a division of labour followed in Salem, and I was told that the case is the same in other parts of Madras. It might be incidentally mentioned here that English method of hank sizing was found by numerous experts, including Mr. Chatterton, to be quite unsuited to the hand-loom of India. The production of long warps is another point to which considerable stress was laid at the last Madras Conference, because such a method effects a great economy both of time and materials.

40. I cannot end this part of the subject better than by quoting a description of the efforts that are being made by Babu Manomohan Lahiri of Tezpur, to improve the preliminary processes of warping and sizing, not only because the results of the experiments are very valuable, but also to shew what a keen interest is being taken by enlightened and patriotic gentlemen to improve the industrial condition of the country.

"I have been trying," says Babu Manomohan, "for some time past to find out a method of warping. I have a winding machine at my disposal, and with this I have managed to make warp quickly, and it works satisfactorily. A six-bobbin winding machine and a few stands are all that is required. For sizing I separate the skeins from the hanks of yarn, and boil them in the size.

For winding I use a winding machine, and a number of bobbins are necessary for this part of the work. A sufficient number of sized skeins are soaked in water till the size becomes soft and are placed on swifts. The ends of the skeins are then taken one by one and passed through the folds of a thick rope, stretched lightly

between the winding machine and the stand for the swifts, and wound on bobbins specially made for the purpose. I take ordinary flanged bobbins and fix with tacks six bamboo or wooden rods round the periphery of the flanges, making as it were, a hexagonal skeleton bobbin. The advantage of winding yarn on such a bobbin is that the yarn quickly dries and does not stick to each other. The object of passing the yarn through the folds of the rope is that the lumps and other foreign matters are caught by the rope, and the yarn goes to the bobbin in a polished state. It is not advisable to wind too much yarn on the same bobbin. When the yarn is dry it is wound on the ordinary bobbins.

The next process is warping and beaming. For this purpose a creel to contain sufficient number of bobbins, one small reed, and a leasing heck or a few healds are wanted. *I wind the yarn direct from the bobbins on to the beam in sections.* The method of winding the yarn round a drum, and from these on to a beam is very troublesome. I have made locally a kind of sectional beam. It is an ordinary beam with a number of flanges two inches apart. The ends of yarns on the bobbins are first taken through the eyes of the heck or heald to make the lease, and then through the reed and tied to pins fixed for the purpose in each section of the beam. It is absolutely necessary that the number of revolutions of the beam must be equal in winding the sections. A string tied to the beam records the number of revolutions." I have watched Mr. Lahiri's methods and I think his method of section winding is better and more time saving than anything I have seen in this line.

41. As regards improvements in the mechanical process of weaving itself, it is clear that in order to successfully supplant the indigenous pit loom, the new loom must satisfy the following requirements:

The adoption of better loom and their requirements.

- (1) Be able to shew quite a substantial increase in the daily outturn over the outturn of the present pit looms.
- (2) Be cheap and within the means of the ordinary weaver.
- (3) The mechanism must be simple and such as could be repaired by the weaver himself or by the village carpenter.
- (4) The mechanism must be light and adaptable to the physique of the ordinary weaver.
- (5) The mechanism must be such as to enable the weaver to keep perfect control over the different primary actions of weaving. Breakages of the warp must be as few as now, and as easily repairable when they occur.
- (6) It should be also adaptable to different kinds of weaving now practised by the hand-loom weaver. A change of shuttle for changing the weft should be as easy and quick, as is the case now.

42. In order to enable one to judge the merits of their respective mechanisms, Mr. Chatterton has divided all the new looms now in the market according to the manner in which the shuttle has to be passed through the warp. We accordingly have—

Different classes of improved looms.

- (1) The ordinary fly-shuttle hand-loom in which the shuttle is thrown by an arrangement of pickers, and picking strings, instead of being thrown each time by the hand.
- (2) The looms in which the picking motion depends on the movement of the sley, the shuttle being thrown as the sley is jerked back by the hand.
- (3) Looms worked by the feet, the shuttle being thrown by an automatic action communicated by the feet.

The Serampur and Madras patterns of the fly-shuttle loom, adopted from the early English hand-loom of John Kay, are examples of the first class, and have found their way to Bengal and Madras many years ago. In the opinion of Mr. Chatterton and Mr. Churchill, and from the results obtained at the last Madras competition, these are up to now the best hand-loom which can be had in the market for all-round work. Mr. Chatterji told me, as the result of the working of the different looms in the new demonstration schools at Tanda, Muradapore and Saharanpur, he has also formed a similar opinion. In these looms, the major actions of forming the shed, throwing the shuttle, and of the beating up of the weft are separate, the only automatic action is that of the "taking up" of the yarn, which follows the action of the sley. The weaver has thus almost as much control over the different actions of weaving as in the pit-loom. Of course, the great advantage of these looms over the old pit-loom

First class of looms.

lies in the fact that the alternation of hands, both with the shuttle and the feed, which took such a lot of time, is no longer necessary now. One hand pulls the string, while the other is free to beat the weft with the reed. As a result of this simple invention, however, the capacity of the loom has been more than doubled, and while the average number of picks per minute in the old looms was 25, the lowest average picking of the fly-shuttle loom is at least 50. The Madras type in which the warp is more spread out, is perhaps more suited to the weaving of finer counts, whereas the Bengali type is more compact and more suited to hand-loom factories, but there is not much difference. Mr. Churchill holds that the speed of the shuttle actually attained by these looms, is capable of very great development. It is a mistake, according to him, to assume that even 80 or 90 picks per minute in a hand-loom is the limit.

Of the second class are the looms, in which the major actions of weaving are reduced to two, the picking and the beating of the sley being combined into one. Mr. Maxwell's Salvation Army loom, Mr. Churchill's old loom, the Syaji Poor loom, are all types of this class. Mr. Chatterton has condemned the mechanical arrangement of these looms, and both he and Mr. Churchill are one in thinking that the driving mechanism comes into operation too late, and the action is somewhat violent, and conducive to irregularities which cannot fail to damage the warp. At best they can be used with advantage in weaving very coarse fabrics only. It is also pointed out that in these looms, the wider the loom, the more violently must the sley be pushed back to give the shuttle sufficient impetus to cross the warp; whereas it is obvious that the reverse would be desirable. The pattern of the Salvation Army loom which I have seen however appeared to me to be an effective machine, and this loom won the gold medal at the last Calcutta Exhibition in 1907. This loom is also used in the Bara Banki weaving school, but Mr. Chatterji informed me that the results have not been very encouraging, and in the new demonstration schools opened by him, the Serampur looms are being mostly used.

Under the third class, fall the looms in which the major actions are all automatic; being driven by power generated by the feet. The Domestic hand-loom of Messrs. Hattersly Sons, the Domestic hand-loom of Messrs. Raphael Brothers, and the Japanese hand-looms are all examples of this class. The Japanese loom Mr. Chatterton found to be "a crude and ill-designed loom," for when the warp once get broken or entangled the reed does not fall as in the other looms, and it takes a great deal of time before the warp can be put in order again. These looms are really power-looms to be worked by human power, and as the physique of the ordinary weaver is far from being strong, the work of driving the loom is found to be far too heavy for the native weaver. They do not appear to be suited to the requirements of the hand-weaving industry of this country. The English looms of this class, however, ought to do very well for small factories, to be driven by oil engines, if the treadles are done away with, and an arrangement made to drive them off a line of shafting.

A most promising loom of this class is, however, the new loom of Mr. Churchill. It has a new design in which the weaver supplies the power with his feet, while his hands are free to look after the warp, changes the shuttle and all the time the loom is running. A special feature of this loom is that 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 loom reached an average of 104 effective picks per minute, but up to now this loom has worked with comparatively coarse yarn and on narrow reeds. If it is equally successful for finer yarns and on wider cloth, then there is a little doubt that this will be the loom of the future.

43. How far have the new looms been able to satisfy the requirements of a model loom as indicated in paragraph 41? If they have not yet attained the ideal, what are their short-comings? On one point there is almost complete unanimity of opinion, viz., that the outturn of the new fly-shuttle loom is very much greater than that of the old pit-loom, due to the greater speed with which the shuttle can be thrown in the new contrivance. As a result of the competition of the pit-looms and new looms held in Madras, it was demonstrated that, taking the average of different kinds of cloth, there is a great but variable degree of advantage in the use of the fly-shuttle and, roughly, it may be taken as three to one. Perhaps in the hands of the ordinary weaver the advantages may not be so great, but even in their case, Mr. P. Theagaraya Chettiar, who has such a large practical experience of hand-weaving, is sanguine "that they will be able to turn out *cent. per cent.* more work with the fly-shuttle looms than they do with

Advantages and drawbacks of the new looms.

the ordinary country loom. At the least, the increased output can never be less than 75 per cent." The opinion of Mr. P. Theagaraya Chettiar, who owns a most successful hand-loom factory in Madras, may be accepted as conclusive as regards the question of the output. But as pointed out by Mr. Cumming, there are some general complaints against the use of the fly-shuttle, amongst which the increased breakages in the warp due to the greater speed of the shuttle, is the most frequent. Breakages in the warp are the result of bad construction of the loom, bad beaming and sizing of the warp, high speed of the shuttle, and want of correct hygroscopic conditions. But breakages are likely to be greatly reduced when improved methods of sizing and warping are adopted, and it has already been suggested that some warping mills and warping factories should be started to supply the weavers with well-sized warp. Besides, a special advantage of the Madras and Serampur looms is that the breakage of warps has been reduced to a minimum by the introduction of a spring tension for the warp, and by other devices.

44. The objection on the score of the unsuitability of the fly-shuttle loom to special classes of fabrics appears also to be groundless, at least for nearly all the cloths now turned out by hand-looms. Mr. Chatterton on this point observes "The opinion that fine cloths cannot be woven on looms fitted with fly-shuttle has absolutely no foundation, in fact, as where the fly-shuttle looms are designed for working in fine counts, no difficulty has been experienced. The great bulk of the work done in the Salem Weaving Factory is in counts between 60's and 100's, and I should not have the least hesitation in undertaking work in higher counts if the orders are sufficiently large to make it worth while." But it appears that special types of looms have to be used for special kinds of cloth. On this point Mr. P. Chettiar says, "About two years ago I commenced making experiments and my weavers have succeeded in turning out superior cloths with lace borders up to 150's, which are just as good as they are of similar counts made from the ordinary pit-looms. The only cloths for which fly-shuttle looms have been found to be unsuitable so far, are cloth with solid borders and Benaras lace cloths." But during my visit to Salem I saw solid borders being woven by the fly-shuttle, with the help of a dobby hung from the top of the roof. Checks of various kinds are being woven by the fly-shuttle looms in the Rajshahi and Dacca jails. But I think it must be admitted that for very superior kinds of weaving required for the fine Dacca *saris*, it will be a long time before the fly-shuttle looms will be able to take the place of the native pit-looms.

45. Finally, we have the question of cost, and I think there can be little doubt that unless the new looms can be turned out at much cheaper rates than they are at present, there is very little hope of the mass of the poor weavers adopting them in their own cottages. The minimum cost of an ordinary Serampur fly-shuttle hand-loom appears to be Rs. 50, whereas the Madras looms of Mr. Chatterton cost Rs. 70, and the Salvation Army looms are being advertised from Rs. 60 to Rs. 100. As a compromise it has been suggested that the improved sley, with the fly-shuttle mechanism, is really the most important part of the new looms, and as a beginning we might very well adopt this in the old pit-looms. This has actually been done in the enterprising hand-loom factory of P. T. Chettiar of Madras with very satisfactory results, and at the last All-India Weaving Conference the consensus of opinion was in favour of the adoption of this contrivance as a preliminary step, although Mr. Chatterton was opposed to the adoption of such a half measure. As the pit-loom with the fly-shuttle sley did very well in the Madras competition, specially with warps 20's counts, and in Madras handkerchiefs, and as the sley can be attached at the small cost of Rs. 10, I think there can be very little doubt as regards the wisdom of making the introduction of the fly-shuttle sley the first step in any scheme of future progress.

46. Admitting that substantial advantages are to be gained by the adoption of the fly-shuttle looms, the question is how to attain this desired object, and how to train weavers to use this improved mechanism. In this connection it is notorious that almost every District Board of Eastern Bengal has made efforts to introduce the improved looms amongst the indigenous weavers, and in Assam also much has been done in this respect by Government. In paragraphs 10 to 27 of his "Note on measures taken in Eastern Bengal to improve hand-loom weaving" Mr. Hart, the Director of Agriculture, gives a summary of these attempts with their sequelae. In every case the result appears to have been a complete failure. Some District Boards, like Faridpur, engaged expert weavers to demonstrate weaving with a fly-shuttle loom, in others, like Dacca, Mymensingh, Rajshahi, and Malda, temporary weaving



classes were opened, while others, like Chittagong, Noakhali and Tippera, sent weavers to Serampur, and subsequent efforts were made to utilise their services; but in all these cases there were no tangible results. The efforts made in Assam were equally unfruitful. After describing the failure of the official efforts Mr. Hart goes on to say that, "In the first flush of new-born *swadeshi* enthusiasm many men and students of the *bhadralok* class purchased Serampur looms, and commenced working as weavers. Of these they soon grew tired and most of the looms are now lying unused. Some of the *swadeshi* associations also attempted to extend the use of fly-shuttle looms among the local weavers, but their efforts appear to have met with no success." Mr. Cumming has recorded a similar ending of the efforts of the Boards of the Bengal districts. Yet at the same time the fly-shuttle looms appear to have caught on in Madras, and in Bengal the Serampur fly-shuttle looms appear to have made their way to Serampur from Farashdanga about 50 years ago, and have been extended to parts of the Jessore district and Howrah district. But this spread of the fly-shuttle loom in Bengal was due, according to Mr. Cumming, "more to inter-communication among the people themselves than to official efforts to popularize the Serampur fly-shuttle loom." Again, as already noted, this form of the loom has also made its appearance in some weavers' families in Barisal and Faridpur, and seems to have travelled over from Kustia (Kumarkhali) in the Nadia district.

Causes of the failure of recent efforts to popularize fly-shuttle looms.

47. The almost uniform and total failure of the recent official efforts to introduce the fly-shuttle loom must therefore I think be ascribed—

- (1) to the disjointed and spasmodic character of the efforts made;
- (2) to the failure to tackle all the difficulties, specially financial, of the weaving question as a whole;
- (3) to the want of really qualified experts to demonstrate weaving on the new looms;
- (4) and most important of all to the failure to demonstrate the advantages of the new methods not only from a theoretical but from a *commercial* point of view, or, in other words, the attempt to teach the new methods only in schools and not in commercially successful *factories*, as is being done in Madras.

The District Boards were never advised as to the correct kind of loom to get for any particular class of fabrics, and they have no practical experts to work the looms. The enterprise of private gentlemen also suffered from these defects, and in no case that I know of, was the undertaking in the hands of really business men. Patriotic enthusiasm and business capacity are quite two different things. The only person in this province who has succeeded in organising a small hand-loom factory is Mr. R. K. Saraswati of Gauhati, and he is a business man.

48. The following suggestions are therefore made for the improvement of the mechanical processes of the hand-loom industry, and the teaching of the improved methods to the artisans :—

Suggestions for future progress.

- (1) A central weaving school should be opened at Dacca. We have the example of the Government Weaving Factory at Salem in Madras, opened more than two years ago, and of the Demonstration schools recently opened in the Upper Provinces by Mr. Chatterjee. The literature on the subject of the proposed weaving school at Serampur, should also be useful in drawing up a scheme. One of the chief objects of the school should be to experiment with the latest improvements in hand-looms, and the inventions for improving the warping, sizing and the other processes preliminary to weaving. The head of the institution might be an European weaving expert with some knowledge of business, and of the industrial conditions prevailing in India. His first assistant should be an Indian of the type of Mr. Subramania Aiyar, who is in direct charge of the Salem Factory. But experiment, as well as education, should form part of the scheme of the school. We want to train men to take charge of the weaving factories and schools to be opened in other parts. With this object we should have apprentice classes attached to the school. The class of young men wanted is of the apprentice type of the Sibpur College. They need not be necessarily of the weaving caste. If they cannot start weaving factories of their own, after they leave the school, they are sure to find employment in the factories which District Boards and Municipalities are to open, or in those which are likely to be started hereafter by the enterprise of private capitalists. Lessons in *design* and *dyeing* should form a part of the curriculum of the school. A third department of the institution will be a factory, on a fairly

comprehensive scale. The new methods and mechanical inventions recommended by the theoretical branch will be practically tested in the factory, and no "improvement" will be recommended unless it is found to be successful from a commercial point of view.

- (2) At selected centres of the weaving industry, like Pabna, Noakhali, Faridpur, Tangail, Comilla, we should have weaving factories run by District Boards or Municipalities, on purely commercial lines. These factories should engage weavers at fixed wages, teach them the use of the latest machines, and methods, and employ them to turn out fabrics which will have a ready sale. The chief object of these factories will be to demonstrate the commercial superiority of using the latest machinery, and of adopting the most up-to-date methods, patterns, etc. If the factory proves to be a success from a business point of view, and is able to show profits, it is almost certain that both private weavers, and capitalists wishing to start hand-loom factories, will follow the example. It will no longer be necessary to attract students by promise of rewards and stipends, as is the case now.
- (3) A weaving *bureau* composed of one Deputy Collector, a Sub-Deputy Collector, and some non-official gentlemen, if possible connected with the weaving business, ought to be very useful in bringing the Government factories and schools and the outside weavers into close touch with each other. It will also be able to bring to notice the needs and requirements of any particular section of weavers, and help generally to popularise the methods and teachings of the schools and factories. In Assam, where weaving is a home industry practised by women, it might be considered desirable to introduce a "weaving class" in every girls' school in the province.

49. In connection with this part of the subject, *viz.*, the improvement of the technical skill of the weaver, reference should be made to the opinion so emphatically expressed by Mr. Chatterton, that in order to be able to hold his own against the power-

Desirability of introducing hand-loom factories amongst the weavers.

mills, the hand-loom weaver must not only improve his skill as a weaver, but must also acquire some knowledge of business management, *i.e.*, he must not only be a skilful artisan, but also a successful *entrepreneur*. The desirability of hand-loom weavers working jointly in factories, instead of individually in their own homes, was discussed at the last All-India Weaving Conference in Madras, and the advantages of both the systems were urged by different members. The advantage of the factory system is that it secures economy in working, and facilitates the purchase of material and the disposal of products, it being possible to deal with hand-loom factories on a wholesale basis; the factory system also teaches weavers habits of order and regularity, and affords openings for the educated class as managers and overseers. But the greater cost of management in factories, and the loss of work for the other members of the family, and the difficulty of breaking away from old inherited habits, were pointed out as reasons for recommending that factories be started by private capitalists, while the best way in which the weaver could be helped was held to be "by taking work to his home and not by taking him away from his work and home." There can be no question that there is much room for progress both on the lines of the factory system, and the individual system. I visited the well-known hand-loom factory of P. T. Chettiar, where over a hundred looms were at work, and which to my surprise were actually weaving fabrics for export to Europe. As already noted before, the only hand-loom factory which I have seen doing business in this province is that of Mr. Saraswati of Gauhati, who has started with 12 looms, and has introduced brass reeds and English healds, though the looms used are the old pit-looms. But the work is carried on under proper management, and the weavers are paid according to contract, and the result is quite satisfactory. Babu-Akshoy Kumar Moitra also attempted to organise a hand-loom factory for silk weaving at Rajshahi, but it ended in failure. The opening of some model factories by District Boards and Municipalities has already been recommended, and it is greatly to be desired that some enterprising and public-spirited gentlemen or joint-stock companies, like the Assam Valley Trading Company, should start some factories on the lines of the Madras factories.

50. Lastly, we come to the financial side of the problem, and I entirely agree with Mr. Hart, the Director of Agriculture, in holding that the chief difficulty in the way of improving the hand-loom industry of the country is the want of capital and credit amongst the weavers. Their present condition is the result of economic laws which have acted uninterruptedly for a long time, and it would be mistaking the effect for the cause, if we hold that the saocars or mahajans have reduced the weavers to their

Financial difficulties and possibility of making weavers independent of mahajans.

present condition. The fact is that they fell into the clutches of the mahajans because their business was not flourishing, which again was the direct result of the contraction of the demand for their commodities, brought about by competition with machine-made fabrics. The difficulty of reversing or re-arranging by outside influences, the economic relations prevailing between the different factors engaged in an industry, is not a light task. But fortunately at the present moment circumstances are in favour of the hand-loom weaver, and there is a visible increase in the demand for his commodities, and any outside help that might be given to him is sure to bear ample fruit. Advances to weavers for purchasing hand-loom, etc., on the principle of agricultural advances has been recommended both by Messrs. Chatterjee and Cumming. Under the supervision of the 'bureau' I have suggested, such advances should I think be freely made to deserving and selected men to enable them to buy improved looms, etc. It has also been suggested that if public-spirited and enterprising private gentlemen, who are anxious to benefit the industry, would make advances of yarn, etc., to the weavers, and then undertake to sell their cloths at a profit, keeping only a reasonable amount of it for themselves, the weaver's material condition would soon improve, and he would be able gradually to free himself from the clutches of the mahajans. It is to the credit of the *swadeshi* leaders that such efforts were made by many of them : for instance, by Babu Kali Charan Sen of Pabna; and Mr. Cumming reports that he came across a similar case. But such a scheme to be successful presupposes a very large share of unselfish enthusiasm and business capacity, a combination which is very rarely to be met with. The Municipal and District Board factories proposed by me however can easily render such assistance to individual weavers, by including selected and efficient weavers, as member of their organization, although the weaver might work separately on his own loom and in his own home. *The introduction of co-operative credit societies amongst weavers* which has been so successfully tried for the silk weavers of Benares, for the weavers of Sholapur in Bombay, and in parts of Madras, stands out however as the most suitable means for improving the financial condition of the weavers, and of teaching them habits of co-operation, self-reliance and self-help, which in themselves will be valuable assets in bringing success to their occupation. At the last All-India Weaving Conference, Mr. Ram Chandra Rao, Registrar of Co-operative Credit Societies, Madras, was very sanguine about the success and the gradual spread of these institutions, into all the important weaving centres of that presidency. It is sincerely to be hoped, that the Registrar for this province, who fully realizes the importance of the subject (see his note annexed to Mr. Hart's note), will not lose this opportunity of organizing similar societies in this province, wherever there should be an opening. It is very important, however, as pointed out by Mr. P. T. Chettiar, that the Registrar should be supported by a suitable staff, to enable him to tackle the intricate questions involved in the re-organization of the capital of the weaving industry. At least one Deputy Collector should be placed under him for this work alone, and the services of the weaving bureau should also be at his disposal for this purpose.

## 2. SILK.

51. The chief feature of the silk industry in recent years has been the decrease of exports, and the increase of imports. The imports of raw silk were in 1876-77 valued at 45 lakhs, twenty-five years later (1900-01) they were valued at 102 lakhs, there was a temporary depression in 1903-04 and the imports fell to 59 lakhs, and this year, 1907-08, they again rose to 98 lakhs. The import of manufactured silk also shows a remarkable expansion. In 1876-77 they were 58 lakhs, in 1903-04 they rose to 183 lakhs, and in 1907-08 they stood at 182 lakhs. The value of the imports of Japanese silk into Calcutta rose from Rs. 18,000 in 1902-03 to Rs. 42,000 in 1906-07. In 1876-77 the total exports of silk from India were valued at 78 lakhs, in 1900 the value of the exports fell to 51 lakhs, whilst in 1903-04 the total value of the exports was 63 lakhs. Last year's figures also shew contraction of exports of raw silk which decreased in value from 68.65 lakhs in 1906-07 to 63.78 lakhs in 1907-08, and while Bombay appears to be making efforts to improve her position, "Bengal, the home of the Swadeshi movement," shews a decline of 19.3 per cent. in quantity and 17.5 per cent. in value. The exports of manufactured silks have shewn a still more serious decline, in 1886-87 they were valued at 32 lakhs, in 1903-04 they had dwindled down to 8 lakhs only.

One important fact about the industry in export of raw silk is that from 1857, when the utilization of waste silk began in Europe, the exports of India changed their character. The waste and wild silk trade improved, and that in reeled silk declined.

This point is of special importance as regards the possibilities of the Assam silk industry.

As Bengal is the chief producing province in India, Bombay does most of the manufacturing business, and out of the three silk mills driven by steam, two are in Bombay and one in Calcutta. These mills are almost exclusively concerned with the Burmese market. Bombay now receives her supply of raw silk almost exclusively from China.

On the whole, "India's position as a producer of silk," as remarked by Mr. Cotton in this year's report of the trade of India, "is altogether unworthy of her potentialities." Not only is India failing to produce silk goods suitable for the demands of other countries, but she is opening her own markets to a foreign competition that must tell disastrously on the local hand-loom workers.

## SECTION I.

### ASSAM.

52. A note on silk in Assam was written by Mr. Stack in 1884. Mr. Darrah wrote his note on *eri* silk in 1890, and Mr. Allen's monograph on the silk cloths of Assam appeared in 1899.

Literature.

53. Like cotton, silk-weaving is not an industry so much as a part of the occupation of every female in the Assam Valley. The remarks about the nature of the cotton-weaving in Assam apply equally to the silk-weaving industry. Silk fabrics are also woven both for home consumption and for sale. All the higher class females in the Assam Valley still dress themselves very largely in silk, and even the poor women always have one or two silk *mekhals* for special occasions. In the Surma Valley, however, the use of silk is very rare.

Nature of the industry.

54. The following figures give details of the population shewn to be engaged in the industry at the last census of 1901:—

Population dependent on the industry.

| Occupation.  | Total supported by it. | Actual workers. |          |                           |          | Dependents. |
|--|------------------------|-----------------|----------|---------------------------|----------|-------------|
|  |                        | Total.          |          | Partially agriculturists. |          |             |
|  |                        | Males.          | Females. | Males.                    | Females. |             |
| Silk worm reapers and cocoon gatherers.                              | 99                     | 42              | 56       | ...                       | 2        | 21          |
| Silk carders, spinners and weavers, makers of silk braid and thread. | 568                    | 62              | 566      | 2                         | ...      | 140         |
| Sellers of raw silk, silk cloth, braid and thread.                   | 1,857                  | 20              | 297      | 4                         | 2        | 1,540       |
| Silk-dyers ... ..  | 29                     | ...             | 29       | ...                       | ...      | ...         |
| Total ... ..   | 2,553                  | 124             | 728      | 6                         | 4        | 1,701       |

55. "In treating of silks in Assam it is desirable," wrote Mr. Stack, "to make it clear at the outset that from the wild silk worms of Assam nothing whatever is to be expected, as they are destitute of all commercial value, present or prospective. Dismissing the wild worms, therefore, from consideration altogether, we have three kinds of domesticated worms in Assam, or rather, it may be said, in the Brahmaputra Valley, for the Surma Valley is not generally a country of silk cultivation. These are the pat or mulberry worm (*Bombyx tector*); the *muga* or sum feeding worms (*Antheraea Assama*), whose cocoons, like that of the pat, can be reeled, and the castor-oil worm (*Attacus ricini*), yielding a silk which is never reeled but spun by hand. Looking simply to their commercial

The Assam silk worms and their commercial possibilities.

potentialities these three species of silk worm may at once be reduced to two, by striking off the mulberry worm (*pat*), on account alike of the costliness of its silk, the scantiness of the present supply and the difficulty of extending its cultivation. The two remaining species, the *muga* and *eri*, present a much more hopeful field of enterprise. They are produced in considerable quantity already; they are thoroughly adapted to the climatic conditions of Assam (being, indeed, probably indigenous to this part of India), and there is no obvious reason why their cultivation should not be capable of immense development. The *eri* is the more promising of the two, both because it is cheaper and more abundant, and also because being reared entirely in-doors, its cultivation does not entail that troublesome necessity of watching by night and day which is imposed upon the *muga* breeder during the period that his worms are on the trees. The *muga*, indeed, yields the finer silk, but as it is only in the roughest shape that Assam silk can hope to become an article of demand in the English market, the difference of quality will perhaps prove to be a matter of secondary importance. The manufacture of silk plushes, and similar fabrics out of waste cocoons imported from India or China, is a flourishing branch of the silk industry in England, and although China has hitherto been the principal source of supply, there is no reason why Assam should not contribute large quantities of an article which is produced with so much ease in the Valley of the Brahmaputra."

56. Chiefly with the object of capturing some portion of the growing demand in England for rough silk, various experiments have been made in different parts of Assam since 1834, to grow *muga* and *eri* silk, chiefly the latter, on a large scale; but unfortunately all these experiments have hitherto met with very scanty success. These experiments have been fully described by Messrs. Darrah (pages 83-96 of his notes) and Allen (page 2, monograph). In all the cases failure was due either to the spread of disease amongst the worms, or the destruction of castor plants by caterpillars. Mr. Darrah made the following observations on the failure of these experiments:—

"Personally, I am still of the opinion I have held for some years that *eri* silk has great potentialities, and though every one of the attempts has failed to prove that its culture can be conducted on a commercial scale, I believe that the time will come when much capital will be embarked in it, and when it will form one of the most important staples of Assam. The climate is an ideal one for the growth of silk. The food of the worm is almost a weed in many parts of the province, and actually a weed in others. The worm is exceedingly prolific and the labour required for rearing it is such as can be given by the decrepit and infirm members of the community. This sort of labour exactly suits the Assamese, to whom even the light work of a tea garden is repugnant. The produce required needs no skill in the handling; reeler are not wanted; nothing but the empty shell from which the chrysalis has been extracted or the moth has escaped is asked for in England, and for this commodity the demand far exceeds the supply. It is difficult to imagine a combination of circumstances which promise fairer for the commercial success of any commodity."

Mr. Allen also remarks:—

"It would be unreasonable, however, to attach too much importance to the failure that has hitherto attended all attempts made by Europeans to cultivate the silk worm. It is inevitable that the pioneers of any industry should make mistakes, and when the subject matter is a delicate insect, these mistakes are likely to have disastrous effects, but further experiments are sure to disclose some means of overcoming the difficulties that have hitherto led to failure."

Mr. Campbell, who was in charge of one of the most extensive experiments, remarked:—

"I would like to add, as my final conclusions, based on the result of rather extensive experiments that the only way of developing the industry and embarking a large capital in it in Assam, is to work it on a system somewhat analogous to indigo advances, and getting the villagers over large tracts of country to undertake the cultivation in small patches, so as to avoid the fearful results of epidemics. The great point to be avoided is the cultivation of too many worms in one place, as in case of epidemic breaking out nothing will save them."

In my humble opinion, however, the real cause of failure in all these cases was the absence of expert knowledge in sericulture, to conduct the operations on scientific principles. The outbreak of disease amongst silk worm is not peculiar to Assam. By scientific culture of the worm, dangers from disease have been greatly reduced in Bengal and elsewhere, and there is no reason why scientific sericulture should not prove equally successful in Assam. The Imperial Entomologist, Mr. Maxwell Lefroy, has also now shown how to control the insect-pests which devastated large plantations of castor, made in past years, for the purpose of silk-worm rearing. (See his "Bulletin on castor semi-looper"). A further experiment under a Government expert can therefore be very strongly recommended. The successful experiments that are being made in the Shillong Government farm since 1904, with the rearing of the European univoltine silk-worm ought to serve as an example.

Further experiments recommended. Experiments in Shillong. A point of special interest in connection with the last experiment is, that last year locally raised seed was used for the first time with the very best result, unlike in Kashmere where similar experiments with local seed are reported to have completely failed. The cocoons raised from the local seed have turned out to be as large and fine as those obtained from seed newly imported from France. This most important experiment is full of promise for the future of the silk industry of Assam.

57. In 1890 Mr. Allen wrote :—

“ In spite of the efforts made by Government and by private individuals, the trade in eri cloths still continues to be in a very languishing condition. And it is seldom that one sees anything but very inferior silk cloth exposed for sale. The decrease of the cultivation of the silk-worm amongst the Assamese is a discouraging sign. Silk is still produced and worn in very large quantities, but it is being ousted by imported cotton goods, which are cheaper and easier to get, for in spite of the high price at present obtainable for silk thread, the villagers find that it pays them better to grow produce for the market than to rear broods of silk-worms.”

From enquiries made at some of the most important centres of the silk industry in Assam, specially at Kamrup, I was informed that a reaction has set in in favour of the silk industry of Assam, and since the last four or five years there has been an increase both of local consumption and of export from the province. But unfortunately a slight decline is again noticeable, and most of the exporting shops in Kamrup and Calcutta are reported to hold stock, which they cannot dispose of. There are no reliable figures available to shew the recent growth of the silk industry of Assam. In 1882-83 the total value of silk exported, both raw and in the piece, amounted to Rs. 2,04,930, but in 1897-98 the value had risen to Rs. 3,66,310. The trade report of the province for 1906-07 shews that altogether 643 maunds of raw silk were exported from the Assam Valley, but the report does not show that there was any export of silk piecegoods from Assam. I am informed, however, that piecegoods valued at 2 lakhs of rupees, at least, were exported from Lower Assam, and probably another lakh from Upper Assam.

58. The nature of the *endi* silk-worm, its hatching and nurture and its duration of cycle have been described by Mr. Stack. It is cultivated to a great or less extent in every district of the province. Mr. Stack noted that “ being regarded as of doubtful purity, it is left principally to Rabhas, Mechas, Kacharis, Mikirs, Kukis, and other non-Hindu tribes.” In his time a trade in cocoons to the extent of 400 to 500 cwt. yearly had sprung up between Goalpara and Calcutta. The best *endi* fabrics now come from Nalbari, Mangaldai, Tumbulpur and Panchnivaskat and Rangia in North Kamrup, and Palashbari in South Kamrup. Over 80 per cent. of the *endi* cloth is exported for use outside Assam, and only about 20 per cent. is consumed locally. I am informed that about two or three years ago *endi* fabrics found a market in Australia, and consequently the trade in *endi* was very brisk for two or three years. But recently it appears heavy import duties have been imposed on the Assam cloth, and therefore its sale in Australia has practically ceased. I have not been able to verify the accuracy of the above statement. The chief stuffs manufactured out of *endi* are *chaddars* and *thans*. The coarse ones, which sell from Rs. 6 to Rs. 12 per *than*, are mostly bought by the hill people, and are sold in the local hats, the Palashbari hat being one of the most important centres of this trade. The better qualities of *thans* are exported to Calcutta, chiefly by wholesale Marwari dealers. Messrs. Saraswati & Co. and some other shopkeepers do also some business in these cloths in Gauhati. A detailed account of the different *endi* fabrics is given in Mr. Allen's monograph. *Endi mekhalas* for Assamese women are also woven, but in very limited quantities. The *endi thans* are used for making suits by both Europeans and well-to-do Indians, and have got a fair amount of sale in Calcutta. But they are comparatively highly priced and a *than* of 6 or 7 yards, with a width of 54 to 56 inches, of good quality, cannot be had for less than 25 rupees. The so-called Benares *endi* of the same quality sells for Rs. 16 to Rs. 18. Thus cheaper silk fabrics from other parts of India, and imported fabrics from foreign countries, are successfully competing with Assam silk, and unless some means are discovered for either improving the quality of the stuff or cheapening its price, the Benares *endi*, the Bhagalpur *bafta* and Bishnupur *garvashuti*, and similar cheaper fabrics will in no distant time succeed in driving Assam silk completely out of the market.

I was rather surprised to find poor Assamese women buying silk cocoons in the Palashbari market from Kyan mahajans, who import large quantities of it from North Assam. Every weaver it appears is not a producer of cocoons. A seer of good selected cocoons was selling at Rs. 2-4, and of unselected ones at Rs. 2. It is said that six spinners can spin about 4 chataks of thread in a day, consuming about 1,200 to 1,500 cocoons. A seer of cocoons will yield about 3 quarters of a seer of thread. The value of the thread varies from Rs. 4 to Rs. 7 per seer, but *endi* thread for sale is hardly obtainable in the market. The spinners are also always weavers, and the wages of spinners cannot be separately determined.

59. I have seen the Assam way of spinning *endi*. It is most primitive and labour-consuming. Mr. Stack has remarked that the *endi* cocoon has been successfully reeled in Italy, and experiments have shewn that it could be reeled in India. Mr. Allen doubts the accuracy of this

statement. There can be no question, however, that if *endi* cocoons could be reeled, there will be a great saving of time and the produce could be sold much cheaper. As regards the manufacture of the *endi* cloth, I was told that the best way of improving the quality of the fabric is by introducing drill-weaving, so that the cloth will be more substantial and be better suited for suitings, etc. Some of the Barpetta weavers have adopted this kind of weaving and the firm of Saraswati & Co. get drill *endi* specially woven for them. It has also been suggested that if any other fabrics, such as jute, or rough cotton, could be mixed with *endi*, the fabrics turned out would have a stiffer texture than the present *endi* has, and it will be possible not only to sell the *thans* cheaper but they are likely to be more popular with the public. For the coarser kinds of *endi*, better and more attractive dyeing is likely to increase their sale, chiefly amongst the hill tribesmen. The purple dyed *eri*, called Khasi *eri*, but woven and dyed in the plains, has now a large sale in the Khasi Hills.

60. From an industrial point of view *muga* is not so important as *endi*, though the silk is much superior in quality, and can be reeled like other kinds of Indian silk. The feeding of the worms, the number of its broods, the treatment of cocoons for breeding, the cycle of the insect have all been described by Mr. Stack. *Muga.* Sibsagar is the great *muga*-growing district of the Assam Valley, next to that the south-western portion of the Mangaldai subdivision. In the western and central parts of Kamrup district, a good deal of *muga* is also cultivated. The worm seems to be unknown in Sylhet and Cachar, while the hill districts do not produce the trees on which it feeds. At the present time there is a visible decline in the rearing of the *muga* worm throughout the province. The superior varieties of *muga*, known as *mezankari*, reared on the *mezankari* tree (*Tetranthera polyantha*), and *chapa* fed on the champa tree (*Magnolia Griffithii*) are now practically unknown.

As regards *muga* and *pat* fabrics, there is much greater local demand for the manufactured article than is the case with *endi* cloth. I am told about 80 per cent. of the *muga* and *pat* fabrics woven are consumed in Assam, and only about 20 per cent. is exported. A fair amount of *muga* thread is also exported to Dacca, Calcutta and other places to be used for ornamenting cotton fabrics, and also for export to the Persian Gulf.

*Muga thans* are used for making suits, but they are mostly used for making *rhas* and *mekhalis* of the Assamese ladies. A list of the *muga* fabrics woven in Assam is given in Mr. Allen's report. Sualkusi in Kamrup and Jorhat in Sibhsagar are the most important centres of the *muga*-weaving industry.

The price of *muga* cocoons was Rs. 2 per thousand in Mr. Stack's time, and Rs. 2 per seer of waste cocoons (3,000 cocoons). When I visited the Palashbari *hat* they were selling *muga* cocoons at the rate of Re. 1 per 200 or Rs. 5 per thousand, but the present year was a bad year for *muga*.

I have watched the method of reeling *muga* silk by the Assamese, but found the reeling not so efficient as the reeling at Malda, and I think some improvement in the reeling of *muga* and *pat* could be effected, if the Malda method is adopted.

61. The cultivation of *pat* (which is white and finer than even *muga*) has been practically given up in Assam, and the fabrics which are supposed to be manufactured from *pat*, now consume almost entirely foreign yarn imported chiefly from China. The decay of the *pat* industry is reported to be due to the fact that the Jugis or Katnis who used to be the only caste engaged in the industry are giving it up, because they wish to rise in the social scale by giving up what is considered a degrading profession. But I am of opinion that the real cause of the decadence of the industry is due to the import of cheaper silk thread from Bengal, China and other foreign countries. Like *muga*-weaving, Sualkusi and Jorhat are the principal centres of *pat*-weaving. All the best silk fabrics for the use of the richer Assamese families are made of *pat*. At Sualkusi I found the weavers were acquainted with a process of bleaching the yarn by *khar* washing. In very rare cases, the yarn is locally dyed with lac dye, but imported dyed silk yarn is almost universally used. The special feature of the *pat*-weaving is that almost all the ornamental work on silk is done on *pat* fabrics, the ornamentation is mostly with *muga* and gold thread. The ornamental designs are woven and not knitted. The ladies of the richer families are best weavers of ornamental work. I saw some fine samples of ornamental work on *pat* silk in the possession of Srijut Krishna Kumar Barua, brother of the late Rai Bahadur Jaggannath Barua, and Tahsildar Srijut Bishnu Ram Barua, of Jorhat. They were all woven by the ladies of the family. I was also shewn three different kinds of patterns used for doing

ornamental work, *viz.*, of patterns worked on coconut bark by thin bamboo slips, secondly, by thread on *kusha* grass, and, lastly, by wool on cloth of net. These patterns clearly mark the three stages reached by the art.

As in the case of *endi*, the *pat* and *muga* fabrics are in danger of being ousted by cheaper silk fabrics from Benares, Murshidabad and other places. For instance, a Benares *than*, 14 × 3 cubits, costs Rs. 32; the same *than* of Assam *pat* will cost about Rs. 60. The Benares embroidered silk *saris* are both prettier and cheaper than the Assam embroidered fabrics. The patterns are also more artistic. Messrs. Saraswati and Company have designed a special kind of *sari* which they call the Saraswati *sari*. But these are priced at Rs. 100. Better weaving, improvement in design, and cheapening of the goods are very urgently needed in the case of the *muga* and *pat* fabrics also.

62. The mass of the silk weavers in Assam are in a very depressed condition. Quite 80 per cent. of them are in the hands of the Kyan mahajans, who advance to them cocoons, and pay them sometimes in cocoons, as the wages of their labour. For instance, if an *endi than* can be woven from 2½ seers of cocoons, about 5 seers are advanced, and the weaver, after he has woven the stuff, keeps 2½ seers of the cocoons as his wages. Now it generally takes a family about six months to spin the thread and do the weaving of a *than*, and for all his labour of spinning and weaving, done by himself and his family; he only gets 2½ seers of *endi* cocoons, or about 5 or 6 rupees. But of course in the above case weaving does not occupy the sole time of the weaver's family. But even if he devoted much more time to the work than he does now, I am told he could not finish the spinning and weaving in less than three months. The average earnings of a weaver for ordinary *endi* cloth is about 1½ to 2 annas a day; but for special kinds of weaving the wages earned are higher and go up to 4 to 6 annas a day. There are some weavers, specially in flourishing centres like Sualkusi, where the weavers are independent of mahajans, and buy their own cocoons and are thus able to sell their cloths at a much greater profit; the average earning of weavers of this class at Sualkusi is from 3 to 4 annas a day. In such cases either the weaver himself goes to the *hats* or to the mahajans, or sells it to a byapari or middleman, who for a small profit takes it to the *hats* or to the mahajans. But almost the entire export business in both raw silk and piecegoods, is in the hands of a few Marwaris, who have no interest either in the welfare of the weavers, or in the introduction of any improvements in the weaving industry. All that they care for is to keep as much of the profits of the business to themselves, and to pay as little to the weavers as possible. The depression of the silk-weaving industry in Assam is very greatly due to the want of capital and credit amongst the weavers.

63. There are much greater possibilities for the development of the silk industry of Assam, both in raw silk and silk piecegoods, than is the case with cotton. It has already been noted that there is a special demand for waste cocoons in England. It might be worthwhile to find out if plush and other materials, for which waste cocoons are wanted in England, cannot be locally manufactured. There is a great demand for such articles in Calcutta.

- (i) It is of very great importance, therefore, to start a Government silk-rearing farm at a convenient centre, near Gauhati. Here experiments on a large scale should be tried in the cultivation of *endi* cocoons and mulberry silk. There should be a factory attached to the farm. The castor-oil plantation necessary for the feeding of the worm, should also be utilized for the extraction of castor-oil by steam machinery.
- (ii) The cultivation of cocoons of the European univoltine silk worm, so successfully reared in Shillong should be extended, by having a branch sericultural farm at a suitable place in the Khasi Hills. I am informed that a European firm would start operations in Khasi Hills, if given a monopoly as in Manipur.
- (iii) An attempt should be made at the proposed factory to introduce fly-shuttle looms for weaving silk fabrics (see Bengal). Small experiments at Jorhat Subdivision with S. A. looms appear to have succeeded.
- (iv) An attempt should be made to produce a mixture of *endi* with cotton or jute for the manufacture of a suitable material for suitings, like the *basta* of Bhagalpur.
- (v) Weavers should be employed and taught new forms of weaving, *e.g.*, the drill-weaving. Novelties in checks and coloured pieces should be made a speciality.



- (vi) A department for designs and for the introduction of better kinds of embroidery should be established.
- (vii) So also a department for dyeing silk locally with indigenous and aniline dyes.

See also the suggestions in the section on Bengal silk.

## SECTION II.

### .. BENGAL.

64. Mr. N. G. Mukerji's monograph on the silk fabrics of Bengal, which appeared in 1903, gives much valuable information on the subject. The recent report of the Silk Committee appointed by the Bengal Government also contains useful suggestions.

65. Amongst the transferred districts in East Bengal, Rajshahi and Maldah are important centres of the silk industry. There is some silk in Bogra also. Some coarse *endi* is manufactured on a very small scale for home consumption in Dinajpur and Rangpur.

66. There are two distinct branches of the industry. The first consists in the production of raw silk (yarn) for export to Europe and to other parts of India; and the second in the weaving of silk fabrics for consumption in India. There is as much industry done in exporting raw silk as in the manufacture of silk products. The export of raw silk to Europe is in the hands of three or four European firms, who reel silk under what is known as the "filature system." The manufacture of silk fabrics is however entirely in the hands of the natives of the country, and all the weaving is done by hand-loom, there being no power-loom factory for weaving silk in the province.

67. The silk industry gives occupation to the following classes of industrial groups :—

- (1) Mulberry-growers.
- (2) Cocoon-rearers.
- (3) Carders and spinners.
- (4) Weavers.

Inclusive of the men employed in the filatures there was an increase of 12 per cent. in Bengal in the population supported by this industry, for the decade ending in 1891, as will be seen from the following table :—

| Occupation. | Population supported in 1901. | Population supported in 1893. | Percentage of variation. |
|-------------|-------------------------------|-------------------------------|--------------------------|
| 1           | 2                             | 3                             | 4                        |
| Silk ... .. | 142,417                       | 126,853                       | 12                       |

In the districts of Malda, Rajshahi and Bogra the population supported by this industry (workers of partially agriculturists and dependents) amounts to 85,000 souls.

### SUB-SECTION I.

#### PRODUCTION OF RAW SILK.

68. The area under mulberry for this province may be estimated as follows :—

|                 | Acres. |     |     |     |     |        |
|-----------------|--------|-----|-----|-----|-----|--------|
| Maldah ... ..   | ...    | ... | ... | ... | ... | 23,000 |
| Rajshahi ... .. | ...    | ... | ... | ... | ... | 800    |
| Bogra ... ..    | ...    | ... | ... | ... | ... | 130    |

Most mulberry-growers are also cocoon-rearers, but quite a fair amount of mulberry is also grown by people, sometimes of high caste, who do not rear cocoons. When a cocoon-rearer grows his own cocoons, it costs him about 4 annas a maund of leaves, but if he has to buy it, he pays something like 4 to 5 rupees for a maund. The mulberry-growers are reported to make a net profit of Rs. 50 per bigha. Owing to the falling off in the silk-rearing industry throughout Bengal, except in Malda, there has been a general decline in the condition of the mulberry-growers. In Bogra large areas of mulberry fields are lying fallow, and in Rajshahi jute is being grown in these fields.

69. The silk of Bengal is almost entirely produced by mulberry-feeding worms, of which there are three principal and two minor varieties, *vis*: (i) the Nistari or Purani (*Bombyx croesi*), (ii) Chota Palu or Desi (*Bombyx fortunatus*), (iii) the Barapalu (*Bombyx textor*), (iv) China Palu (*Bombyx surensis*) and (v) Bula Palu. The following figures shew the produce of raw silk in Eastern Bengal:—

|          |     |     |     |     |     | Maunds. |
|----------|-----|-----|-----|-----|-----|---------|
| Malda    | ... | ... | ... | ... | ... | 80,000  |
| Rajshahi | ... | ... | ... | ... | ... | 15,000  |
| Bogra    | ... | ... | ... | ... | ... | 1,000   |
|          |     |     |     |     |     | 96,000  |

The habits of these worms, and the method of rearing them, and the quality and quantity of silk obtainable from these cocoons, have been described in detail in Chapter III of Mr. Mukherji's monograph.

70. In Mr. Mukherji's monograph, and in the report of the Commission appointed by the Bengal Government in 1906, an account is to be found of the growth and vicissitudes of the silk-rearing industry in Bengal, from the middle of the eighteenth century downwards. The efforts of Wilder and Pouchon which ended about 1770, in the introduction of the method of Italian winding, is an important land-mark, and gave a great impetus to the industry; and as a result other silks, except China and Italian, were driven from the London market. The industry flourished from 1776 to 1805. In 1811 there was a check, and the East India Company who still had a monopoly of the industry, took special measures to improve the industry. In 1835 the East India Company gave up the direct control of the industry, but nothing was done by Government till 1882, when the Government of India took up the question of (1) the extension of the mulberry cultivation, (2) and distribution of silk eggs. But no definite results were achieved. In 1888, Mr. N. G. Mukherji was deputed to make a special study of sericulture in France and Italy, and as a result of the experimental work done by him, several nurseries for the rearing of pure seed were established in different silk districts. In 1896 the Bengal Government made a special grant of Rs. 3,000 for sericulture, and two more nurseries were opened at Rajshahi. In 1898, the Bengal

Progress of silk-rearing in Malda. Silk Committee was formed, and received a subsidy from Government. One of the chief objects of the Committee was the appointment of an experienced Superintendent to reside in the Upper 'Joars' in Malda, where were the best cocoons and the best rearers in Bengal, and teach the rearers to work under Pasteur's system in their own houses. The efforts of the Committee and their Superintendent, Mr. A. K. Ghose, met with great success in Malda. The cultivation of mulberry cocoon-rearing grew rapidly, many rearing-houses were established, the use of the microscope was popularized, and it appears that 38 microscopes were sold to rearers in the district. Out of the total estimated produce of 93,000 maunds from Eastern Bengal, Malda alone supplies 80,000 maunds. It might be noted in passing that the rearers of Malda get most of their seeds from Birbhum. Mr. Beatson Bell has observed "that it is probably an advantage to bring seed from a distance." The agricultural department might consider this point.

71. The seed cocoons sell dearer than the cocoons used for yarn. Each *kahan* of seed cocoon sells for Rs. 2, whereas for yarn it is generally sold at Re. 1. The Malda cocoons are considered to be fairly good specimens of Bengal cocoons, and generally fetch from Rs. 30 to Rs. 40 a maund.

72. While silk-rearing shows signs of improvement in Malda, in Rajshahi, Bogra, and in fact all other parts of Bengal, there has been a marked decline. Last year a Committee was appointed by the Bengal Government to specially report on the causes of the decline. The Committee reported that "there is abundant evidence of serious decline, of the decrease of production of raw silk and of the abandonment of their long-established profession by a large proportion of cocoon-rearers."

73. There are two methods of reeling silk, *vis.*, by the European method in filatures and, secondly, by the native method in *ghais*.

The filature system has been described in Mr. Mukerji's monograph (pages 34-35). The Navi pattern of reeling was successfully introduced in 1770 by Messrs. Weir and Robinson. It has been ascertained that although the present method followed in the European filatures in Bengal is about a hundred years old, yet the Bengal method is as good as the method followed

either in Kashmere or Mysore, and the decline in the industry is not due to any defects in the system of reeling followed. The special feature of the filature system appears to lie in the fact that silk is reeled to even weights. Another speciality is that the boiling and heating of water is done in filatures from a central boiler with steam, and not by fire kept under each basin, as is done in the native *ghais*. The filatures at work in Bengal are mostly owned by the Bengal Silk Company, and the firm of Messrs. Louis, Payen & Co. A few smaller filatures are, however, also owned by the native merchants, and a portion of their produce is bought up by the European firms under a contract system.

74. In Rajshahi in 1898 the Bengal Silk Company owned 10 filatures, whose outturn was 98,732 lbs.

Louis, Payen & Co. had three factories, whose outturn was 45,120 lbs.

The following table gives the figures for the manufacture of reeled silk in Rajshahi for the last three years:—

| 1904-05. | 1905-06. | 1906-07. |
|----------|----------|----------|
| lbs.     | lbs.     | lbs.     |
| 97,214   | 20,591   | 31,421   |

It will be seen that in 1905-06 the silk trade greatly declined, and although the prospects were slightly better in 1906-07, yet the outturn was nearly only  $\frac{1}{3}$ rd of the produce in 1904-05. The signal decrease in 1905-06 was attributed to (1) loss of worms from muscardine and other diseases which were said to be on the increase; (2) the scantiness of the supply of healthy seed to the rearers; (3) to unfavourable climatic conditions.

In Malda there are two European factories, one at Bholahat, belonging to Messrs. Louis, Payen & Co., and the other at Baragharia, of the Bengal Silk Company. The two factories give employment to 509 factory operatives. The outturn of reeled silk of these two factories is given below:—

|               | 1904-05.                      | 1905-06.                        | 1906-07.                        |
|---------------|-------------------------------|---------------------------------|---------------------------------|
| Bholahat ...  | { 11,115 lbs.<br>(Rs. 91,694) | { 24,080 lbs.<br>(Rs. 1,97,197) | { 20,018 lbs.<br>(Rs. 1,85,742) |
| Baragharia .. | { 7,148 lbs.<br>(Rs. 62,060)  | { 9,204 lbs.<br>(Rs. 77,783)    | { 10,558 lbs.<br>(Rs. 94,233)   |

The production of raw cocoons and the manufacture of silk yarn thus appear to be a growing industry in Malda.

75. Silk yarn spun by native method of reeling is known as Khamru silk. Pierced and waste silk spun by the native method is known as the Matka silk. According to Mr. Mukherji, a little more than half the quantity of green cocoons reared in Bengal is spun by the native method. The method of spinning in *ghais* has been described in detail in the monograph.

In Malda there are regular filatures consisting of 40 or 50 *ghais*, the total number of *ghais* in the district is estimated to be 1,500. In some of these six skeins of silk are turned out, at a time, on each reel, while in others four, and in others two as in European filatures. The thread spun according to the native system, is not so uniform or so fine as in the filature system, and the Khamru silk is more difficult to unwind than filature silk. But Mr. Mukherji holds that, on the whole, it is less expensive to reel silk according to the native method than according to the filature system, because the yield of Khamru silk is larger, while the establishment charges of European factories are much greater.

Thus the manufacture of Khamru silk proves more profitable to the native reeler than that of the filature silk, notwithstanding the higher price which is, or ought to be, obtained for the latter. From a maund of green cocoons  $2\frac{1}{2}$  to  $3\frac{1}{2}$  seers of Khamru silk is obtained, the outturn of filature-reeled silk being about half a seer less in either case. On an average, when a reeler is engaged on monthly pay he gets from Rs. 6 to Rs. 10 a month, and a winder from Rs. 4 to Rs. 6. In filatures the scale of pay is less, being Rs. 5 to Rs. 7 for spinners, and Rs. 3 to Rs. 4 for winders, but the latter generally receive money in advance, and has smaller hours of work than his fellow-workers in native *ghais*.

76. "The Khamru silk-spinning industry of Bengal has continued to do well for some years past, and the demand for Khamru silk in the silk districts, specially Malda, Rajshahi and Birbhum, has gone on increasing." So wrote Mr. Mukherji in 1903. But this may be true now for Malda, but there has been a sad decline in this business at Rajshahi. There are only two firms in Rajshahi who now deal in Khamru, one a Muhammadan and the second a Marwari firm. I visited these firms, and they both complained that the business has dwindled down to nearly  $\frac{1}{3}$ th of its old volume.

In Malda, Khamru-reeling prevails in all the Joars, chiefly in villages close to English Bazar, and in English Bazar and old Malla; and about 2,000 maunds of Khamru silk is produced. The Khamru silk of Malda is highly prized by native weavers, specially for the weft, the weft (*bharna*) silk of Malda usually selling at Rs. 12 to Rs. 16 per seer, which is a rupee per seer higher than the *tana* or warp silk. Berhampore weavers are said to prefer Malda Khamru to that reeled in their own district. But more than half of the silk produced in Bengal is bought up by dealers from Benares, Nagpur, Karachi, Mysore, Solapur and other parts of India.

In Bogra "there are only about a dozen skilful labourers who can reel silk. Most of them belong to the village Barbakpur, also called Barapur, near Nowdapura, where there was once a silk factory." These reelers are all Muhammadans.

77. The outstanding features of this part of the industry are—

Outstanding features.

- (1) Eastern Bengal is lucky in possessing the only district in the whole of Bengal, where the industry of silk cocoon-rearing is still in a flourishing condition.
- (2) Rajshahi and Bogra share the decadence prevailing in the rest of Bengal.

78. Suggestions for the improvement of this department of the industry are under the consideration of Government. The Committee appointed by the Bengal Government submitted various proposals.

Suggestions for improvement.

Mr. Hart, Director of Agriculture, has submitted an exhaustive report to Government on this subject last year. He observed—

(1) The conclusion of the Special Silk Committee appointed last year, that the decline in the industry is chiefly due to disease in the worms, and that the greatest loss is caused by pebrine, must be accepted as correct.

(2) That if worms free from disease can be obtained, silk-rearing is more profitable than any other form of cultivation even more profitable than jute in 1906. This is the universal testimony of all the silk-rearers I have met.

(3) That by the Pasteur system of microscopic selection of seed, as practised in the Bengal Silk Committee's nurseries, pebrine can be eradicated. The evidence recorded by the Special Committee leaves no doubt on that point, and my own enquiries have confirmed their finding.

(4) That an adequate supply of pure seed cocoons would alone cause a very great improvement in the industry.

(5) That properly constructed rearing-houses and the adoption of certain precautions against the silk-worm-fly muscardine, grasserie and flachrie are only second in importance to the necessity of pure seed.

(6) That the Government should vigorously attack the silk question on tried and proved lines, by establishing at first eight nurseries (three of these, including the Rajshahi school Nursery, already exist) and increasing the number till it is found adequate to supply the seed required by all the rearers of this province. (Mr. Hart now thinks that a central depôt would be more profitable, and steps are being taken to start a large seed depôt and nursery near Sara.)

(7) That the building of silk-rearing house on approved lines be declared to be an "improvement" under the Land Improvement Loans Act, and that a fairly large sum, say, Rs. 10,000, be placed at the disposal of the Director of Agriculture to distribute as loans for improvement of this kind.

(8) That for the control of all sericultural operations, including loans a Sericultural Superintendent of this Province be appointed and that he be assisted by three district overseers.

I entirely agree with the above observations.

## SUB-SECTION II.

### WEAVING OF SILK.

79. In Bogra there are only about a dozen silk-weavers properly so called. Bogra silk has only a local demand and is not sufficient to keep even these few weavers fully occupied. The kinds of silk fabrics manufactured in Bogra are very limited. The Tantils weave mostly *dhutis* and *chuddars*. The other kinds of fabrics are handkerchiefs, *thans* or pieces for making coats, *chapkans*, etc., and *alwans*. One Baulchander Basak is the best known weaver in Bogra, and received a medal at the last Exhibition.

Centres of the industry and fabrics woven.  
Bogra.

In Rajshahi, silk-weaving proper is hardly ever done. This district, however, is famous for its *matka* weaving. There are about 30 families of weavers at Dakra who produce the well-known *Mirgunge* or *Dakra matka*. Khamru silk is occasionally mixed with *matka* thread for turning out *matkas* of superior quality specially ordered. *Matka* pieces (*thans*) are well suited for making durable cloths. *Matka dhutis* and *saris* made in Rajshahi are also in requisition, chiefly in the Calcutta market.

In Malda silk *saris*, *dhutis*, handkerchiefs, sheets and pieces of coating are manufactured. Fine silk *saris* and *dhutis*, 15 feet by 44 to 46 inches, sell at from Rs. 10 to Rs. 15 per piece; and silk *thans* for coating sell at Rs. 20 to Rs. 25 per piece of 10 yards, the width being 44 inches. Silk sheets used as wrappers in winter, six to seven cubits in length, and 2 $\frac{3}{4}$  to 3 cubits in width, sell at Rs. 25 to Rs. 28 per pair. Besides these *urans* or *chuddars* used in summer, made of fine threads, length 6 cubits and width 3 cubits, are also manufactured, the price per piece being Rs. 5 to Rs. 7. It might be noted that in Malda itself there is as much sale of Malda fabrics as of Murshidabad and Mirzapur silk.

In Malda, there are two important centres, one at Shahpur close to English Bazar, and the other at Shibganj. At Shibganj there are nearly 140 families of silk-weavers with 180 looms, of whom nearly 50 families weave *matka* or coarse fabrics and the rest *garad* or pure silk. Some parts of the loom used and the shuttle are imported from Birbhum; a complete loom costs nearly 12 rupees. There appears to be some division of labour among the Shibganj silk-weavers. The selection of yarn, its spinning, laying the warp, and the actual weaving being done by different classes of people. Most of the weavers of Shibganj are exclusively employed in this industry, very few have recourse to agriculture in addition. It is reported that the manufacture of silk fabrics has received an impetus from the *swadeshi* movement, but what the exact increase in the trade has been, cannot be definitely ascertained. The total value of the fabrics manufactured at Shibganj is estimated at about a lakh and a half of rupees, including 5,000 rupees of *matka*. No ornamental work is done except in weaving borders of the *saris*. The *saris* are sometimes dyed locally in violet, yellow and red colour, but the colours are fugitive. The yarn is dyed either at Fulbari and Shahpur near English Bazar, or Khagra in Murshidabad. The *matkas* are sent to Murshidabad plain, are coloured there, and then sent to Madras and Bombay. At Shahpur there are nearly 200 families. Here Gultishi, Bulbulchasam, and other patterns of Malda silk cloth are woven, the weft being of cotton, while the warp is silk. There are about seven families who can dye the yarn locally, and clothes valued at about half a lakh of rupees are annually exported to Bombay, Ahmedabad and Nepal. Uda, Gultishi and Bulbulchasam are sold locally from Rs. 3-8 to Rs. 8 per *than*, Kadamfuli from Rs. 12 to Rs. 16.

The Malda fabrics come into competition chiefly with the Murshidabad *saris* and *chuddars*. The yarn used by the Murshidabad weavers is reported to have more twist than the yarn used by the Malda weavers, and there is a difference of between 5 to 8 tolas in the weight of a good Murshidabad *sari* over one manufactured at Malda. Better weaving, and the introduction of ornamental weaving with the help of what is known as the "Naksha" looms of Murshidabad, would appear to be the proper lines of progress in the Malda silk industry. I was informed that one Baishnab Charan Kolté, son of Gour Charan Kolté, was a very promising young weaver, and could weave almost all the ornamental fabrics designed by the famous Mirtyunjoy of Murshidabad. I have seen his weaving. It was a highly ornamental dress piece. The man has gone away to Birbhum. If we open a school at Shibganj this man should be brought back.

80. Silk-weavers like cotton-weavers are also largely in the hands of mahajans, but their condition is more prosperous than that of cotton-weavers. The silk mahajans are generally weavers who have raised themselves to the head of the profession, and employ the poorer members of their guild to weave for them, and make advances of both materials and money, to help the artisans to be kept supplied with the necessities of life. A distinction has to be drawn between such mahajans either in the cotton or silk trade, such as Suranath of Comilla, Gour Basak of Dacca and Mohesh Chandra of Shibganj, who are intimately interested in the welfare of the industry, and the Kyan mahajans of Assam, to whom usury is the sole motive for advancing money to the artisans, and who would as soon invest money in weaving as in any other business which will pay them as well. It is said the guild mahajans do not drive as hard bargains with the craftsmen, as the outside mahajans do. In any case, it appears possible to get the guild mahajans on the side of any

scheme of reform which might be organized for the improvement of the industry. Mr. Mukherji found them very willing in Murshidabad to introduce new designs and patterns. He also found that the head weavers exercise a sort of supervision over forty or fifty families of poorer weavers whom he may employ, with the object of keeping up their reputation for the quality of their goods. Such weavers' guilds are really "hand-loom factories" so strongly recommended by Mr. Chatterton for the improvement of the weaving industry. The percentage of weavers who are dependent on mahajans can be judged from the fact that in Shibganj, where there are 150 families of weavers, there are only 10 families of weavers who do their own business, and out of these about three are guild merchants. The mahajans generally advance thread to the weavers, and when the cloth has been woven, it is weighed, a certain percentage being allowed for wastage. *Bani* (or price of weaving) is paid according to the quality and size of the cloth woven, and it varies from Rs. 3 to Rs. 7 per piece.

The daily earning of weavers varies from annas 4 to 8, but as they do not work all the days of the month, their average earnings may be put down at 5 annas per day. But the women and boys earn about annas 2 and 1-6, respectively. The weavers of the *malika* fabrics, in which the materials are cheap and for which the demand is greater, earn bigger wages, which amount to 6 to 8 annas a day.

81. Reference has already been made to the general decline of the silk industry in Bengal. The position is not, however, without its redeeming features. The revival and improvement of the industry in Malda, chiefly in the production of raw silk, due no doubt to the teaching of scientific methods of sericulture to the silk-rearers; and the success of Mr. N. G. Mukherji in Murshidabad to develop the silk weaving industry of that district, are encouraging factors. The *swadeshi* movement has also augmented the demand for silk fabrics in Bengal and other parts of India. It has already been shown that the imports of both raw and manufactured silk fabrics into India are growing apace. The future possibilities of the silk industry of this province, therefore, appear to be very great, in fact there is far greater room for the expansion of this than that of the cotton industry. Bengal produces much the best and the largest quantity of silk of any other part of India, and the districts of East Bengal and Assam in this respect are quite as important as those of West Bengal. In a scheme for the revival of the indigeneous industries, the silk industry of the province, ought to receive a very prominent place.

82. Suggestions for the improvement of the sericulture of the province have already been dealt with. It is only to be hoped that the recommendations of the Agricultural Department would be soon carried into practice.

As regards the silk-weaving industry, the first point for consideration is whether there is not room for the opening of a power mill silk factory, like the Bengal Silk Mills Company, Limited, of Calcutta, which is owned and managed by a Muhammadan gentleman. The concern is doing successful business and exporting silk to all parts of India and Burma. About this firm Mr. Cumming observes: "This firm is an object lesson to Bengal capitalists of what can be done by skill and capital." As has already been pointed out, more than half the industry in silk consists in the export of raw silk to European countries. Surely it will pay capitalists and also bring more money to the producers of raw silk, if the raw product could be profitably manufactured in the country, and, judging from the existing demand for silk, there seems to be no reason why such a venture should not prove a very great financial success. I had a talk with the Maharaja of Kashiambazar about the matter, and it seems quite probable that if facts and figures are collected by an expert, and the commercial possibilities of the industry explained to the rich zamindars of Rajshahi, Malda and Murshidabad, they might be persuaded to float a Joint Stock Company, and start a factory for the manufacture of silk fabrics by machinery.

Coming now to the question of the possibility of improving the existing mechanical processes of silk-weaving by hand-loom, by the introduction of fly-shuttle looms, it might at once be said that the difficulties in introducing the fly-shuttle for silk, appear to be greater than in the case of cotton, as the threads are much finer and breakages of warp are likely to be more frequent. Yet from Mr. Chatterji's report it would appear that Rai Bahadur Gosain Bhawani Puri in Benares and Mr. Babu Lal Govilla in Aligarh, have found the Japanese fly-shuttle loom successful for silk; and Mr. Cumming mentions the case of one weaver in Mourbharg who has been successful with a fly-shuttle for *Tassar*. As has been noted before, at the last Jorhat

exhibition, a Salvation Army loom succeeded in weaving a little silk. It will be interesting to note here the efforts made by Babu Akshay Kumar Maitra to introduce fly-shuttle for silk-weaving in Rajshahi and to improve the industry in other ways.

“As Honorary Secretary of the Rajshahi Diamond Jubilee Industrial School (of Sericulture),” says Mr. Maitra, “I was directed by the Government of the late lamented Sir John Woodburn to carry on certain experiments with a view to ascertain how far the ‘fly-shuttle loom’ was really suited to silk-weaving. I brought a loom from Kusteia, and subsequently made a few specimen looms of the type in the school, and carried on experiments with them in weaving (1) silk, (2) silk waste, commonly called *matka*, (3) mixed fabrics of silk and *matka*, and (4) of *matka* and cotton. But I found the ‘fly-shuttle loom’ useful only under efficient management in weaving wrappers and gown pieces with warp of *matka* thread, woven with weft of *matka* or of silk or cotton. A piece so woven at the school, with warp of silk was presented to Sir John Woodburn, and similar pieces were sold at Rs. 2 per yard. There is an increasing market for such stuff, and I had offers from Australia, as the stuff looked like *endi*, commonly ‘the Assam silk.’ But I found to my regret that the profits would not pay the capitalist, although they might help the *matka* weaver to make a little more than what he did with his old loom. I tried to induce the *matka* weavers of Rajshahi to adopt the ‘fly-shuttle loom,’ but they then preferred, and still prefer, their old loom.”

In this connection it might be stated that some of the fabrics of France are still turned out by hand-loom, and the hand-loom is almost certain of keeping the silk industry much longer than it will the cotton industry, if the latest improvements are adopted. What is most necessary for the trade, however, is the adoption of new patterns and better kinds of weaving. The sample of Murshidabad silk for suitings, etc., which the enterprising firm of Bagchi & Co. is advertising, and the samples of Benares silks advertised by Messrs. Narayan Das, Gobinda Das, show that the silk weavers of Eastern Bengal have a great deal to learn from the advanced weavers of their own country. Of course, it is not suggested that efforts should not be simultaneously made to learn the improved methods adopted in France and Japan.

83. We may briefly summarise the suggestions—

- (1) Private capitalists should be assisted and encouraged to open a silk manufacturing power-loom factory in Malda.
- (2) A central silk hand-loom weaving factory should be established in Malda. The institution should be, if possible, under the charge of a French or Italian weaver. The most improved methods of Murshidabad and Benares should be introduced. Experiments with fly-shuttle should be tried. The advantages of the filature method of spinning should be demonstrated. New “weaves” and patterns should be introduced. “Dyeing” and “Designing” should be made special subjects of experiment and instruction. A branch school and factory might be opened at Rajshahi which might make *matka* weaving a speciality.
- (3) As in the case of the cotton-weavers, strenuous efforts should be made to free the weavers from the clutches of mahajans. Advantage should be taken of the survival of the “guild” system amongst silk-weavers, to establish co-operative credit societies amongst them on the lines of the Benares silk-weavers’ credit society.
- (4) A ‘bureau’ for the silk industry should be established with a Deputy Collector at its head. The Sericultural Superintendent will be in charge of the sericultural operations connected with the scheme, whereas the bureau will be in charge of the industrial side of the scheme. Its chief object will be to bring the work of the factory home to the weavers, and help them to free themselves from the clutches of middlemen.

### 3. DYEING.

84. Dr. H. W. M’Cann’s Dyes and Tans of Bengal appeared in 1883, and the Provincial Monograph for Bengal was written by Mr. N. N. Banerji in 1896. The Assam Monograph, written by Mr. W. M. Duncan, I.C.S., appeared in the same year. Mr. Watson has made various experiments with a view to ascertaining the fastness of the indigenous dyes of Bengal, and the result of his observations has been published in the “Memoirs of the Asiatic Society of Bengal,” Vol. II, No. 3, 1907.

85. The industry is practically extinct in the plains districts of the province, though in the hill districts the dyeing of woven cloth is still practised to a fair extent.

The condition of the industry and some centres.

In Eastern Bengal, Pabna is the only district where I saw yarn being dyed locally for borders of *saris* and *dhutis*. The colours produced are two: black and red. For black, vegetable indigo was being used, and for red, aniline powder. There are two grades of black dyeing. For the first the yarn is successively soaked in the vegetable dye two or three times, till a fast colour is obtained. The *bani* or rate charged by the dyers for dyeing, according to the above process, a bundle of five seers of yarn is Rs. 2-8. An inferior black is obtained by first steeping the yarn in aniline red dye, and then into the pot containing the vegetable indigo. The result produced is a comparatively inferior kind of colouring, and the price charged is from annas 12 to Re. 1 per bundle of five seers. The cost of dyeing the yarn with red aniline dye is only annas 5 per bundle, but this colour is reported to be fugitive. It would thus appear that in Pabna, at any rate, chemical indigo has not yet penetrated, and the great difference in the cost of dyeing with vegetable and chemical dyes is apparently due entirely to the difference in the value of the dyeing materials.

In Murshidabad I saw local vegetable dyes being used for dyeing yarn. A mixture consisting of *saji*, powder of the jackfruit, and the plant called *lod* were being used to produce a bright green colour. I also saw cloths being printed by hand dies, but this branch of the industry has suffered greatly on account of the competition with the printed fabrics of the United Provinces.

In Sylhet some families who have migrated from the North-Western Provinces are reported to print and dye cloth, but I could not see the work done.

In the towns of Shahpur and Shibganj in Malda silk yarn is dyed locally, to which reference has already been made.

The lac dye is still used to a very limited extent to colour silk fabrics in Sialkusi, and other centres of silk-weaving in the Assam Valley. In the Khasi Hills *endi* cloth is dyed with a purple dye, and sold to the hill people as Khasi silk.

The Manipuris and the Turungs largely practise dyeing of their cotton cloths. There are varieties of dyeing, such as knot-dyeing, the tie-and-dye work for which Baran in the Kotah State is famed. The Turungs and Noras of Jorhat dye cotton thread and cloths with the *rum* plant to a very large extent. The process adopted has been very fully described in Mr. Duncan's Monograph on "Dyes and Dyeing in Assam" (page 49). By this method light or dark blue colour is obtained as required. This colour is again converted into black by the bark of a large creeper which is very common in the jungle and is called by the Assamese *barasi akora latu*, and by the Turungs *tungataru*. It has hooked thorns like the *barnsi*, i.e., fishing-hook. The bark is obtained and cut into small pieces. It is then either slightly boiled or steeped in cold water in an earthen or metal vessel till the water attains a reddish black colour. The blue cloth is then put into the liquid for some minutes. The cloth is then dried in the sun. It is put into the liquid once or twice according to the depth of the dark colour required. They also dye blue or black longcloth in the above way, from which they make shirts, coats, etc.

For the province 27 maunds of aniline and alizarine dyes were imported into the Dacca block, and were valued at Rs. 1,878. Forty-six maunds of vegetable indigo, valued at Rs. 7,476, were also imported.

86. The Hindus of the plains districts are not very partial to coloured fabrics for their wearing apparel, although checks for suitings and shirts are largely used. The Musalmans, specially females, use coloured fabrics to a very large extent. The great demand for coloured *lungis* amongst the Muhammadans has already been referred to. All the hill tribes people, as is well known, are most partial to coloured fabrics. There is a large import of printed cotton fabrics from the United Provinces for Bhutan and other hill tribes.

The outstanding features about the demand and supply of dyed yarn and coloured fabrics in the province are the following:—

- (1) There is a large demand for dyed yarn, most of which is of foreign manufacture (outside India). The amount of yarn dyed locally is so small as to be negligible.
- (2) The difference in the price of dyed and undyed yarn is quite substantial. A bundle of undyed yarn which sells at Rs. 8, in Comilla, costs Rs. 10 when bought dyed.
- (3) A large quantity of dyed and printed fabrics are imported into the province, which could be done locally, if we had suitable dye-houses.



- (4) Fabrics woven in the province, specially silk, have to be sent to other parts of India (Murshidabad) to be dyed before they can find a sale.

87. All the above circumstances point to the necessity of the establishment of dye-houses in suitable centres. The work done by Professor Gajjar in reviving the dyeing industry in South India is a splendid example of what is possible to achieve by foresight and enthusiasm, and has thus been described by himself :—

The need for "dye-houses" in the province.

When our vegetable colours were driven out from the world's market, which they had held for centuries, by the marvellous colours modern chemistry had extracted from coal-tar; when our dyers and weavers were reduced to poverty, their occupations having been taken up by others, there was no recourse left but to make use of these new colours and not to pay unnecessarily for the process of dyeing carried on outside India. Germany, the home of these chemical dyes, was anxious to secure a market for them in India. Our mill industry also needed a healthy growth and development. These considerations led me to suggest to the great colour manufacturers of Germany, *to train students and instruct native dyers in the use of their dyes* if they desired India to become one of their great consumers. They appreciated the suggestion and acted upon it, and started their first laboratory in this very city (Surat) and commenced to instruct students and native dyers in the processes connected with dyeing. When Mr. J. N. Tata heard about this he at once communicated with me, and made up his mind to append a dye-house to his mill, with the help of dyers trained in my private laboratory at Baroda. Even a costly laboratory set of dyeing apparatus was presented to his mill through me by the German manufacturers. Dyeing schools were soon after opened at Ahmedabad, Delhi, Cawnpore, Amritsar and other places under my supervision, and several trained dyers were sent round as travelling agents. There are now several laboratories in Bombay connected with German offices where students are trained. These are the educational methods the Germans adopted for their purely commercial purposes, and the result is the present remarkable revival in our dyeing industry. My friend, Mr. Tulsiram, who introduced dyeing into Madura, informed me, at the time of the last Bombay Congress, that 47,000 Sorathi settlers have been blessing the trained dyer sent by me to Madura some years back, and the Glasgow turkey-red yarn manufacturers had to send their agents to Madura to enquire why all the imports were stopped and what were the methods of dyeing adopted there. Since that time an extensive use of coal-tar colours is made in India, and thus is saved to her the margin of profit swallowed by Lancashire and Glasgow. The mill industry has thus been saved from stagnation, and remunerative work is being found for thousands of workmen.

88. I have been informed that "dye-houses" can be attached to power-weaving mills, or be started as a profitable hand industry. Mr. Watson has given considerable attention to the matter, and has made various experiments to find out the relative fastness of indigenous and imported dyes. But fastness is not the only element which we shall have to consider. If a dye-house be opened at Dacca under the supervision of Mr. Watson, and with the help of German and other dyers, and I strongly recommend that one should be opened, our work will consist chiefly in demonstrating—

The scope of the work of a pioneer "dye-house."

- (1) How to use aniline and alizarine dyes properly and in the least wasteful manner.

It is needless to point out that an attempt to fight against the introduction of aniline and alizarine dyes on the ground of their being manufactured abroad, would be both wrong and useless. These chemical dyes are much cheaper than vegetable dyes, are vivid and bright and suited to the popular taste, and it is a mistake to think that they are all fugitive. Besides, every day the richness and fastness of their colouring matter is being steadily improved. On the other hand, as pointed out by Mr. Watson, it is a mistake to think that all indigenous vegetable dyes are fast, in fact most of them appear to be fugitive.

- (2) What indigenous vegetable dyes could be commercially used for dyeing purposes in this province. Whether it will be possible to mix them with imported dyes to any advantage.
- (3) Whether by the introduction of fresh designs and printing by hand dies, etc., the consumption of coloured fabrics in the province could not be increased.

The immediate effect of the establishment of some properly-managed dye-houses in the province will be—

- (1) That, besides providing work for a large number of dyers, the price of dyed yarn, both silk and cotton, for which there is such a large demand, and which is now all imported, will go down. This again will result in cheapening the price of the fabrics, and also increasing the earnings of the weavers.
- (2) The prospect of manufacturing *lungis* and other coloured and printed fabrics locally in the province will be much brighter, and it will be possible to compete successfully with the imported fabrics of this class.

## CHAPTER II.

## INDUSTRY IN METAL WORK.

## 1. BRASS, COPPER AND BELL-METAL WARES.

89. Mr. Cumming has made special inquiries about this industry and has made valuable suggestions. The notes of Messrs. Darrah and Gait on this industry in Assam are to be found in the *Literature.* Secretariat volume "of the Industries of Assam." For Bengal Mr. T. N. Mukherji wrote a monograph in 1904.

90. This industry in the province is confined to the production of utensils for household use. There is no art work in copper or brass in the province. *Nature of demand.*

The Muhammadans who form a large proportion of the population of Eastern Bengal generally use copper, whereas the Hindus use brass and bell-metal utensils. Amongst the Muhammadans there is a very large and growing demand for enamelled ironware, and some sections of Musalman in Chittagong are fond of using earthenware for dishes, etc. There is not much chinaware used in the province even amongst the Muhammadans, except of the richer classes. Aluminium wares have not yet succeeded in obtaining a market here to any appreciable extent.

The usually accepted opinion that this industry has not suffered from the competition of any imported machine-made articles is therefore true only in limited sense for Eastern Bengal, where there is a growing and extensive demand amongst the Musalman population for enamelled ware. In Assam, however, the population is mostly Hindu, and there is not much demand for enamelled ware or china. The coolies of Assam, however, have taken to using tin utensils to a large extent. Though I am not in a position to pass any final opinion on the subject, yet it appears to me that the comparatively depressed condition of the metal utensil industry in Eastern Bengal is due to the competition with enamelled ware.

91. It is difficult to get any comparative figures for the import of manufactured brass and bell-metal utensils into Assam and East Bengal, or the quantity of raw materials imported into the province during past years. But the following figures from the Bengal Trade Report are interesting :—

*Imports of brass and copper, wrought and unwrought, into Eastern Bengal and Assam from Bengal.*

|                     | Eastern Bengal. |           |           | Assam.   |          |          | Total.    |           |           |
|---------------------|-----------------|-----------|-----------|----------|----------|----------|-----------|-----------|-----------|
|                     | 1903-04.        | 1904-05.  | 1905-06.  | 1903-04. | 1904-05. | 1905-06. | 1903-04.  | 1904-05.  | 1905-06.  |
| 1                   | 2               | 3         | 4         | 5        | 6        | 7        | 8         | 9         | 10        |
|                     | Rs.             | Rs.       | Rs.       | Rs.      | Rs.      | Rs.      | Rs.       | Rs.       | Rs.       |
| Brass, unwrought... | 2,77,372        | 1,33,212  | 73,882    | ...      | ...      | ...      | 2,77,372  | 1,33,212  | 73,882    |
| Brass, wrought ...  | 23,06,367       | 31,16,740 | 26,23,901 | 4,39,154 | 5,87,521 | 4,34,721 | 27,45,521 | 37,04,261 | 30,58,622 |
| Copper, unwrought   | 26,910          | 1,23,760  | 87,367    | ...      | ...      | ...      | 26,910    | 1,23,760  | 87,367    |
| Copper, wrought ... | 2,31,322        | 8,87,055  | 8,42,776  | ...      | ...      | 1,28,996 | 2,31,322  | 8,87,055  | 8,71,772  |

This province gets its supply of copper and brass sheets and enamelled ware from Calcutta. The following figures of the import of these commodities into Calcutta quoted by Mr. Cumming will therefore be of interest :—

|   | 1902-03. | 1903-04. | 1904-05. | 1905-06. | 1906-07. |
|---|----------|----------|----------|----------|----------|
| 1   | 2        | 3        | 4        | 5        | 6        |
| Imports of enamelled iron ware into Calcutta, in lakhs. | 1.38     | 4.15     | 3.59     | 3.26     | 3.10     |
| Imports of wrought brass into Calcutta, in lakhs.       | 2.00     | 1.60     | 1.53     | 2.5      | 2.03     |

It appears from the above that whereas the import of brass has been almost stationary during the five years, the import of enamelled ware has nearly trebled itself.

92. In the Brahmaputra Valley there are no special occupational sub-castes engaged in the manufacture of brass and bell-metal. "They are," says Mr. Gait, "mostly persons of the Kalita, Koch and Kurat castes and the word 'Kashar' being tacked on to their proper caste name as an indication of the occupation they follow." But the Assamese call them Kahars and not Kashars. The absence of professional castes, according to Mr. Gait, accounts for the low standard of skill possessed by the metal workers, and also the ease with which imported articles from Bengal have been able to supplant the locally manufactured articles. The manufacture of brass utensils, however, is carried on by a low class of Mahammadans, known as Morias.

In the East Bengal districts the occupation is carried on by Kansaris, although other castes have now, in places, taken to this profession. The total numerical strength of the population dependent on this industry would appear to have been 12,405 in the transferred districts at the last census.

93. Domestic utensils of a very simple kind are manufactured in Assam; a list is given by Mr. Darrah which has been quoted in Mr. Gait's note. The manufacture of bell-metal utensils by Kahars of Saityabari, in mouza Sarukhetri, is in a fairly flourishing condition. The value of the articles manufactured in Saityabari last year is estimated at one and a lakh of rupees, but only about 10 per cent. is said to have been sold in the district, the rest being exported for sale to Upper Assam. There are 400 families of Kahars in Saityabari, of whom about 100 are solely dependent on this occupation, the rest holding some land. The Kahars of Saityabari occasionally migrate to Gauhati and Barpeta, and work there in temporary sheds. I saw a colony at work in Gauhati. Hajo and Gauhati are important centres of the manufacture of brass in Assam, and utensils valued at half a lakh of rupees are reported to have been manufactured last year, of which fully 50 per cent. was exported to North Assam. There are about 150 families of braziers in Kamrup. In Nowgong 13 families are engaged in the manufacture of bell-metal at Molankata and Baumington. About 205 families of Marias are engaged in the manufacture of brass utensils at Kaoritol, Sutagaon and Baligaon of Jagial in Sibsagar, and the business is reported to be fairly lucrative. There is a flourishing colony of bell-metal workers at Titabar in Jorhat (Sibsagar).

94. In East Bengal, Kalam in Nator, English Bazar and Nawabganj in Malda, Palong and Rajbari in Faridpur, Kagmari in Tangail and Islampur in Jamalpur subdivision of Mymensingh, and Gomnati in Nilphamari, Rangpur, are important centres. In the town of Dacca also there is a colony of braziers and copper-smiths. Of these Kalam, Islampur, and Nawabganj are the most well-known centres. A list of the utensils manufactured in these metals has been given in Mr. Mukherji's note. He classifies the manufactured articles of Bengal as follows :—

- (a) Sacrificial vessels.
- (b) Water-pots.
- (c) Cooking utensils.
- (d) Eating and drinking utensils.
- (e) Musical instruments.
- (f) Ornaments for personal adornment.

I did not see any articles of class (a), (e) and (f) being manufactured in this province.

At Nawabganj in Malda about 270 families are supported by the industry, of whom about half are Mahammadans. About 10,000 maunds of metal utensils are manufactured annually, of which 10 annas are of brass,  $5\frac{1}{2}$  bell-metal, and  $\frac{1}{2}$  an anna of mixed metal. The manufactured articles are exported all over the province, to Dacca, Calcutta, Rajshahi, Rangpur, etc. The Islampur wares have also a very great fame, although only few families are reported to be following their caste occupation. In Kutubpur in English Bazar, Malda, 60 families are engaged in the manufacture of brass *lotas*, of which 800 maunds of finished articles are turned out annually.

In Natore about 100 families at Kalam, and about 60 families at Budhapara, manufacture utensils of brass, bell-metal and the alloy known as *bharan*. The artisans are both Hindu and Musalman. The Hindu colony originally migrated from Murshidabad, and the Mahammadan artisans who have now set up independent shops were really originally workmen in the employ of the Hindu artisans. The business at Kalam and Islampur are reported to be in a depressed condition, whereas at

Nawabganj the business is flourishing. At Dacca, too, the artisans complained of a depression in the industry.

95. Except the metal known as *bharan*, no other alloy appears to be locally made in any part of the province. Bell-metal utensils are exclusively made by melting down the metal of old vessels. The braziers also exclusively use imported brass plates, and the copper-smiths, whom I saw at Dacca, use copper plates. *Bharan* is a mixture of copper and zinc, in equal proportions. This metal is used in the manufacture of 'glasses' (tumblers) at Nawabganj in Malda, and Kalam in Natore. Of the two methods usually followed, in the manufacture of these utensils, *viz.*, (1) the *Pita* or hammering, and (2) casting in moulds, the first is almost exclusively resorted to in this province. The braziers, with the help of their hammers and furnaces, beat out the plates to any shape they want, so do the copper-smiths and bell-metal workers. After being beaten out to the required shape, the component parts are soldered together by means of an alloy of copper, zinc and borax, known as *pan*. The rough vessel is then turned in a lathe, to be chiselled and polished. This process is interesting. The bottom of the vessel is first heated and then fixed to a cylindrical piece of wood with resin, and when it gets fixed, the bar of wood is made to revolve backwards and forwards with a piece of rope. One man (a cooly or a novice) works at the rope, and the master-brazier applies the chisel, a process which needs a good deal of skill. Then follows the process of polishing with the help of the lathe and a pad smeared over with an oily polish. Both the processes of chiselling and polishing appear to be very old-fashioned and time-consuming.

For the manufacture of glasses and *lotas* or *ghatis*, moulds of which the outer layer is earthen and the inner core of metal, are used in *Kalam*. In Nilphamari moulds are also in use, both the outer and inner layers being of earth, mixed with jute cuttings and husks of paddy. In Nawabganj only one artisan from Bonpash (Nadia) tried to manufacture *lotas* by casting the metal in moulds, but he has left the place and the *pita* process is now universally followed in the place. I only saw one brazier using moulds for making the ornamental stand of a lamp in Dacca. On the whole the use of moulds is very rare in this province.

96. The majority of the workers in bell-metal, brass and copper utensils suffer from the same disadvantage as the weavers, and are not in direct touch with the actual consumers. The industry is almost entirely in the hands of the mahajans. The mahajans supply the workers with the raw material, old bell-metal utensil in the case of bell-metal workers, and copper and the brass sheets in the case of braziers and copper-smiths, and take back the finished article from them after paying them wages at fixed rates per seer of the manufactured article, which however varies with the quality of the article turned out. In some cases, between the mahajans and the artisans there is a second class of middlemen *byaparis* who bring the metal and money from the mahajans, and advance them to the workers, and take back the finished article to the mahajans.

In every case the profits of the industry go very largely into the pockets of the mahajans, and where there are middlemen *byaparis*, they also appropriate a small share of the profits. The result is that on an average the worker does not earn more than Rs. 8 to Rs. 10 a month, and everywhere I heard the same story that they can just manage to live and get on, while in some places they are reported to be in debt. Their lot is the harder, because in this industry only the able-bodied males can take a share, and the other members of the family are of no assistance. While this is the general condition of the labourer (artisan), the mahajans make a profit of over 25 per cent. on their money. We will take the case of the bell-metal workers of Kamrup. In Kamrup the cost of the broken bell-metal is calculated to be Rs. 45 per maund, *i.e.*, Re. 1-2 per seer. The average wage paid to the bell-metal worker is Re. 1 per seer of finished article, in some cases it is less and in some it is slightly more. About five men working all the day can turn out from 3 to 4 seers of the finished article. Their gross earnings come to 14 annas to Re. 1 per head per day. The cost of the fuel is said to come to 10 annas per seer of metal. The net earnings therefore do not come to more than 5 to 6 annas per day, or an average about 10 rupees per month. The finished article sells from Rs. 2-8 to Rs. 3-8 per seer, or on an average at Rs. 3 per seer. So while the worker gets only 6 annas per day, the mahajan makes nearly a clear profit of 8 annas on every seer of metal that he advances, making allowance for all his incidental expenses. Similarly, in Nawabganj it is found that an increase in the price of charcoal, and the wages of coolies engaged to work the bellows, has reduced the wages of the worker to Rs. 4 and Rs. 5 a maund, or about Rs. 10 a month. In Islampur it is reported that the industry, underwent a depression about seven years ago, and it has not yet recovered from the effects of it. It is also reported from the same centre that the mahajans do

not make any allowance for the wastage which is incidental to the melting of old utensils, and which amounts to nearly 2 to 2½ seers per maund, and this loss the poor artisans have to suffer. The earnings of the braziers are even less than in the case of bell-metal workers, and it amounts to only from Rs. 7 to Rs. 10 per month.

At Kalam, the artisans are paid by the mahajans at the rate of Rs. 12 to Rs. 15 per maund for *bharan* and brass vessels, and from Rs. 20 to Rs. 50, according to quality, for bell-metal articles. Excluding his expenses, the earnings of the average worker come to Rs. 8 to Rs. 12 per month.

97. It is clear from the above that the most important help which this industry can receive will be in the direction of the readjustment of the relations of capital and labour. If the industry is to flourish, we must try and improve the financial position of the artisans, and free them from the clutches of the mahajans. It will be no use to teach the artisans more improved mechanical methods, if the lion's share of the profits is to be appropriated by the mahajans. The establishment of co-operative credit societies amongst the artisans would therefore appear to be the first want of the industry.

98. As regards improvements in the mechanical methods, the suggestions made by Mr. Collins still hold good. He suggested—

- (1) The use of dies for stamping the goods to the required shape. The dies are to be stamped with a hydraulic press.
- (2) The introduction of better hand-lathes for polishing and filing brass articles ;
- (3) The introduction of punching machines to save the trouble of cutting with scissors.
- (4) The introduction of better and more permanent plate-moulds.

Both Mr. Chatterji and Mr. Cumming have repeated these suggestions. Mr. Cumming has described the different methods of moulding followed in different parts of Bengal, and has advocated that a metal pattern may be used as a mould, consisting of two vertical halves, the pieces being kept together by four small friction clutches. As already noted, moulding is not practised much in this part of the province, and it is questionable whether for the ordinary brass and copperware it will effect any saving, as, according to the process now followed, it is not necessary to melt the metals to a liquid condition, which will be required if a mould is to be used. This process can therefore effect a substantial saving in time only in the case of the manufacture of vessels of a spherical shape, like *lotas*, etc. Mr. Mukherji thinks, however, that the people appreciate utensils by the *pita* process more than those cast in moulds, as the former process is supposed to make the utensils more lasting.

Then as regards the suggestions of stamping from dies instead of hammering, the necessary machinery and hydraulic press can only be set up in small factories, for it is clear that the individual artisans will never be able to afford to buy presses costing Rs. 300. In the Aluminium Factory at Madras, and in the Bengal Technical Institute in Calcutta, I saw machinery for turning out utensils by the processes of spinning and stamping. If the machines could be so modified as to be adaptable for hand-power, and if they could be obtained fairly cheap, it will certainly be a move in the right direction. But in the meanwhile it has to be considered whether brass and bell-metal will be sufficiently malleable to take shape from a die, and whether they will not break under excessive pressure.

The improved hand-lathe of the Madras pattern, by which one coolie can turn two lathes simultaneously, by producing a continuous rotary motion with the help of a crank handle and a rope passing round the shaft of the lathe, ought to be most useful, and is easily adaptable under the present condition of the industry. The adoption of such a lathe will be quite inexpensive and at the same time it will save a good deal of time and labour.

99. To sum up, the salient facts of the industry are —

- (1) The industry depends upon raw material which has all to be exported from England. A very large share of the profits must go to the manufacturers of the metal abroad. Mr. Chatterton told me that if the Indians took largely to aluminium ware, it might be possible to manufacture aluminium in the country for commercial purposes. As the Mahammadans use enamelled ware very largely, and tea-garden coolies are now taking to tin utensils, an aluminium factory ought to be able to supply these demands and take the place of these articles.

- (2) As most of the improvements in the mechanical processes of the industry require some amount of capital for their introduction, the establishment of some factories by private capitalists will be most useful. Municipalities and District Boards might start factories at some of the existing centres of the industry like Nawabganj and Kalam.
- (3) It may be considered whether art work in copper and brass, on the lines of Jeypur and Benares work, cannot be profitably introduced into this province. Dacca will be a good centre for the introduction of this new industry. There ought to be a fair amount of demand for this kind of ware in the new metropolis of the province, and there is no want of skilled labour which might be utilized in developing the new industry.
- (4) But the most essential as well as the most important improvement in this industry will be the adoption of measures by which the present producer of these articles could be brought into direct touch with the consumers, and thus be able to secure a more equitable share of the profits of the industry than he is able to at present. For this object a provincial 'bureau' for metal work should be appointed. This bureau consisting of a Deputy Collector, and some private gentlemen interested in the industry, ought to be able to help the Registrar to form co-operative societies amongst the weavers. It is very probable that any efforts to improve the financial condition of the weavers, or to free them from the trammels of the mahajans, will be keenly resented by that body. The task of substituting any other system of business in the place of the one which has taken such deep root, will be fraught with many difficulties. But with the assistance of Government and the co-operation of public-spirited private gentlemen some improvements are sure to follow.

## 2. IRON AND STEEL WORK.

100. Mr. Jackson's monograph on the "Iron and Steel Work" of the province appeared in 1907. Mr. Watson wrote the monograph for Bengal, and Mr. Cumming has made some suggestions in his recent survey which apply equally to this province.

Subdivisions of the industry. 101. This industry may for convenience be subdivided as follows :—

- (1) The industry of the ordinary village blacksmiths.
- (2) The industry in cutlery, steel trunks, agricultural implements followed by the more qualified blacksmiths, and persons trained in the technical schools.
- (3) The higher branches of the industry in factories, *e.g.*, railway workshops, private iron foundries and workshops.

Of the above (1) and (2) are parts of the indigenous industry of the province, whereas (3), of which there is very little in this province, compared to Bengal, is mostly under European management.

102. No reliable figures to show the number of village blacksmiths are obtainable. Mr. Jackson collected the following figures for 14 districts of the province :—

| District.              | Number of forges. | Number of persons. |
|------------------------|-------------------|--------------------|
| 1                      | 2                 | 3                  |
| Rangpur                | 710               | 2,982              |
| Dinajpur               | 896               | 3,078              |
| Rajshahi               | 650               | 3,500              |
| Malda                  | 550               | 7,241              |
| Mymensingh             | 500               | 1,540              |
| Bakarganj              | 650               | 2,430              |
| Noakhali               | 150               | 600                |
| Sylhet                 | 490               | 4,500              |
| Cachar                 | 86                | .....              |
| Goalpara               | 166               | 400                |
| Kamrup                 | 227               | 918                |
| Darrang                | 110               | .....              |
| Nowgong                | 98                | 300                |
| Lakhimpur              | 145               | 455                |
| Total for 14 districts | 5,347             | .....              |

103. No iron is now smelted in this province, and the volume of the industry of the

Imports of raw iron. local blacksmiths is reflected in the import of raw iron and steel into the province. The provincial trade figures give the total of wrought and unwrought iron to be 586 thousand maunds, valued at 35 lakhs, and that of miscellaneous import of iron and steel to be 793 thousand maunds of the value 46.5 lakhs of rupees.

104. Agricultural implements, cooking utensils, tools and other articles used in various handicrafts, and weapons are the various kinds of articles manufactured by the village blacksmiths. A list of the products of the indigenous forges is given by

The village blacksmiths and condition of the industry.

Mr. Jackson. Almost every important village has a blacksmith, who is generally a Hindu and also an agriculturist.

There is very little competition with imported articles for the common agricultural implements and household articles used by the villagers. The price of the raw material is also small, compared to the price of the manufactured article, iron being bought at Rs. 5 a maund and steel at Rs. 13 (though Mr. Watson found steel selling at Rs. 6-2-0 per maund and iron at Rs. 4-8-0 in Calcutta). But the finished article is sold from Re. 1-4-0 to Rs. 2-8-0 per seer. In the ordinary implements only a little steel is welded to the edge, to give hardness and sharpness to it. The profits of this industry I therefore found to be greater than that of any other village industry. The ordinary blacksmith earns about Rs. 15 a month during the working season. They are all independent of mahajans, and as their females can also earn for themselves if they like, they are really well-off. As far as the manufacture of the village implement is concerned, it is difficult to suggest any improvements in the existing methods of production. The artisans themselves only complain about the high price of coke and coal.

105. Amongst the more important centres of the industry may be mentioned

Some of the more important centres of the industry.

Duttapara in Noakhali, Barapaika, Uzirpur and Patuakhali in Barisal, Panchgaon in Maulvi Bazar Subdivision of Sylhet, Sherladpur in Malda, Jamalpur in Mymensingh and Chandpur in Comilla. At Gauhati I saw a certain number of blacksmiths at work. The earnings of a head blacksmith at Gauhati come to Rs. 30 a month, from which he has to pay to his assistant Rs. 8. He uses coke and his bellows are the same as those in use by the Bengal blacksmiths. The bell-metal workers in the same place, however, use small goat-skin bellows of a primitive kind and charcoal for their fuel. I was told that coal is not suitable for melting bell-metal, etc.

Duttapara in Noakhali and Uzirpur in Barisal are the only two places in the province where cutlery of a comparatively fair quality is manufactured. Very fine knives with horn blades from Duttapara were sent to the last Calcutta Exhibition. As many as five forges are said to be found in one workshop at Duttapara. But special implements like scissors, knives, etc., are only manufactured to order, and there is a great demand for these articles during Durga Puja time. At Uzirpur I found four shops with about 30 artisans working. The well-known *Ram dao* (sacrificial swords), small *daos*, razors, *sarota* or *janti* (nut-cutter), scissors, etc., are manufactured here. The smiths said they bought their steel at Rs. 17 per maund. Ordinary *daos* with rough blades were being sold for Re. 1-8-0 per seer, but when polished the same *dao* sold for Rs. 2-4-0 per seer. At Uzirpur the special saws for cutting conch shells are also manufactured, but no stock is kept. The conch shell-worker has to come from Dacca and wait while his instrument is being manufactured; one is sold for Rs. 10. The master-smith makes an income of Rs. 30 per month, and the paid assistants receive from Rs. 10 to Rs. 12 per month. But the sale of knives or scissors at these places is extremely limited. They are not sold, as far as I know, in any shops, and almost the entire consumption of cutlery of the province, is in imported wares. The total import of manufactured hardware and cutlery into the province amounted to 242 thousand maunds, of the value of 25.5 lakhs.

106. The first important step towards progress in this industry would be to start some

Suggestions for improvement.

factories in central towns for the manufacture of cutlery and other hardware. The well-known shop of Prem Chand Mistry of Kanchannagore, Burdwan, whose cutlery is to be found in most *swadeshi* shops in Bengal, ought to be an example for the blacksmiths of Duttapara and Uzirpur. Prem Chand Mistry has got a small oil-engine to drive his lathes. There ought to be very good opening for a hardware and cutlery factory in Dacca. Mr. Ganguly's shop at Chandpur might with advantage be enlarged and better class of cutlery, etc., manufactured. There is no reason why if the cutlery (knives, scissors) turned out are of good quality, they should not receive the patronage of Government and supply all the Government offices with stationery (knives and scissors).

107. During the first two years of the *swadeshi* movement, steel and white metal nibs were manufactured at Pabna, Tezpur, Patuakhali, Rangpur and Barisal. But as these were products of hand machines, they could not hold the market against machine-made nibs. At present Uzirpur is the only place in the province where nibs are supposed to be manufactured. But I did not see any nibs being manufactured at Uzirpur, although the samples I have seen did not seem to be bad. Whether it will pay to import the metal sheets and then make nibs with hand machinery is a question which will have to be looked into, but there is little doubt that if with suitable machinery a factory is started, there will be great and growing demand for its products. Perhaps a small factory with an oil-engine ought to pay. Here again Government patronage ought to be a great help to such a factory, if one be started.

108. The manufacture of steel trunks, cash boxes, despatch boxes from imported iron sheets is a fairly paying industry up to now, but considering the large number of such shops which are springing up everywhere excessive competition is likely to lower profits. In fact some of the shop-keepers of Rajshahi, where there are not less than three or four of these shops, complained to the above effect, and I found that some shops at Dacca and Rajshahi have already wound up business. In the Victoria Technical Institute at Chittagong I saw some good specimens of locally manufactured trunks. The Comilla Technical School had also some good trunks on show. In Dacca about 300 people are engaged in this business, and I visited one large shop in Mymensingh. I do not think there is room for a further expansion of this industry in the province. What is necessary now is to improve the finish and to use heavier and better quality of sheets. In spite of the numerous shops, large number of Calcutta-made trunks find a sale in all the big towns. If better class of goods are locally manufactured the imports would naturally cease.

109. There are no large factories or workshops in this province comparable either to the railway or private engineering workshops in Bengal. The largest railway workshops in the province are at Chittagong and Dacca. There is a railway workshop also at Jorhat.

Most of the big tea factories have their own workshops. Messrs. Turner Morrison & Co. have also their workshop in Chittagong, chiefly for the repair of ships, steamers, etc. It is worth while noting that a small iron foundry named Sarma's Iron Work has been opened at Dacca, about a couple of years ago, by Babu Rajendra Lal Sarma, a zamindar. The business is said to have started with a capital of Rs. 25,000 and is being managed by one Kanai Lal Karmaker, who although he has received no technical training, yet seems to have practical knowledge, and an instinct for the business. Two steam furnaces have been set up, and cast-iron railings, light posts, gates, etc., are being manufactured. Both old broken iron and pig iron are used for the castings. The manager told me that they had successfully repaired steamers, and were about to take up the repair of some iron bridges of the town. The enterprise has not sufficient capital. More trained knowledge is necessary, and it is a sound move on the part of the proprietor to attempt to float a Joint Stock Company for financing the Foundry. The enterprise deserves encouragement from Government.

110. The existence of a number of large iron and steel factories near Calcutta (of which there are 14) is due first to Government owning some of these factories, like the Government Rifle Factory, Isapur, Government Gun and Steel Factory, Cossipur; and secondly, to the concentration of business and commerce in Calcutta. Chittagong is bound in the near future to attract a good portion of the commerce of Calcutta, and there will be room for the opening of more than one large iron factory in Chittagong, like those of Messrs. Burn & Co.'s Engineering Works, Howrah, Messrs. Jessop & Co.'s Bridge Works and Foundry, Howrah. There is no reason why Indian capital should not anticipate this opening for profitable investment, and start a factory on a large scale at Chittagong. It is well known that the senior partner of Messrs. Martin & Co. is an Indian gentleman.

111. The question of the development of the iron and steel industry must occupy an important place in any comprehensive scheme for the industrial regeneration of India. The number of workers of iron and steel and the production and consumption of these metals in a country may be taken as a measure of its industrial prosperity and civilization, and judged from this standard even Bengal, which is the most advanced



province in India in this respect, is lamentably behind even the most backward countries of Europe. The consumption of iron for Bengal is only 5·8 lbs. per head, against 375 lbs. for the United Kingdom, and 17 lbs. for Russia. What possibilities there are of this province taking a part in the development of the iron industry is therefore a most important problem.

112. Iron is found in several places in Assam. In the Khasi Hills it is derived from the minute crystals of titaniferous iron ore, which are found in the decomposed granite on the surface of the central dyke of that rock, near the highest portion of the plateau. The quality of the iron is excellent and it is still sought after to some extent for manufacture into hoes and *daos*.

Raw material in the province and possibility of manufacturing iron.

In Upper Assam, clay iron stone occurs in nodules of various sizes, and sometimes in thin beds, interstratified with shales and sandstones, in the coal measures of the Naga Hills, but it is believed that the ore is not in sufficient abundance to afford a supply for a blast furnace on the English principle; while the scarcity of limestone required to form a flux would, even if the ore were in greater quantity, probably form an insuperable obstacle to operations on a large scale. Iron ore is also of widespread occurrence in the South Mikir Hills, but no attempt has been made to work deposits. The company who have the concession of the Makum Coal-field have also the monopoly of the iron of that region, but have hitherto made no attempt to work it. The iron ore formerly smelted in Sibsagar was derived both from the clay iron stones in the coal measures (chiefly those of the Nazira-field) and from the impure limestone which occurs in great abundance in the Tipam rocks south of Dhodar Ali, the former was the source most used. Referring to the Khasi deposits, Mr. Jackson makes the following remarks: "The deposits both at Nongspung and Nongkrem and its neighbourhood seem to be extensive. There are large coal measures now supplying excellent fuel for coal consumption at no great distance; lime is somewhat nearer and ample pine timber and water-power is to be had on the spot, more particularly at Nongspung, though naturally the water-power is more plentiful in rainy season. Probably the most accessible coal is in the British village of Mawbehlarkhar, about 12 miles south-west of Nongkrem in a straight line and about 10 miles east and south-east of Nongspung in a straight line. Of course, a practicable path in both cases is considerably longer. I think there is room, particularly at Nongspung, for a really prosperous working on European lines and extensive scale."

Bengal is the only province in India where iron and steel are manufactured. The Bengal Iron and Steel Works, Barakar, has been in existence from some years and the Tata Iron and Steel Company are about to start operations at Kalimoti on the Bengal-Nagpur Railway. It has to be considered whether, in view of the richness of the raw material in Bengal, the facility of communications, the abundance of coal, etc., and the wealth of capital at the disposal of these two companies in Bengal, it will be feasible to start another iron and steel manufactory in this province. But in any case a Government factory on an extensive scale for manufacturing machinery and other commodities from iron to be imported from the Bengal firms, ought not only to be a great commercial success but also a great step forward in developing industrial enterprise in the province. What the demand for the manufactures of the pioneer iron factory will be will be clear if we realize what the volume of the demand in the province is for—

- (1) Machinery for tea factories;
- (2) Rails and other gear for railways;
- (3) Enamelled ironware for the agriculturist;
- (4) Galvanized iron sheets for buildings, etc.

I think the demand for (3) and (4) class of goods is greater in this province than in any other province of India. I therefore recommend that a Pioneer Iron and Steel Foundry be opened in this province, preferably at Chittagong, with the special aim of manufacturing galvanized corrugated iron sheets and enamelled ware locally.

## CHAPTER III.

## LEATHER.

113. Messrs. Cumming and Chatterji have reviewed the present condition of the leather industries of Bengal and the Upper Provinces, respectively. Mr. Watson's exhaustive reports on the leather industry of Bengal have just been published for general information. Mr. Chatterton's papers on the chrome leather factory are also full of useful suggestions. The conditions prevailing in this province are very similar to those of Bengal, and the suggestions and recommendations made by Messrs. Watson and Cumming for Bengal apply equally to this province.

Subdivisions of the industry.

114. The industry in leather consists in—

- (1) the export of hides and skins;
- (2) the curing and tanning of leather;
- (3) the manufacture of boots, shoes and other articles.

115. It is needless to point out that both in volume and value the first is by far the most important part of the industry. As pointed out by Mr. Cumming, since 1900 there has been a phenomenal export of hides and skins from Bengal, and the following figures quoted by him are instructive :—

|                  | 1904-05. | 1905-06. | 1906-07. | 1907-08. |
|------------------|----------|----------|----------|----------|
| 1                | 2        | 3        | 4        | 5        |
|                  | Average. | Lakhs.   | Lakhs.   | Lakhs.   |
| Raw hides ... .. | 311      | 448      | 554      | 380      |
| Raw skins ... .. | 192      | 327      | 255      | 176      |
| Total ... ..     | 503      | 775      | 809      | 556      |

It is interesting to note that about 85 per cent. of all the hides exported from British India, are exported from Calcutta. The phenomenal increase was due to a variety of causes, such as the development of the motor-car industry, the boom in the cotton industry, etc. During 1906-07 nearly three lakhs and twenty thousand maunds of hides and skins were exported from this province, valued at Rs. 81,39,278, and formed the most important item of export from the province after jute and tea. The total number of persons engaged in the industry was at the last census shewn to be nearly 80,000, and were distributed as follows :—

| Occupation.  | Actual workers. |         |                           |         | Dependents. |
|--|-----------------|---------|---------------------------|---------|-------------|
|  | Total.          |         | Partially agriculturists. |         |             |
|  | Male.           | Female. | Male.                     | Female. |             |
| 1  | 2               | 3       | 4                         | 5       | 6           |
| <i>Transferred Districts.</i>  |                 |         |                           |         |             |
| Shoe, boot and sandal-makers, tanners, etc.,<br>sellers of hides, etc. | 20,952          | 885     | 2,610                     | 17      | 46,976      |
| <i>Assam.</i>  |                 |         |                           |         |             |
| Shoe, boot, etc. ... ..  | 3,698           | 210     | 216                       | 5       | 4,161       |

116. The method by which the industry is carried on has been described by Mr. Watson. Chamars and the butchers sell the hides to Muhammadan *byaparis*, who export to Calcutta. Besides the collection by native agency, a considerable number of hides is collected by the exporting European firms by their own agencies in the districts. For a medium quality of dried hides, per 20 lbs., the price paid to the butcher or Chamar comes to Rs. 11-14, whereas the price paid for the same in Calcutta to the European firm comes to Rs. 16. So the charges for collecting, and collector's profits come to Rs. 4-2 per 20 lbs. In the case of slaughtered hide the butcher has to pay a fair price to the owner, but in the case of the carcass collected by the Chamar, the raiyat gains nothing, and the whole profit goes to the Chamar.

117. It is generally the accepted opinion, that the quality of hides exported from Calcutta could be much improved by a better cure, but as it is not very certain that under the conditions prevailing at present a better price would be obtained for better cure, an improvement cannot be expected, unless the "artificial" state of the market in Calcutta in which the advantage to the seller is almost in favour of badly-cured hides is rectified. Mr. Cumming accepts the suggestions made by Watson with slight modifications.

These are—

- (1) That the Calcutta hide merchants and the foreign hide merchants should rectify the present artificial state of the industry and encourage the sale of better cured hides.
- (2) To teach the butchers and Chamars correct methods of curing by a demonstration factory at Tengra.

If the lead in this matter is taken by Bengal, this province might well wait and see if any separate action would be required here. I think the exporting firms in Dacca will take the cue from the standard set by the firms in Calcutta, and no separate action will be necessary. Besides, better process of curing will be taught in the Government tannery which is suggested further on.

118. There are no large tanneries in this province. The export is entirely in untanned hides. In this Bengal differs from Madras, where most of the hides are exported in a tanned or dressed condition, and as a consequence most of the large tanneries are in the Madras Presidency. Though Madras realized more for tanned hides than Bengal for its untanned exports, yet Mr. Watson thinks "that the tanning of hides for export is not an ideal industry to develop." No doubt if the leather could be tanned and manufactured locally, instead of being exported as tanned leather, the country will be the gainer by it, yet as long as the export of raw materials remains an important industry, it is *prima facie* desirable that the leather should be sent out tanned according to the latest methods, so as to satisfy the requirements of the importing countries, than in a crude condition. For one thing, the produce exported is more valuable and occupation will also be given to a large number of tanners in the country. Mr. Chatterji has rightly pointed that the notable decrease in the export of dressed hides and skins is a disquieting feature, because "it shows that the local industry has no longer any share even in the preliminary processes of dressing the goods exported."

It is not possible to arrive at a correct estimate of the amount of leather tanned by the local tanners for home consumption. The number of tanners and carriers for Eastern Bengal has been given, roughly, to be 4,200 only. According to the standard adopted by Messrs. Chatterton and Watson, each tanner is supposed to earn 3 annas daily, and to work 6 annas worth of leather daily. According to this calculation, the value of the local tanned leather comes to about 6 lakhs annually. But it is only for the roughest kinds of articles that locally tanned leather is used. The demand for shoes is mostly of the European pattern, and the leather used by the shoe-makers is all imported from outside the province. Most of it is tanned either at Agra or Cawnpore. The value of the import of leather, wrought and unwrought, into the province for 1906-07 is shewn to be Rs. 23,000.

119. Although every large town has its colony of shoe-makers, yet the major portion of leather goods consumed in the province is imported. There are no figures available to show the import of shoe into the province, as the figures are included under the head "Apparel." But as the supply of foreign shoes, etc., is received through Calcutta, the following figures quoted by Mr. Cumming are of interest.

The imports of boots and shoes from abroad into Calcutta were as follows :—

| 1902-03. | 1903-04. | 1904-05. | 1905-06. | 1906-07. | 1907-08. |
|----------|----------|----------|----------|----------|----------|
| 1        | 2        | 3        | 4        | 5        | 6        |
| Lakhs.   | Lakhs.   | Lakhs.   | Lakhs.   | Lakhs.   | Lakhs.   |
| 9.01     | 9.56     | 12.86    | 10.93    | 6.41     | 9.40     |

There was a marked decrease in the imports in 1906-07 which is attributed by Mr. Cumming to the boycott movement. But in 1907-08 the imports seem to have recovered most of the lost ground. But the chief feature in the shoe-selling industry of this province is the large increase in the consumption of shoes and boots manufactured in India. Every town has got one or two *swadeshi* shoe shops, which deal in nothing but *swadeshi* shoes. These shoes are reported to be cheaper and almost as durable as foreign shoes.

120. As regards the local industry in the manufacture of shoes, it also appears to have got some encouragement from the *swadeshi* movement, and trade is brisk in some of the larger towns like Dacca, etc. In Pabna, the consumption is almost entirely of Indian boots and shoes, imported chiefly from Calcutta, Cawnpore, and Nadia. In Noakhali there are four shoe-makers' shops and thirteen leather shops, but the shoes manufactured locally are all from imported leather. The daily wage earned by the shoe-makers in this town is 6 annas. Imported shoes, manufactured in Calcutta and Cawnpore, are chiefly sold. At Dacca there is a colony of over 100 shoe-makers, all up-country men, settled at Laksmi Bazar, Malitola, and Nawabpur, who make new shoes as well as mend old ones. As stated above, the leather used is almost all imported, being tanned in Calcutta, Cawnpore, and Jullandar, that from the last place being used for soles. The ordinary cobblers earn from Rs. 8 to Rs. 10 a month, whereas the head artisans earn from Rs. 15 to Rs. 25 a month. Those who work in firms are generally paid by piece-work, the usual rate being 10 to 12 annas per pair of shoes. It takes a cobbler nearly two days to finish a pair. Besides the shoe-makers' shops, there are four or five leather shops in Dacca, and it is interesting to note that the newly started tannery is already finding a ready sale of its leather in the local shops. Since the *swadeshi* movement there has been a very marked increase in the sale of country-made boots and shoes in Dacca. The firm of Whiteman & Sons (really a native firm) used formerly to import at least 25,000 rupees worth of English boots and shoes annually, but now it does not find a sale for more than 100 rupees worth of these articles. It is curious to note that boots manufactured in Calcutta are being palmed off as being of Cawnpore make, which shows that Cawnpore has already succeeded in establishing a wide reputation in the leather industry. For the whole province the following figures are given :—

- (1) Shoe-makers, 14,193.
- (2) Sellers of manufactured leather goods, 3,780.

121. The conditions of this industry are the same as in Bengal, except perhaps that the impetus given to this as well as other indigenous industries by the *swadeshi* movement has not yet borne fruit in the same way as in Bengal. Coupled with an abundance of the raw material (hides and skins) which are being exported in increasing quantities out of the province, we have a very undeveloped leather manufacturing industry, which again has to depend for its supply of tanned leather from outside the province. Yet within recent years a flourishing leather industry has been established at Cawnpore, and at Bombay, and Madras is moving with rapid strides in the same direction. The Government Chrome and Leather Factory at Madras is perhaps the best equipped, and most up-to-date tanning factory in India. Mr. Watson directed his inquiries to finding out why the leather industry had been successful in Cawnpore and Bombay, and why it had not taken root in Bengal, and he thinks the reason is to be found in the fact that the Government of India established a factory at Cawnpore and a branch one at Bombay, while no such Government encouragement was given to Bengal. Mr. Chatterton also thinks "That leather industry at Cawnpore and Bombay has grown up under the stimulus of demands from the Military Department, and its flourishing condition to-day is due to not only the expansion of Military requirements but also to indents from other Government departments, which in the aggregate require considerable supplies of leather

goods." Mr. Watson is diffident whether the Government of India would be persuaded to open a branch in Calcutta, in view of the express desire of the military authorities to centralize the Government factory at one place (Cawnpore). But Mr.

A central leather factory recommended.

Cumming supports Mr. Watson's suggestion with regard to the opening of a Government branch factory in Bengal. It is most doubtful, however, whether this will be done; in any case, it is certain that if a branch-Government factory be opened in Calcutta, a fourth one would not be sanctioned for Dacca. Our only alternative therefore is to start a Provincial Tanning and Manufacturing Factory at Dacca. The importance of having a factory doing work on a large scale, with up-to-date appliances and under expert management, which will serve as nucleus for giving a start to the leather industry in this province, is universally acknowledged. In this factory experiments may be made with chrome-tanning as well as in improved processes of bark-tanning. But the factory should have a manufacturing department added to it. Boots, shoes, saddlery may be manufactured in the factory. In this connection it is worthwhile mentioning that the services of Mr. Chatterton's Assistant who manages the Madras Government Tannery are available. As he has acquired a good deal of practical experience we shall do wisely to get this expert.

As in the case of weaving, a number of branch factories under management of District Boards and Municipalities, might be opened at suitable centres. We may start with one at Gauhati or at Mymensingh or Pabna. These factories might employ local *muchis* with some Chinamen workers from Calcutta. These district factories are the best forms of "small schools to teach boot and shoe-making and manufacture of saddlery and harness with modern appliances" suggested by Mr. Chatterji.

Of course, the object to be kept in view in these purely Government factories or semi-Government factories will be to demonstrate the commercial success of such concerns, and as soon as private capital and enterprise are forthcoming, the factories should be made over to private capitalists.

Activity in Bengal.

122. In Bengal four tanning and manufacturing factories have been started by private enterprise within recent years :—

- (1) Mr. Madhu Sudhan Das, Utkal Tannery at Cuttack.
- (2) Mr. Bipra Das Pal Chaudhuri at Maheshganj.
- (3) Dr. Nil Ratan Sircar, National Tannery.
- (4) New Boot and Equipment Factory Company, Limited, to work at Agra.

Mr. Cumming has not therefore recommended the opening of a Government factory in Bengal. In Eastern Bengal only one tannery is being organized, called the Dacca Tannery Work, with a capital of Rs. 50,000, of which Rs. 25,000 have already been paid up. The Managing Director, Babu Sachindra Nath Ghose, who has been trained in the Madras Factory, has acquired some amount of practical experience. The Company has acquired a site, and when I visited the tannery last August, work had already commenced on a small scale. Both chrome-tanning and bark-tanning are being done, and the small quantity of leather turned out finds a ready market in Dacca. In view of the initiation taken by this Company, it might be questioned whether it will not be worthwhile to come to some arrangement with this Company, so that they, under Government patronage and management, should do the work of pioneering the industry in the province. But I am afraid numerous practical difficulties are likely to arise, and it is better to have Government factory to start with.

123. Messrs. Chatterji, Watson and Cumming have all pointed out that in the establishment of small chrome leather factories, the middle class capitalists have a splendid opening. The moment is auspicious for the development of the leather industry, as the *swadeshi* movement has created a large demand for home-manufactured goods. The capital necessary for the equipment of a moderate tannery is not very large, and the raw materials are plentiful. Mr. Cumming has summarized the requisites of tanning factories to be (1) a hide market, (2) a supply of the raw material for tanning, (3) good water, (4) a cheap supply of labour, and (5) local colony of Chamars or *muchis*. It might be possible for such capitalists who intend to start this business to come to some terms with the Local District Boards or Municipalities and start the factory under semi-Government auspices.

124. Lastly, the question of obtaining suitable tanning materials has been discussed, and I agree with Mr. Cumming in thinking that the simplest course will be to increase the quantity of the tanning materials which are locally procurable, and with that object the planting of the *babul* trees as wayside trees, etc., should be greatly extended. The Agricultural Department might also experiment and find out whether the *Cassia auriculata* of Madras which gives a perennial supply and is not destroyed after use like the *babul*, and which gives 23 per cent. of tannin, while the *babul* gives only 16 per cent., will not grow in this province. Experiments may be also made with the Australian Wattle-bark (*Acacia decurrens*) which gives 33 per cent. of tannin, and which is strongly recommended by Mr. Hooper, of the Indian Museum. Mr. Hill, the Conservator of Forests, informs me that the bark of the *sdl* (*Shorea robusta*) yields a good tannin and is gregarious to Assam, but it appears that efforts hitherto made to induce tanners to utilize it have failed. It also appears that *Terminalia chebula*, which has 28 per cent. of tannin, also occurs in Assam.

One hundred and twenty maunds of tanning-bark, valued at Rs. 211, were imported into this province during 1906-07.

---

## CHAPTER IV.

## CARPENTRY.

125. The village carpenter, catering for the ordinary agriculturist, is very often an agriculturist himself, who owns some tools, perhaps a saw and a chisel, and turns out doors, cart-wheels, agricultural implements, such as ploughs, *dhenkis* for husking rice, *ghanis* for the oil mill, and the weavers' looms, etc. Like the village blacksmith, he earns from 5 to 6 annas a day, and under existing conditions is a well-paid artisan. In the last census (1901) 118,151 persons were shewn to be following the profession of carpentry in Assam and the transferred districts of East Bengal. Of these 41,860 were shewn as actual workers, and 4,312 as being partially agriculturists, whereas the dependents numbered 71,979.

126. The boat-makers and dugout-makers are more centralized carpenters, and colonies of these are to be found in one or two villages of most East Bengal districts. On some villages on the Karnafuli river in Chittagong a large number of *sarangas*, *kondas* and *sampan* boats are made, and exported largely to Noakhali, Tippera, and other districts. Malda was at one time a great centre of boat-building, and the industry is still carried on to some extent. In the subdivision of Habiganj in Sylhet special kinds of flat bottomed *sarangas* are manufactured, and great quantities of keels and half-finished boats of *jarul* wood are made for sale at Phandauk Bazar in the Tippera district. Dacca is famous for its "house-boats," and the Dacca mistries are in requisition all over the province either to build, or to supervise the building, of such boats. A fairly comfortable Dacca boat can be constructed for Rs. 1,000.

The making of palanquins and *kharums* (wooden shoes), and wooden plates, or *barkoshes*, for which Dhakadakshin is famous, are also other departments of the village carpenter's profession.

127. The town carpenter has, however, to meet a different class of demand. Here the demand is mostly for—

- (1) articles of furniture;
- (2) house-materials, doors, windows, etc.
- (3) woodwork in connection with tea-gardens and factories.

In most of the towns the local carpenters are able to supply some portion of the demand for woodwork, but in the larger towns, whether the goods are for the use of Europeans or the richer Indians, the quality sought for is superior to that which is locally available. Hence, Calcutta supplies most of the better-class furniture of this province, both of Europeans and the richer Indians. There is not a single firm of high-class furniture and cabinet-makers in the province. There is obviously room for such ventures in places like Dacca, Dibrugarh, Chittagong, and Shillong. Woodwork for houses, such as doors, windows, etc., have also to be largely imported from Calcutta, specially by the Public Works Department. But iron beams have now practically superseded wooden beams for the better class of buildings.

128. Though firms approaching the workmanship of the Calcutta Bow Bazar shops are not to be seen in any town of the province, yet most towns have carpenters' shops, where benches, rude tables and chairs, *taktaposhes*, and bedsteads are turned out. Dacca has naturally the best carpenters' shops, and there are as many as 25 in the town, and the carpenters working in these shops earn from Rs. 15 to Rs. 25 per month. In Dacca there are also some rich timber merchants, who supply timber to the cabinet-makers. In Chittagong there are a number of local shops, and some timber merchants, who get teak and *khair* (iron wood) from Burma. Sloop-building was once an important indigenous industry of the district, but it is now extinct. In Noakhali there are both Hindu and Muhammadan carpenters; the Muhammadans are mostly from Chittagong, who receive pay at the rate of Rs. 15 to Rs. 25 per month. Ordinary almirahs, benches, and tables are turned out at the local shops. The Hindu carpenters of Swaruppur and Gopalpur are reported to be very skilful, and the Swandip carpenters make a speciality of elaborately carved bedsteads.

But the more skilful carpenters of the province are either Chinamen or up-country Punjabis, who have practically monopolised all the work in Assam. The Khasi carpenters are also very good workmen, and do a good deal of work in Shillong. In Shillong the daily wage of a China carpenter is Rs. 2, of a Punjabi carpenter Re. 1-8, and of a native Khasi carpenter, annas 8 to Re. 1.

129. Why does not the middle-class Bengali and Assamese youth (Hindu or Muhammadan) turn to carpentry, instead of being a clerk in the office for a small fixed pay? There are many districts in the province where carpentry is taught in the technical schools, but the attendance in these classes is very irregular, and very few indeed amongst the boys trained at these schools appear to have started independent business of their own. At Comilla only I learnt that some of the passed students of the school had started small shops, and were making a decent living. It is more the want of capital with the majority of these boys, rather than a fondness for clerical life, that compels them to take to any profession that will bring them a ready income.

130. I therefore recommend that instead of the carpentry schools there should be carpentry factories in big stations like Dacca, Chittagong, Dibrugarh, and Shillong. If private capital be not forthcoming, it should be permissible for District Boards and Municipalities to start such factories. These factories should have "some machine plant driven by mechanical power, such as a band-saw, planing and mortising machines." The object of the factories should be both educative and commercial. The furniture, etc., turned out at the factory should be sold, and the business should be run with a view to making it commercially successful. When indigenous capital would be forthcoming, the factories may be sold. An apprentice class for would-be carpenters should be attached to the factory. Chinese carpenters, local mistries and youths who have received training at the existing carpenters' classes, might be employed in the factories. The head carpenter might be a specially trained overseer from Sibpur, or a practical man from Calcutta.

131. There is a very large demand for tea-chests in this province, and quite a number of saw-mills driven by machinery have been set up at Dibrugarh and other likely places for the manufacture of tea-chests. There are four in Dibrugarh owned by Marwaries:—

- (1) The Halketta factory.
- (2) The Dehingmukh factory.
- (3) Two factories at Mahimjanmukh.

I visited the last two factories. In the one owned by Sankar Das, rice-milling was going on, as the timber had not reached from the forest. The man complained that, though he had got a pass for 400 trees, he could only remove 50, on account of difficulties put in his way by the subordinate officers of the Forest Department. Sankar Das has got an engine of 14 horse-power. Both in Sankar Das's mill and the neighbouring mill of Rangopal Das, the proprietors do not seem to have any difficulty about labour, although the men get only Rs. 7 and Rs. 8 and the women Rs. 5. The skilled labourer who saws the timber gets Rs. 12. No use is made of the sawdust, although several commercial uses of sawdust, e.g., preparation "xylolith" for decorative purposes, sawdust bricks, etc., are known in other countries. At Silchar, there were four European saw-mills, but only one, at Fulertol, is now working; it employs 157 labourers. Besides the steam factories, there are five hand-saw factories in Silchar, owned by Muhammadans and by Kyans, employing altogether about 300 carpenters. I visited the factory of Abdul Rekhman. He also complained about the difficulty of getting timber. He was anxious to start a steam factory, for which he said he would want Rs. 20,000, of which he can find Rs. 10,000 himself. Besides tea-chests, of which 30 to 40 thousand are manufactured annually, *taktaposhes* and other articles of furniture are also made at these shops.

As the steam saw-mills at Dibrugarh are all doing so well, there is no reason why one or two steam saw-mills at Silchar should not also prove equally remunerative, yet in Tezpur the business of the saw-mills shows a decline in the last year, for whereas in 1906-07 40,000 tea-boxes, valued at Rs. 33,000, were manufactured, in 1907-08, only 25,000 boxes, valued at Rs. 2,000, were made.

132. Mr. Majid, in his monograph on wood-carving, has described the various kinds of wood-carvings to be found in the Hindu places of worship in Assam, either *Namghurs* or *Kirtunghurs*, and also the carvings in their ordinary furniture, implements and conveyances. The carvings are very poor specimens of art work, but as there is some amount of native talent already available, a department in the proposed carpentry factories should take up carving and engraving. At Comilla I saw some fine specimens of wood-carving in the school, but the price put on appeared to me to be a little too high.



In the Dacca Jail there are some good wood-carvers and carpenters. The carving is now done by local convicts according to patterns left by Burmese convicts who used to be previously employed for this work. It is curious that, in spite of the existence of so many carpenters' schools in the province, there is no other place outside the Dacca Jail where good engraving can be done. I saw a dragon's head being engraved for Lady Fraser in the jail, and was told by the jailer that no other jail in Bengal could produce the same work. On enquiry, I found that a convict doing high-class carpenter's work in the jail, seldom, if ever, keeps up this work after he leaves jail. Want of capital necessary for starting an independent business, and want of demand for such carpenters in any recognised firm, must be responsible for this state of things. This would point to the necessity of some change in the existing system of jail labour, so that the released convict could start a fresh career in the industry which he might have been taught in jail. A certain portion of the profits from his labour might be saved for him, as is the case I understand in Japan.

133. Allied to wood-carving, mention may be made of the industry in manufacturing children's toys. Fairly nice coloured toys are manufactured at Sylhet, and a set of 25 wooden toys sells for Re. 1-4 and the makers make a decent living. There is room for an expansion of this industry.

---

## CHAPTER V.

## POTTERY AND EARTHEN WARE.

134. The indigenous Assamese pottery is very inferior, and here again Mr. Gait finds the reason in the absence of occupational sub-castes like those to be found in Bengal. Two classes of persons—the Hiras (originally Chandals), and Kumars (persons of the Kolita, Kewat and Koch caste), are engaged in pottery in the Brahmaputra valley. In Sylhet and Cachar, the Kumars are a separate potter caste (Navasakh). In Sylhet there are some Musulman potters, known as Khuskis, who prepare *sanaki* for their co-religionists. The total number of potters in the province was shown in 1901 to be 105,036. But almost the entire number also combine agriculture with this profession, in fact in most cases pottery is only a secondary occupation.

135. The methods of the Assam potters are very crude. The wheel used is the old solid wheel, which does not revolve so fast as the new Bengal wheel, with a heavy periphery attached by spokes to the central hub. The firing and the moulding are also very poor. The earth used is glutinous clay (*atha mati*, *palatiya mati*, and *Kumar mati*). In Gauhati, when I discussed industrial questions with some of the leading Assamese gentry of the town, I was told there was no prospect of effecting any improvement in the pottery of the province. The religious observances of the Hindus, they pointed out, require them to occasionally destroy their earthen pots, and thus the flimsy but cheap pottery of the province (from half a pice to 3 pice per ware) serves its purpose, and there will be no demand in Assam for any superior pottery. (The same afternoon I noticed boatloads of earthen ware going up the Bramahputra to Dibrugarh, which had come all the way from Tangail.) The pots, mostly cooking vessels and vessels for carrying water, were fine specimens of country pottery, and I was told each ware will sell from annas 3 to annas 6 and 8, and one boatload will fetch a thousand rupees. The tea-garden coolies are of course the purchasers. In Upper Assam, I found near most tea-garden *hâts*, a colony of Kumbars, who have come from Chupra and other parts of Behar, and are doing very good business. The local Assamese have failed to take advantage of the demand for such articles as pottery, and it has to be met either by import from East Bengal or by manufacture by immigrants. The Sylhet pottery is superior to the Assam pottery, and the potters are both Hindus and Muhammadans. The potters who make clay images of various deities, which are painted in bright colours and worshipped at the various festivals, and small models of elephants and other dolls, make a fair profit; and this branch of the potter's arts is distinctly lucrative all over the province. But in Sylhet also a large amount of pottery is imported from East Bengal.

Good deal of demand among tea-garden coolies.

136. I saw some specimens of earthen rings for wells. They are very inferior to those manufactured in East Bengal.

Rings for wells.

The Assam potters have a lot to learn from the potters of Bengal, the introduction of the better wheel being the most important.

137. In East Bengal, Dacca, Mymensingh, Barisal and Dinajpur produce fine specimens of pottery. In Dacca town there are about 400 families of potters, nearly all Hindus. They complained that their earnings have fallen off lately, owing to a rise in the price of *chan* grass, earth and fuel. In Uzirpur, Barisal, I saw fine specimens of earthen ware, artistic in shape, well burnt, and with a fine shining black and red polish. In Chittagong, where the Muhammadans mostly use earthen dishes, there is a special demand for this class of ware.

Pottery in East Bengal.

In Assam the earnings of a potter come to Rs. 4 to Rs. 6 a month, whereas in Bengal (as in Dacca) he earns about Rs. 10.

Earnings.

138. There is not much scope for improvement in this ancient industry of the province. With the growth of the prosperity of the people, earthen ware are being more and more replaced, amongst the Hindus, by metal ware of copper and bell-metal. It has already been stated that the Muhammadans of East Bengal are beginning to largely use enamelled iron ware for their daily household use, and in Sylhet the better class of Musalmans

Future of the industry.

use china ware. The old earthen *chakis* and lamps have now been almost completely superseded by tin lamps, and in several places I noticed tea garden-coolies using tin dishes and mugs for taking their food and drink.

139. Nor does there seem to be any prospect of our doing much in the higher branches of pottery, of which there has been such a marked development in the sister province. White porcelain is now being manufactured in Bengal from *kaolin*, of which rich deposits are to be found near Rajmahal, Orissa and Gya. The Calcutta pottery works, which is the result chiefly of the enterprise of the Maharaja of Kasim Bazar, is described by Mr. Cumming "as being good example of what is required in Bengal for indigenous development: sufficient working capital, suitable raw material, expert management, and sufficient demand." Glazing, which was considered impossible, is also being successfully done in Bengal. I think the demand for various kinds of china ware—ink pots, insulators, cups, saucers, etc.—is very large in this province, but it is a question whether the business in pottery will be a financial success in this province, having regard to the fact that in all probability the firm will have to import their *kaolin* from Bengal. Though it is true that deposits of *kaolin* are reported to exist in fairly large quantities in two places in the extreme north-east of the province, near Brahmakund; and a fine white clay, apparently of good quality for pottery, also occurs very extensively near the base of the cretaceous rocks at the western end of the Garo Hills, yet these places are so far away from any likely site for pottery works factory that it will be cheaper perhaps to get the clay from Bengal, if a factory were started in this province (either at Chittagong or Dacca), than to depend on the local supply of materials.

## CHAPTER VI.

## INDUSTRIAL ARTS.

## 1. GOLD AND SILVER WARE.

140. Dacca is centre of what industrial arts are to be found in the province. No other class of artisans, however, enjoy the same reputation for skill and fineness of work as the muslin weavers of Dacca. The gold and silversmiths of Dacca have also a great reputation. There appear to be three distinct branches of the industry :—

Dacca gold-work.

- (1) Preparation of ordinary gold and silver ornaments.
- (2) The setting of precious stones in gold.
- (3) Filigree work in gold and silver wire.

The first branch of the industry is still flourishing, probably more so than before; the second is stationary, while the third has greatly declined. The reason for this state of things is to be found in the fact that the demand for ordinary gold jewellery is increasing, and the Dacca workmen are the most skilful, as well as the most reliable workmen in East Bengal. In almost all important towns there is a colony of Dacca workers, and they ply a profitable business. In the Jubilee School at Chittagong I saw a Dacca workman, himself a Kyastha, teaching some Kayastha and Brahmin boys. In the Dacca town there are no less than 50 shops, and some young men are apprenticed to each shop. The master artisan, who is generally the owner of the shop, makes quite a decent income, ranging from Rs. 50 to Rs. 80 a month; and he employs paid artisans who earn from Rs. 15 to Rs. 20 a month. The samples of stone inlaid jewellery I saw were fairly good, but they were inferior to the work of the Calcutta up-country shops like that of Tara Chand in Park-Street, and I have no doubt that the richer noblemen who can afford to buy these articles get their requirements from Calcutta. The examples of filigree work which I saw, an elephant in gold and silver wire, some *atterdans* and dishes, were distinctly good, but the demand for these articles is limited and is daily decreasing. As Messrs. Cumming and Collin have pointed out, the artistic industries of Bengal are not supported as they ought to be, and Indian noblemen appear to be more inclined to patronize foreign production than the arts of the country. Dacca-made silver *hookas* are greatly in demand.

141. In Assam the enamel work of Jorhat is the most well-known type of purely Assamese jewellery. I visited some of the jewellers' shops. They complained that their business was declining, as the higher class of Assamese were giving up Assamese enamelled jewellery in favour of the gold ornaments of Calcutta. Some 200 families, are, however, still engaged in the industry. I was not much struck with either the beauty or finish of the ornaments that were shown to me. At best, they can be described to be very quaint. The precious stones used are, as remarked by Mr. Henniker in his monograph, "neither very precious nor well cut." A detailed account of the Assamese method of enamelling is given in Mr. Darrah's notes "on the industries of Assam." Barpeta is another important centre in Assam, and the Barpeta jewellers make a speciality of their filigree work. The necklaces manufactured at Barpeta (see photograph in Mr. Henniker's monograph) are distinctly attractive, and are sure to have a market, if properly advertised. The Khasis also produce some unique kinds of gold and silver ornaments. The best known Khasi jewellery being a large bead-and-coral necklace. Their silver belts are also very attractive.

Encouragement to this and other art industries.

142. For Bengal, Mr. Cumming has made the following suggestion :—

Indigenous artistic industries at present suffer from want of patronage and want of publicity; and any real encouragement must consist in providing publicity and a ready sale for the articles of the best type. The Indian Museum in Calcutta is Imperial; Bengal has no Provincial museum similar to those in Lahore, Lucknow, and Madras. At the museum of the School of Art there should be an Art Dépôt, where should be exhibited samples of the best work of Bengal craftsmen, with the names and addresses of the makers and the market price. If Government are not prepared to subsidize a private art-ware dépôt in Calcutta, I recommend that Government itself should maintain at the School of Art a model art-ware dépôt. This is done with success in Lahore and Lucknow. Moreover, if similar dépôts were started at divisional headquarters under the auspices of local enthusiasts, some good might be done.

I doubt much, however, if we could stimulate much demand for the art work of this province. The filigree work of Dacca is inferior to the filigree of Cuttack. The art work of Upper India is chiefly patronised by European tourists. A fair portion of them also visit Calcutta, where there is also a certain amount of local demand. If an Art School were opened at Dacca, we may have an "emporium" of the nature suggested by Mr. Cumming, with a branch at Shillong, and if a Bengal emporium were opened, arrangements should be made to set apart some place for the art industries of this province.

## 2. IVORY-CARVING.

143. Jorhat, Barpeta and Sylhet in Assam and Rangpur in East Bengal are the only districts where any ivory-carving is still done. In Jorhat there is only one old man, Fiznur Musalman, who knows the art, and the samples of his handiwork—spoons, paper-cutters, forks and back-scratchers—do not display much skill. He said his ancestors had been brought to Assam by the Hindu Rajas, and as they had been strictly enjoined not to teach the art to any outsider beyond their own families, he is still faithfully carrying out these instructions. Similarly, in Barpeta there is also only one man, Radha Nath Das, who carries on this business, and manufactures pen-holders, combs, dice, sticks, etc. Some of his wares find a sale even in Calcutta. In Sylhet, ivory fans and ivory *sitalpatis* are manufactured by one family. In Rangpur about six families, in Panga, in Lalmonirhat, still do ivory-carving. I saw some fine specimens of ivory thrones for gods made by the Rangpur artists.

144. I have visited the famous shops in Murshidabad, where, perhaps the finest specimens of ivory-carving in India are to be seen, and which supply even the shops of Delhi with carved ivory goods. The shop-keepers complained bitterly of the great falling off in the demand for their wares. If this be the case as regards the ivory work of Murshidabad, it is useless to think of reviving the sporadic and very inferior industry in ivory which still lingers in this province.

## 3. CONCH BANGLES.

145. Dacca is the principal centre of this very old industry. There are about 100 families of Sankharis (conch-shell dealers) at Sankhari Bazar, the principal centre of these artisans, and five families are at Faridabad. About 500 people, including children, live upon this trade. There has been a slight increase in the demand for these articles since the *swadeshi* movement began, but the manufacturers complain that, owing to a rise in the price of shells, their profits have considerably fallen off. There has been no proportionate rise in the price of manufactures. The price of bangles varies from annas 6 to Rs. 2 per pair, and very pretty patterns of bangles and chains are sometimes made to order. The average monthly income of an artisan is from Rs. 8 to Rs. 10. Each one works with his own capital, which seldom exceeds Rs. 100. Shells are imported from Calcutta, and the artisans complain that the Calcutta dealers have raised the rates for the past three years. The present material condition of the Sankharis is anything but satisfactory. Their work is very arduous, imposing severe strain upon patience and limbs. Everything is done by the hand. They have to ply their trade cooped up in the dark and narrow cells in Sankhari Bazar. The artisans suggest that it is possible for Government to help them in the matter, as in some places (*e.g.*, Tuticorin) Government has got the monopoly of shells, and it can dispose of the same at more favourable rates. Prem Chand Sur and Dwarika Nath Nag are the most important dealers at Sankhari Bazar.

In Sylhet and Chittagong a certain amount of this industry is also carried on.

146. The most exhausting and trying part of the industry is the sawing of the conch shells. This is done by holding the shell fast against a small anvil by the big toe, while a heavy saw is passed backwards and forwards like a pendulum by the two hands. I think if a sharp circular steel saw could be turned by a lathe, either by the hand or by steam power, and the conches, which are fairly soft, cut by this process, the work could be much more easily done.

## 4. EMBROIDERY.

147. The embroidery of Assam, and the *jamdani* and *kasida* embroidery work of Dacca, have already been described. A particular branch of this industry is the cap embroidery industry of Dacca. About 250 Muhammadans are supported by this industry. The artisans do not find full occupation for the year, and work only for three or four months. Their average monthly earnings come to Rs. 8 to Rs. 10, but the mahajans do a lucrative business. The embroidery is, however, not held to be so good as that of Benares or Lucknow, and is hardly equal to the Patna work.

## 5. HORN-CARVING.

148. There are three shops in Barisal, where buttons, combs and bangles are made of buffalo horns. The horns are bought locally at the rate of Rs. 10 per maund. The few men employed, earn from 4 to 6 annas daily. In Dacca there are about 150 families of Muhammadans at Amligolah, Nawabganj, and its vicinity, who carry on this industry, which is one of the oldest in Dacca. Horn is bought from the leather merchants at Rs. 12 a maund. The earnings of the artisans are reported to be about Rs. 10 a month. This industry is capable of very great development, and if a small factory were set up in Barisal or Dhubri, where large quantities of buffalo horns are available for manufacturing combs, blades for knives, and other articles from horns, it ought to be a very paying business.

## 6. GLASS CHURIS (BANGLES).

149. This industry is in a very depressed condition in Dacca, chiefly because of the competition with the imported *churis* from Ferojabad. The best kinds sell for Rs. 5 per thousand, while the ordinary kinds sell at Re. 1 per thousand. The artisans say they earn only about Rs. 5 per month.

## 7. MOTHER-OF-PEARLS BUTTONS.

150. This is a new industry started in Dacca, and is an unique example of *swadeshi* enterprise. Oyster shells are bought locally for annas 12 per thousand, and several Kayasthas have taken to this industry. Two gross of small buttons and half a gross of big buttons, can be turned out daily, and the average earnings of the men come to Rs. 15 a month. But there is already a good deal of competition, which is lowering profits. Babu S. Mitra, the son of a pleader, is doing excellent business, and sends out his articles to Calcutta, Bombay, and Madras. The firm of Ruplal Dutta, the Bandemataram Karkhana, and the National Button Factory of Das & Co., besides three or four smaller shops, are also engaged in this business. Small buttons are sold at annas 12 per gross, and the ordinary ones for annas 6. The demand for buttons is very great, and is daily growing. The locally-made buttons are being sold cheaper than imported ones. There is therefore room for expansion of this industry. There is no reason why a paying export trade in buttons should not be established.

## 8. WOOD-CARVING.

151. What little of wood-carving there is has already been mentioned.

## 9. LAC WORK.

152. Lac bangles are made in almost all districts, but in Sylhet toys are made of lac.

## CHAPTER VII.

## MAT AND BASKET-MAKING.

153. For the whole province, including Eastern Bengal Districts, the last census (1901) shows 74,862 persons as being engaged in this industry. Of these 20,048 males, and 16,483 females were shewn to be "actual workers" and 1,198 persons as partially agriculturists and 37,123 as dependents.

154. Sylhet is the great centre of the cane, bamboo and mat-work in the province. Mr. Allen has thus described these industries:—  
Centres of the industry.

The cane and bamboo furniture of Sylhet is cheap and of a good quality; a serviceable chair costing as little as annas 6. Really good cane baskets are also to be obtained in the bazar, and the leaf umbrellas of Sylhet are quite a speciality. They are made of what is known as *Chatta patti* (*licuala peltata*) on a framework of bamboo, but, though they only cost about three annas each, they are being ousted by the imported article, which is more convenient, in that it can be closed, and lasts much longer. Mats are of several kinds, the best quality being the famous *sitalpati*, which is made from the *murta* reed (*maranta dichroma*), and is valued for its coolness and smooth texture. The finest quality of *sitalpati* is manufactured in pargana Chaualis, and commands a fancy price. The *neuli* mats, which are made of split bamboo, are almost as fine as a coarse *sitalpati*, and last a good deal longer. The best varieties of this mat are manufactured in pargana Chapghat, but bamboo mats are usually made of a much coarser quality. Mats are also made from *nal* (*phragmites roxburghii*), a high reed which grows in marshy country; the fine kinds, which are called *chatis* or *maluas*, are used to sit or sleep on, the coarser varieties, known as *dhara*, *katia* or *chas*, are used for partition walls in houses, and are some times laid upon the cow shed floor. There is a considerable export trade in mats, and nearly 140,000 maunds weight of these useful articles are said to have been sent out of the district in 1902-03.

In Mymensingh, in Char Iswardia, about 75 families manufacture a special kind of cane box which commands a great sale in Mymensingh town.

In Nowgong three kinds of mats, viz. *kathe*, *pati*, and *dhari*, are manufactured. About 80 families make *kath* at Bardoa out of *kuhila*, and the price per *kath* varies from 4 annas to Rs. 3-8. *Dharis* are woven of split bamboos by the hill Mikirs, Lalungs, and Kacharis of Duar Bagori, Salona, and Ramuni. Various kinds of *jhapis*, or bamboo baskets, are manufactured all over the district, but the best work is done by about 40 families in *Jhapisojigaon* in Kondoli mauza. The *jhapis* sell from annas 8 to Rs. 5 each, according to its size and the ornamental work on it.

In Silchar, too, there are three firms. Some Muhammadans of Sylhet manufacture cane chairs, tables, and other furniture. During the Volunteers' Meet in February, there is a good deal of demand for these articles, but as there is no export from the district the demand is rather fluctuating. Easy-chairs sell for Rs. 4, and ordinary chairs from Re. 1 to Rs. 3. About half a dozen men work in each of these factories, and earn from Rs. 8 to Rs. 12 a month.

155. The industry is flourishing, and I do not consider that any steps are necessary to help this industry. There is room, however, for one or two factories at places like Chittagong and Dacca for the manufacture of really high-class cane and bamboo work. The cane and bamboo work of the jails (e.g., Dacca, Sylhet, Silchar, Gauhati, and Comilla) are much superior to anything that can be found in the market, and have a fairly large sale. Outside firms ought to be able to sell cheaper than jails. There is a good deal of skilled labour available, so also bamboo and canes. In 1906-1907 the sale of canes from the Government forests realised Rs. 10,292, and most of the cane was exported to Calcutta. Mr. Collins in 1890 expressed the opinion that there is no reason why India should not export a large quantity of fancy and useful basket work. If such an export industry were to be established, this province has more materials and skilled labour than the old province. Perhaps the employment of some Japanese workmen in these factories might help the firm to turn out new designs and better class of goods. In the Comilla Jail, I saw plantain fibre being used in the cane and bamboo furniture, and the effect was artistic.

## CHAPTER VIII.

## FISH INDUSTRY.

156. The fish industry is one of the most important of the indigenous industries of the province. It is still carried on in the old methods, either by individual fishermen, or by a combination of fishermen, working under a middleman, who takes the lease of a fishery, and supplies the boats and nets necessary for carrying on the business, while the fishermen supply the labour. Quite a large population is supported by this industry, as will appear from the following table :—

| Occupation.                   | Actual workers. |         |                          |         | Dependent s.        |
|-------------------------------|-----------------|---------|--------------------------|---------|---------------------|
|                               | Total.          |         | Partially agriculturist. |         |                     |
|                               | Male.           | Female. | Male.                    | Female. |                     |
| 1                             | 2               | 3       | 4                        | 5       | 6                   |
| Fishermen and fish-curers ... | 121,973         | 9,604   | 11,450                   | 344     | 193,981             |
| Fish dealers ...              | 115,987         | 36,336  | 14,608                   | 838     | 236,314             |
| Total ...                     | 237,960         | 45,940  | 26,058                   | 1,182   | 430,295<br>=741,435 |

157. The ordinary fisherman works only in seasons, and sometimes combines agriculture with his caste occupation. The fish-catcher generally earns from Rs. 4 to Rs. 10 or Rs. 12 per mensem, whereas the fish-seller, or *kaori*, who buys from the catchers and sells fish in the markets, generally earns from Rs. 8 to Rs. 15 a month. The profits of capitalists, who take lease of large fisheries, vary from year to year, and according to the quantity of fish caught. But it is considered to be a profitable business, and the contractors generally make profits, ranging from Rs. 500 to Rs. 1,200 a year, on an initial expenditure, ranging from Rs. 1,500 to Rs. 4,000.

158. Special inquiries with regard to the fish industry are being made for the province, and a comprehensive report is very soon expected. In Bengal action has already been taken on the exhaustive and able report of Mr. K. G. Gupta. Before taking any steps in this province, it would perhaps be well to watch the results of the measures adopted in Bengal and Madras.

159. The export of fresh and salted fish (mostly *hilsha*) from such centres as Goalundo and Sara to the Calcutta markets, by the Eastern Bengal Railway, forms the most important item of the fish industry of the province. I have not been able to get exact figures to show the volume of this industry. *Hilsha* is the only fish that is salted. In centres of abundant supply, the fish is cut up into transverse slices (sometimes not entirely severed), salted, put into earthen vessels and transported to those places where the fish cannot be either obtained or transported fresh, half a seer of salt being used for each adult fish. This process preserves the fish for a short period only. Sometimes such fish are brought to village markets for sale, and have to last longer. In such cases, the slices are put into strong brine, which preserves the fish for



about a fortnight. In rare instances only roes of *hilsha* are dried or put into brine and exported.

Amongst other forms of the industry the following may be noted :—

- (1) Preparation of dried fish.
- (2) Preparation of fish-oil,
- (3) Sale of fish-manure.

160. The manufacture of dried fish in this province is almost exclusively confined to the district of Sylhet, where the supply of fish is simply enormous. The centre of the fish industry of Sylhet is the subdivision of Sunamganj, from which place 500,000 maunds of dried fish are reported to be exported annually. A certain amount of fish-drying is also done in the districts of Tippera, Mymensingh, and Barisal. The bony portions of the heads are at first severed, very close to the gills, by women with sharp *daos*; the lower side along the breast is then opened from end to end, the entrails being taken out by hand, and the roes, if any, separated. The fishes are then flatly laid on mats of reeds (called *nol*) in a single layer, and exposed to the sun for four or five days under a net to prevent damage. Of smaller varieties, however, the heads are not severed, and the entrails only pressed out. In some cases they are dried entire. The roes are also dried. They diffuse all the time a foul, unpleasant odour. The dried fish is then transferred and preserved under a shade in shallow ditches of suitable length, with a double coating of mat and straw and disposed of when required.

There is another method of drying fish known as *shidol-sukti*. The dried fish obtained by the above process is washed in tank water in the afternoon, kept over night to allow the water to drain out thoroughly, and next morning transferred in small quantities to big earthen pots, in which it is pressed to layers with a little fish oil, the mouths of the pots being then closed with an earthen lid. One special advantage of this over the ordinary *shukti* is that it keeps soft. This kind of dried fish is appreciated only by the hillmen called Tipperahs. Good varieties of *shukti* weigh a quarter of the weight of the fish. The price of dried fish varies from Rs. 8 to Rs. 13 per maund.

161. The severed heads and entrails obtained in the process of drying are utilised in the manufacture of fish-oil, called *Bishan* or *Ainsh Tel*. It is obtained in two ways: (a) from the heads by boiling them in water in earthen vessels, when the oil liberated from the brains floats on the water, and is collected by shells; (b) from the entrails by heating them in tin canisters. By this latter process the fat of the entrails melts, and the oil, thus obtained, is filtered through a gunny-bag. The heads and the entrails of one maund of fresh fish yield from 2 to 2½ seers of oil. The highest yield of oil is obtained from carps.

162. Fish-oil is used for burning, and gives a soft light. It is denser than mustard-oil but burns longer. It has an unpleasant odour, and is never used for cooking and other purposes. In commerce it is used in the preparation of lubricants for machinery. With the introduction of kerosine oil for burning the price of fish-oil has fallen to Rs. 5 or Rs. 6 per maund, from Rs. 16 or Rs. 17 per maund. Formerly there was a regular export of fish-oil to Calcutta from the centres of *shukti* manufactures, through the agency of wholesale dealers. Thus what was formerly a lucrative business to fishermen has almost died out.

163. Two kinds of beetles eat into the dried fish and gradually reduce it to powder. Large quantities of this fish-powder are annually thrown away from the centres of *shukti* manufacture. It finds a ready market in Rangpur as manure for *tobacco* and other garden vegetables. No other use of fish as manure is known.

164. No trade in fish-skins and fins is carried on in this province, although sharks' fins have a great market in China.

Possible industries in bye-products.

Isinglass can be prepared from the sounds or air-bladders of certain fishes, e.g., a few kinds of *Arius* (e.g., *Arius Gagora*), *Nokora* (*Polynemus Indicus*) and *Soa Bhetki* (*Sesamus Sounerati*), but is apparently unknown in this province. There is thus an opportunity of lucrative business for small capitalists. There is a great demand for sounds in China, and they can also be exported to Europe.

The thorny long tails of some varieties of skates (7 or 8 feet long) make very good whips.

165. But of course the most profitable manner of developing the industry would be to start the curing and preserving of fish according to modern methods. *Hilsa* preserved by the Great Eastern Co. in jars, has already got a large sale. The preserving of *hilsa*, *pabda*, and other suitable fish taken up on a large scale is sure to prove very profitable, as the fish thus preserved is sure to have a large market, not only in India, but also in foreign countries. But improvements in this industry, as in others, must come from enterprising capitalists who will be able to carry on business in a more organised and up-to-date manner, than is possible in the case of the individual fishermen who now carry on the bulk of the industry. It is satisfactory to note that the enterprising firm of Yusuf Essa, of Chittagong and Bombay, is about to undertake the industry on a commercial scale, and has already ordered a trawler from England. The principal business, I am informed, would be to catch the *Lakua* fish for its gelatine. But the firm will also deal in fresh fish, that the trawler might bring in.

## CHAPTER IX.

## INDUSTRY IN AGRICULTURAL PRODUCTS.

## 1. JUTE.

166. For an exhaustive note on the past history of the jute industry, its rise and present dimensions, the reader is referred to the Bengal Maritime Trade Report of 1906-07. The following points might however be noticed :—

Salient features of the jute industry.

- (1) Jute is practically a monopoly crop of India.
- (2) In 1907-08 the total area under jute in India was 3,883,000 acres, with an estimated outturn of 34,235,000 cwt. On the basis of the latest figures, 83·4 per cent. of this monopoly crop was grown in Eastern Bengal and Assam, and the balance in Bengal.
- (3) In 1907-08 the total value of the export of manufactured jute was slightly greater than that of the raw material. It amounted to Rs. 18,29,76,445, whereas the value of the raw jute exported was Rs. 17,97,28,013. But the export from Eastern Bengal and Assam was practically all in raw jute, and amounted to Rs. 22 ~~lakhs~~ <sup>crores</sup> nearly.
- (4) The capital sunk, almost entirely European, in the jute manufacturing industry at the end of 1905-06 was over five crores of rupees; and for the five years ending with 1906 the profits were 74, 64, 51, 96, 109, and 97 lakhs, respectively.
- (5) That in India, besides the 37 mills in Bengal, there was one small mill in Cawnpore, and a larger one in Madras.
- (6) The Calcutta mills are employed chiefly in coarse weaving, whereas those of Dundee are engaged in finer work, requiring high technical skill in manipulation and finish. The manufacture in Bengal consists of gunny bags and cloths.

167. The question naturally arises why, if the bulk of the jute is grown in Eastern Bengal and Assam, there should not be a manufacturing industry in jute started in this province, and why, if jute mills can be started even in Madras and Cawnpur, we should not be able to have jute mills in Chittagong, Chandpur, or Narayanganj. The following note on jute at Narayanganj (kindly prepared for me by Mr. Dawson, I.C.S.), the chief centre of this industry, attempts to answer the question :—

168 There are 20 firms at Narayanganj, engaged in the purchase, baling and supply to Calcutta mills of raw jute; of these, eighteen are in European and two in Native ownership. The operations of these firms consist in purchasing jute from the producer, either through Byaparis, who bring in the jute in their own boats to Narayanganj, usually taking advances from the firm they supply for the purpose, or through the firm's own purchasing stations, which are scattered at convenient places in the interior of the three districts of Dacca, Mymensingh and Tippera. These purchasing stations are manned by the firm's own employes and consist of an office and godowns. The jute is brought in from them periodically by the firm's own boats. In round figures the annual value of the jute purchased, baled and sold through Narayanganj firms, is seven crores of rupees.

It has frequently been asked why jute mills have never been established at Narayanganj, and why the firms prefer to incur the expenditure involved in sending the raw jute to Calcutta for manufacture instead of manufacturing on the spot. There are several reasons which make the establishment of jute mills at a place situated as Narayanganj impracticable. The chief obstacle is the fact that it is absolutely essential for the satisfactory conduct of a jute mill, for the conductors to be in constant and immediate touch with the market. The market for gunnies is concentrated at Calcutta, and the mill-owner at Narayanganj would thus be handicapped from the very start. Another obstacle is the question of labour. Even a moderate-sized jute mill employs about 4,000 hands. The whole of this labour would have to be imported if mills were established at Narayanganj. Considerable difficulty is experienced in the season in maintaining a sufficient supply of labour for the jute presses at present working here, and the difficulty in the case of mills would probably be insurmountable. Further, owing to the fact, stated above, that there is no market for manufactured jute in or near Narayanganj, it would be necessary to transport all manufactured jute to Calcutta for sale, and as the shortage occurring in the process of manufacture is estimated at only 5 per cent., the saving in freight for the consignment of manufactured as opposed to raw jute would be inconsiderable, even if the actual running of mills here were possible. And as an offset to whatever small saving might be made in this way should be placed the great cost of import of coal and mill stores from Calcutta, with the additional disadvantage arising from the absence from Narayanganj of large engineering firms capable at moment's notice of carrying out extensive repairs and alterations of machinery. A jute mill was started some years ago at Serajganj in the Pabna district, but was found unworkable.

Regarding this mill at Serajganj, the Subdivisional Officer says—

The factory was given up, owing to the fact that it fell down during the earthquake, and when the question of rebuilding it was discussed, the Engineers said that it would be almost impossible to build a heavy structure of that sort on the Serajganj soil, without great risk, as there is no suitable ground for a foundation. While it worked, I believe it was very successful, and I do not know that this explanation is satisfactory.

Besides repeating the arguments suggested by Mr. Dawson, the Subdivisional Officer of Chandpur adds—

Only one kind of jute is available locally, but all three principal kinds of jute—Serajganj jute, Narayanganj jute, and North Bengal jute, are necessary for the proper working of a mill. Capital will not come easily to those parts, since capitalists generally are interested in the Calcutta market and the mills on the Hooghly.

In my humble opinion, however, the starting of some jute mills in this province is only a question of time, and with the industrial development of the province, and the growth of the commercial importance of Chittagong, it is most likely that enterprising firms will open branch mills in this province. It may be true that the difference in the freight of raw jute and manufactured jute, does not count for much as far as export from East Bengal to Calcutta is concerned, but when it is remembered that most of the manufactured jute has to be exported from Calcutta to foreign countries, it is quite clear that the advantages of having exporting houses and manufacturing mills at Chittagong or Chandpur, over the mills and the houses near Calcutta, are so great that an enterprising firm will have only to show the way to have its example followed by a large number of the jute merchants of Calcutta. Nor do I think that the labour question, for places like Narayanganj or Chandpur, presents such insuperable difficulties as is imagined. It should be remembered that the mill labour in Bengal mills is almost all imported, and with sufficient inducements, I do not think it will be difficult to attract large colonies of up-country labourers to the comparatively healthy towns in East Bengal. It is to be hoped that when any new jute mills are set up in this province, the finer kind of cloth manufactured at Dundee will also be attempted, and that Indian capital will also have some share in the business.

## 2. SUGAR.

169 The past and future of the sugar industry of Eastern Bengal and Assam is

History and present condition of the sugar industry in India.

perhaps more bound up with the fate of the Indian industry in sugar as a whole, than is the case with other indigenous industries. A brief resumé of the history of the Indian sugar trade will therefore be instructive. The arts of preparing, refining, and crystallising raw sugar have been practised from ancient times in India. When the East India Company began to export the finer qualities of crystallised sugar, their transactions were confined originally to Bengal. Restrictions were placed by the Company on the traffic from Madras and Bombay, it being desired that Bengal should be accepted as the province from which sugar and silk could best be procured. In course of time, however, the British Government found cause to grant special favours to the sugar planters of the West Indies. An import duty was accordingly imposed on Bengal sugar at such a high rate as to render the Indian traffic no longer profitable. This state of affairs continued till about 1885, when the establishment of large refineries in Great Britain created a demand for raw sugar. This new traffic was first organised with Madras, but soon after refineries on European methods and with European capital were established all over India. These for some time successfully contested the Indian markets against imports, but gradually India lost ground and exported less sugar and imported more. In 1904-05 the imports of sugar had swollen from 1,523,890 cwt. (average from 1882-92) to nearly 7,900,000 cwts., whereas export (chiefly of raw sugar for refinement in England) dwindled down to 307,414 cwts. from 1,145,685 (the average for 1882-92). This decline in the cane sugar industry of India in recent years has been chiefly due to the development of the beet sugar industry in continental Europe, and the stimulation of its export by bounties, and also to the increasing export of canesugar from tropical countries, such as Mauritius and Java. The importation of beet sugar to India was, however, slightly checked by the duties applied in 1889 by the Government of India to sugar shipped from any country giving State bounty, and subsequently by the provisions of the Brussels Convention (1902). But causes deeper than the artificial stimulation of the beet-root sugar

Causes of decline.

by bounties have caused the deterioration of the sugar industry of India. For with the comparatively primitive methods of the manufacture still employed, the Indian industry cannot hope to hold her own against the progressive methods employed abroad. It has been calculated

that an acre in India produces 1.25 tons of raw sugar, as against 2 tons in Cuba, 3.44 tons in Java and 4.02 tons in Hawaii. The series of bad years which culminated in the famine of 1901-02, also seriously affected all the sugar-producing tracts, and the reduction of local supplies made it possible for foreign sugar to be sold profitably in the Punjab and Bengal. The latest figures are still more discouraging. For whereas in 1906-07 less than 6 million cwts. of cane sugar were imported into this country, the quantity rose in 1907-08 to 9,250,000 cwts. This expansion in imports of raw sugar was, it is true, associated with a decrease of over 3 million cwts. in the import of beet sugar, but the heavy importation of cane sugar clearly shows that India is being beaten on her own ground.

170. Mr. B. C. Basu, Assistant Director of Agriculture, has written an exhaustive report on the sugarcane industry of the province. For the first part of this note I have chiefly relied on the information collected by Mr. Basu. In the year 1905-06 the entire area under sugarcane in this province was 224,400 acres, or nearly 351 square miles. The provincial average outturn per acre has been estimated to be 24 cwts. of *gur*. The total sugarcane cultivation in British India in 1903-04 was 3,600 square miles, of which there were 1,700 square miles in the United Provinces, 1,000 in Bengal and 500 in the Punjab. The figures given above for this province are only approximate, except for the six districts of Assam, *viz.*, Cachar, Kamrup, Darrang, Nawabganj, Sibsagar, and Lakhimpur, of which accurate statistics are available from the field surveys revised annually.

171 It appears that the cultivation of sugar has rapidly increased in Cachar and in Sylhet time-expired tea-garden coolies have settled in large numbers, and begun to cultivate sugarcane on hilly jungle-covered land, which at one time was considered useless, except for growing thatching-grass. In the Lakhimpur district also the area under sugarcane has undergone considerable expansion within recent years. The sugarcane industry in this district, as well as in the adjoining portions of Sibsagar and Darrang, is now mainly in the hands of Nepalese emigrants. Their custom is to settle down in the midst of a forest, usually on the banks of a river, make a clearing in the forest, grow sugarcane on it, for as long as a single crop which its ratoons will last, and then shift to a new forest site. They are able to produce jaggery so cheap, that the native Assamese cultivators are unable to compete with them. Hence, in those parts of Assam where the Nepalese have taken to sugarcane, the natives of the country have practically abandoned its cultivation. (To this fact may be attributed the slight decrease of area under sugarcane in Sibsagar district, where, of all districts in Assam, the crop was at one time cultivated to a larger extent) Though trustworthy statistics are not available for any of the Eastern Bengal districts, or for Sylhet and Goalpara, it would appear that on the open, well-cultivated parts of the country the cultivation of sugarcane is giving way to jute, which has fetched very high prices within recent year, which is far easier to grow, and gives a quicker return than sugarcane. On the other hand, the cultivation of sugarcane has been rapidly increasing in more backward tracts, where jute does not thrive well, *e.g.*, the foot of the Sitakund range in Chittagong, and the jungly tract of country in Rangpur known as the *barind*.

172 The bulk of the sugarcane crop in the province is grown in small patches of one or two *bighas*, the area of a field being determined by the amount of labour at the command of cultivator. Two European planters, Mr. Cattell and Mr. Brownlow, and a Bengalee planter, Nabin Chandra Sikdar, have large sugarcane farms in Chittagong, and an Assamese gentleman, Srijut Deveswar Gossain, cultivates about 100 *bighas* of sugarcane at Barpathar in the Sibsagar district.

The questions of ascertaining the best varieties to grow and the most profitable methods of cultivation and manuring are engaging the earnest attention of the Agricultural Department, and various experiments are being made at the Government farm at Jorhat.

173. The manufacture of jaggery or *gur* is almost the sole industry with sugarcane which is pursued in this province. The opening up of communications in the interior of the country, and the increasing prosperity of the rural population have greatly increased the demand for jaggery, and also for refined sugar. The local production of jaggery is however quite inadequate to meet the local demand, and large quantities of jaggery and refined sugar have to be imported annually from Bengal and the United

Provinces. The following table shows the average annual import of raw sugar or jaggery into the province for the five years ending with 1905-06 :—

|  | Mds.      |
|--|-----------|
| Assam Valley ... ..  | 101,409   |
| Surma Valley ... ..  | 225,330   |
| Eastern Bengal (three trade blocks—Eastern Bengal, Northern Bengal and Dacca) ... .. | 933,224   |
| Total ...  | 1,259,963 |

The three trade blocks of Eastern Bengal cover a little more than the present territory of Eastern Bengal. In the Provincial Trade Report for 1906-07, the import of unrefined sugar for the whole province has been put down at 986,000 maunds. The United Provinces and Bengal were the chief places from which imports were received.

The average annual imports of refined sugar into the province for the five years ending with 1905-06 were as follows :—

|  | Mds.    |
|--|---------|
| Assam ... ..                               | 80,514  |
| Eastern Bengal (three trade blocks) ... .. | 565,264 |
| Total ...                                  | 645,778 |

For 1906-07 the total imports of refined sugar into the province have been shown to be 822,000 maunds. The different classes of refined sugar imported into the province are :—

- (1) Country sugar which comes mainly from the United Provinces and Behar, and is ordinarily known as Benares sugar.
- (2) Foreign sugar imported through Calcutta.
- (3) Country date sugar from Central Bengal.
- (4) Cossipore sugar from the Cossipore Sugar Factory near Calcutta.

Nearly 80 per cent. of the imports, however, consist of foreign sugar.

174. The process of crushing the canes for the extraction of juice, and the subsequent process of manufacturing *jaggery* have been described by Mr. Basu at length in Part III of his Report. It appears that three descriptions of mills are in use for crushing sugarcane in Eastern Bengal and Assam, *viz.* :— (1) iron mill, (2) the wooden roller mill, and (3) the *ghani* or wooden mortar and pestle mill, the same as is used in crushing oil-seeds. Steam crushing-mills appear to be used in large crushing-mills in Chittagong and Sibsagar. Iron mills have been introduced within the last twenty years. They appear to have completely supplanted the wooden mill in all the districts of Rajshahi division, and in the districts of Faridpur, Bakarganj and the great part of Chittagong division and Cachar. The Nepalese cane-growers of Assam also use iron mills, though among the Assamese cultivators the use of the wooden roller mill is still all but universal. The earlier type of iron mill with two vertical rollers, is slowly giving way to three roller mills which are more effective. Most of the iron mills used in the Rajshahi and Dacca divisions are supplied by Messrs. Renwick and Company of Kushtia. The firm maintains depôts of their own, at different cane-growing centres, and lets out the mills on hire to a group of cultivators. The rate of hire, which is divided by the men who use the mill, generally comes to Re. 1 to annas 8 per diem, and the average expenditure on this account has been estimated at from Rs. 9 to Rs. 30 per acre of cane. The District Engineer of Rangpur has reported that with the softer varieties of cane, the expression obtained by three-roller mill may amount to 65 to 75 per cent. of the weight of cane, while the two-roller mill is not able to express more than 58 per cent. (Experiments made in the Assam Valley show that with the wooden roller mill an average expression of only 48 lbs. of juice per 100 lbs. of cane can be obtained.) The raiyats of Eastern Bengal and Assam do not use any substance for defæccating the juice. The use of lime has been reported from several places, but it is not at all general, the difficulty being that the use of lime turns the *gur* black. The usual form of jaggery made, is the semi-liquid *gur* known in Bengal as *dana* (or crystal mixed) *gur*, and in Upper India as *rab*. Sugar is produced on a very small scale in the province. The only districts, where it is known to be manufactured, are Rangpur and Faridpur. But the *dhura* sugar of these districts hardly deserves to be called sugar at all.

Till quite recently there were no sugar factories in Eastern Bengal and Assam equipped with modern machinery. Since the last two years two small factories with Mr. Hadi's apparatus have been started, one in Golaghat and the other at Dibrugarh. These will be described later on. The sugarcane firms in Chittagong and Sibesar use steam-power mills for crushing the cane only, and *jaggery* is their only product. Two old rum or sugar factories existed many years ago at Gauhati and Dabapar in Goalpara district, but they have now disappeared.

175. Besides the manufacture of *jaggery* and *bhura* sugar, the manufacture of molasses for mixing with tobacco leaves, to make *chillum* tobacco, or *tamák*, is a special industry, pursued at the Panchuria junction in the Rajbari subdivision. Some Muhammadan firms of Shelimar in Howrah, import the refuse scum of cane-juice, after sugar has been manufactured, from Java and Mauritius, and supply it to the merchants at Panchuria in tin canisters. Three hundred and twenty thousand and seven hundred maunds of this juice were imported in 1907. The juice is boiled in large shallow iron vessels till it becomes sufficiently thick. The cost of manufacturing a maund of this substance comes to Rs. 2-10, and it is sold for Rs. 2-12, so that there is a profit of only 2 annas per maund of the molasses sold. There are about 12 Shaha firms who carry on the business, and employ about 100 labourers.

Possibilities of improvement. 176. Improvements in the sugar industry can be effected—

- (1) By improvements in the cultivation of the cane, by the selection of better varieties, by more careful cultivation, and by an extension of the area under the crop ;
- (2) By improvements in the processes of manufacture, in the initial process of crushing juice out of the canes, and the subsequent processes of manufacturing sugar out of the juice ;
- (3) By introducing the factory system, by which production can be carried on on a large scale, with all the incidental advantages of division of labour, better management, etc.
- (4) By the introduction of steam power and modern machinery, and the opening of power-mill factories.

177. As regards the introduction of the best varieties of canes, it has already been pointed out that the subject is engaging the attention of the Agricultural Department. The discovery and application of the most scientific treatment of the various diseases from which this crop suffers, as also the demonstration of the advantages of using manure should be the special care of the Agricultural Department. Mr. Basu is of opinion that the real reason why the raiyats in East Bengal do not resort to more careful cultivation, is to be found in the fact that the raiyats find that they make large enough profits by their present method. More Government agricultural demonstration farms, and some factories either run by Government or private parties, which will have farms attached to them, and where the latest methods of cultivation will be followed, are likely to popularise the use of manures and a more careful cultivation of the crop. An extension of the area of the crop will naturally follow any increase in the profits to be derived from the crop. Jute is ousting paddy and sugarcane from parts of Eastern Bengal, because, taking every thing into consideration, it is more profitable to grow jute.

The importance of extending the area of the crop, and resorting to more careful cultivation may be judged from the following observation in the present year's Trade Report of India :—

As a producer it would seem that India is losing ground. She is far behind all other cane-growing countries in acreage outturn, and unless this is improved, the erection of more factories, for the scientific crushing of cane to supersede the wasteful and primitive methods of manufacture, will not be sufficient to prevent increased competition on part of imported sugar.

178. The second and third points noted above may be considered together. Mr. Moreland, the Director of Agriculture of United Provinces than whom nobody has given more anxious thought to this matter, or whose opinion is more valuable, has said that the industry can be helped forward either—

- (1) by the introduction of large factories consuming cane ;
- (2) or the introduction of factories consuming *gur* ;
- (3) or the improvement of local processes on a small scale.

179. From a theoretical point of view the introduction of the central factory system successfully followed in the most progressive sugar-producing countries, like Hawaii, Java and Mauritius, will no doubt appear to be the surest means of reviving the industry, checking imports and perhaps establishing a flourishing export industry. The chief features of the central factory system would appear to be—

The central factory system.

- (1) The cultivation of large continuous areas with sugarcane, so that they may keep the machinery of the factory fully engaged. The present system of cultivation in India, in patches, is the direct opposite of this system.
- (2) The employment of very powerful roller-mills driven by steam for crushing the canes. In these mills the canes are passed thrice, and as many as 12 rollers are used, the result being that over 90 per cent. of juice can be extracted, whereas under the existing methods followed in India, on an average, only about 55 to 65 per cent. of juice to total weight of cane is extracted.
- (3) The manufacture of sugar straight from the juice, by a process of bleaching with sulphuric acid gas, and liming and subsequent filtering of the juice through cloth bags, the evaporation to a thick liquor, the boiling to grain in the vacuum pan, and the spinning of the wet sugar in centrifugals, all carried out by the most up-to-date machinery driven by steam power. By this method, the maximum amount of sugar and the minimum amount of molasses is turned out, even the crushed cane is utilised as fuel for the furnaces.

The possibility of introducing central factories in India.

180. It should also be remembered that India has two great advantages over the colonies—

- (1) Labour is comparatively cheap, which has all to be imported in the case of the colonies.
- (2) There is a fairly extensive home demand for the produce.

Mr. Moreland, however, thinks that, having regard to the limited capital of most men engaged in the industry, and the difficulty of obtaining such a continuous and large supply of sugarcane at one centre, which a central factory will require, it would probably be impossible, under existing conditions, for such a large factory to be run at a profit in India. It should also be remembered that the sugar factory will only be busy for three or four months in the year, when the canes will be ready for crushing, etc. But it has been suggested that the machinery of the factory can be utilised as an oil-pressing or rice-hulling factory, for the remaining season of the year; or the sugar factory may be a combination factory for manufacturing sugar direct from juice and also for refining *gur* made by the cultivators in the outlying country, and so that the factory would be kept going all through the year.

But taking everything into consideration, for this province, the introduction of some factories like the Cassipore factory and the Cawnpore Sugar Works, which take over *gur* and produce sugar and molasses, would appear to be the most practical line of progress which could be adopted now.

181. Thanks also to the efforts of Mr. Moreland and his able assistant, Mr. Hadi, it appears to be possible to establish a small factory in which sugar will be manufactured straight from the juice, according to the latest methods, with the help of centrifugals, and in which the initial expenditure will not exceed more than a couple of thousand rupees. The consumption of raw material in these mills will not be so great as to be unprocurable with a little management. It would appear that Mr. Hadi's proposed factory can use either steam power or bullock power, and can produce the sugar either direct from the juice, or *rab*, or from *gur*. In the North-West Agricultural Bulletin No. 19 of 1905 a full account is given of Mr. Hadi's method, and it is most satisfactory that in this province, his methods are receiving practical demonstration :—

Introduction of smaller factories. Mr. Hadi's system.

(1) In the Barpathar Farm in Golaghat, and (2) in a small factory at Dibrugarh. The sugar is being manufactured from juice at Golaghat, and from *gur* at Dibrugarh. The following note recorded by Mr. Basu on the trial of the Hadi apparatus at Barpathar will be of great interest :—

The manufacture of *rab* with the Hadi plant was started at Barpathar on the 25th March, and the extraction of sugar with the centrifugal ten days later, *i.e.*, on the 3rd April. Mr. Hadi was good enough to send one of his Inspectors, Babu Hari Sing, to help Debeswar Babu. Up to the 1st



of May, 1,567 maunds of juice had been boiled, yielding exactly 300 maunds of *rab*, and out of the 800 maunds of *rab*, 165 maunds 11 seers 4 chattaks had been machined, yielding 68 maunds 14 seers 11 chattaks of sugar, and 68 maunds 37 seers 10 chattaks of *gur*. The outturn of sugar has amounted to 40 per cent., and that of *gur* prepared from the molasses to 41 per cent. The loss in manufacture amounted therefore to 19 per cent.

The *rab* and sugar made at Barpathar are distinctly superior to those made at Rajshahi. Debeswar Babu has been selling the sugar at Rs. 12 per maund, mostly in small parcels, to Marwari shopkeepers who take it for their own consumption. Good Banaras sugar is landed here at a little over Rs. 11 per maund, and it is not so good as the sugar made with Mr. Hadi's apparatus.

From the statement prepared by Mr. Basu on the data furnished by the working of the factory, it appears that a handsome profit of Rs. 146-13-6 for every 100 maunds of *rab* can be made, in addition to whatever profit the cane-grower might make by converting his crop into *gur*, and selling it as such. It may also be mentioned that the profit from *gur*-making has practically vanished for those who, like Debeswar Babu, grow cane on a large scale and with hired labour.

At Dibrugarh, the Kyan brothers, Brahma Dutta and Durga Dutta, the former being trained by Mr. Hadi for three months, have set up a small factory with a centrifugal apparatus from Jessop & Co., for Rs. 1,150, and which is worked by a two-horse power steam engine. The total initial cost of the concern was Rs. 2,000. From 3 maunds of *gur*, costing Rs. 12, a maund of sugar (selling at Rs. 11) and 1 maund and 32 seers of *rab* (selling at Rs. 3.2 per maund) are manufactured, and the wastage comes to 9 seers. The daily outturn is about 3 maunds of sugar, and the net monthly profit is about Rs. 300.

182. In Eastern Bengal, in Faridpur and Rangpur, I found great keenness to start sugar factories. At Rangpur, the late District Engineer, Possibilities in Faridpur and Rangpur. Babu Ashutosh Lahiri, a most enthusiastic and practical man, is thinking of floating a Joint Stock Company to start a large factory. In a note which he kindly prepared for my use he says—

In Rangpur, where the Honourable East India Company had extensive sugar business, and where there are still remains of some large sugar factories, there are special advantages for a sugar factory, as the district has a belt of country on the two banks of the river Jamuneswari (called Karatoya lower down), specially suited for cane cultivation, and where it is extensively grown.

At Faridpur Babu Ambica Charan Mazumdar discussed the question of the revival of the sugar industry of the district, which according to him was at one time very extensive in Faridpur. In his note he says—

In Kalkini, within the subdivision of Madaripur, there is still large cultivation of sugarcane. Kalkini is a Government *khas mahal*, and very advantageously situated in relation to Madaripur, which is one of the most important marts in East Bengal. I would suggest that a sugar factory should be established at Kalkini with Mr. Hadi's machinery. It would be an excellent object lesson, which is likely to furnish a strong stimulus to private enterprise in other parts of the district, where sugar manufacture may be carried on with advantage. Should the Government, however, for any reason, not feel inclined to take up such a work on its own initiative, the Faridpur public would probably be glad to undertake it, if Government will help them with such aid as may be found necessary.

183. To sum up, I would advocate—

- (1) That the introduction of the best varieties of cane, and more careful methods of cultivating the crop, should receive the special attention of the Department of Agriculture.
- (2) That the Department should employ a special officer whose duty would be to induce riyats to use the most effective roller mills in the market. Mr. Hadi says—

The mills, most suitable for immediate introduction, are the three-roller, Nahau mills, made at the Nahau Foundry, the latest three-roller Behea mill made by Messrs. Thomson and Myln, the four-roller Babu Mill, which can be got from Mr. Simpson of Mallikpur, Bulandshahr, and the three-roller mills manufactured by Mr. George Perfect of Barabanki.

On this point, Mr. Moreland says—

After studying this subject for some years, I have formed the conclusion that no more immediate want exists in the province than the organisation of an agency for the supply of efficient cane-mills and their maintenance in good order in those parts of the province where no such agency exists at present. Such an agency would require to start with—

- (1) a supply of good mills,
- (2) a repair of factories,
- (3) a staff of trained mechanics.

It may be desirable to find out whether, in consideration of a subsidy from Government, Messrs. Renwick & Co., who are already doing business in mills, will not agree to allow supervision by an officer of the Agricultural Department.

(3) That the manufacturers of *gur* should be taught to improve the quality of the *jaggery* now produced by them. On this point Mr. Basu remarks—

“*Jaggery* of excellent quality is prepared at the Burdwan and Sibpur Experimental Farms. The same appliances as are used by the neighbouring cultivators are used, but attention is paid to a few simple details, about which the raiyats are as a rule careless. The juice is received in pots, which are cleaned and sweetened every day; and as soon as the pot is full, the juice is poured into the boiling pan, and kept sufficiently hot to prevent fermentation until the full charge has been collected. The pan used is of iron, and of the shallow circular type now used in many parts of Bengal. The pan is so placed over the fire that its outer six inches or so projects beyond the furnace, preventing the burning of the *jaggery* as it thickens in the pan. After the juice has been clarified, and the first scum that rises has been removed, the boiling is pushed on as fast as possible. The simple method, which entails no additional cost, can be further improved by defæcating the juice with the help of such substances as soda and the extract obtained by crushing the stems of the *Bhindi* plant.”

184. The Agricultural Department, with the help of District Boards, might try to introduce these improvements.

(4) The establishment of several more factories with Mr. Hadi's appliances which have been already found to be a commercial success. The *khas mahal* of Kalkini in Faridpur would be good place. The planters in Chittagong, who have sugarcane farms and produce *jaggery*, might also be induced to have such factories. Sugarcane factories should also be started in suitable sites in Silchar and Sylhet districts, where the cultivation of the crop is growing.

(5) If the opinion of experts be found favourable to such an undertaking, the efforts of the people of Rangpur to start a central factory might be supplemented by Government aid.

(6) The appointment of an expert by Government, to revive this industry in the province will be, I think, fully justified.

### 3. MUSTARD OIL.

185. The following table showing the export of mustard seed out of, and import of mustard oil into, the province will be interesting:—

Area and export of seed.

*Export of mustard seed from, and import of mustard oil into, the Province.*

|             | Upper Assam block. | Lower Assam block. | Surma Valley block. | Khasi and Jaintia Hills. | Bakerganj block. | Rajshahi block. | Dacca block. | Tippura block. | Chittagong Port. | Weight.   | Value.    |
|-------------|--------------------|--------------------|---------------------|--------------------------|------------------|-----------------|--------------|----------------|------------------|-----------|-----------|
| 1           | 2                  | 3                  | 4                   | 5                        | 6                | 7               | 8            | 9              | 10               | 11        | 12        |
| Export..... | 80,012             | 188,430            | 1,765               | ..                       | 10,611           | 0,672           | 4,336        | 279            | ..               | 240,086   | 15,58,308 |
| Import ...  | 11,483             | 11,451             | 98,798              | ..                       | 223,652          | 27,254          | 130,389      | 82,554         | 1,812            | 1,627,218 | 97,38,876 |

The area under cultivation in the province was nearly fifteen thousand acres and the average outturn for the district was 4 cwt. per acre.

The foregoing table is very instructive, and indicates quite clearly the localities where there is need for the manufacture of this oil. The bulk of the seeds appear to be exported from Assam. Some steam oil-mills have been opened in the province, but *prima facie* the above figures clearly indicate that there is room for far greater expansion.

186. As far as I know, there are three oil-mills in Dibrugarh, the first being the Dibru rice and oil-mills owned by a Marwari, the second is owned by a Punjabi Mistry, and has only 12 *ghanis*, and the third is a new venture of an English Company, called the Lakhimpur Oil Company. The last will work on a large scale. Its nominal capital is 2 lakhs, of which Rs. 80,000 have already been paid up. All the shareholders are Englishmen, but two Kyans have shares of Rs. 10,000 each. There are 30 pairs of *ghanis* and the boiler is of 50 horse-power.

187. In Kamrup there are four oil-mills. The first is a Marwari concern and its capital is a lakh. About 180,000 thousand maunds of seed can be pressed in a month, giving 25,000 maunds of oil. The Manager informed me that the local seed yields from 11 to 12 seers of oil per maund,

which is undoubtedly an under-estimate. The oil was being sold at Rs. 19 per maund. The imported oil from Calcutta sells at Rs. 18-8 per maund, the price at Calcutta being Rs. 17 per maund. According to the Manager, the local oil is much purer, but I was credibly informed that this Company had taken to adulterating their oil, which led the Kamrup Industrial and Trading Company, which is almost a purely Assamese enterprise, to start a second mill. This latter mill combines the business of oil-pressing, flour and rice-milling and cotton-ginning. The total outturn of oil last year was 2,590 maunds. The oil-cake is bought up by the tea-gardens. But now, as most of the tea-gardens have small oil-mills of their own for the coolies and for the oil-cakes for manure, the demand for the oil-cakes for this factory is not so brisk. The other two mills in the town are small concerns.

188. We have seen above that the Barisal block consumes 223,552 maunds, or 44 per cent. of the imported oil from Calcutta. There are Mills in East Bengal. two oil-mills, one at Jhalakati and the other at Nalchiti. The first was started in 1905 by Mr. Zügler, but has already changed hand twice. The daily output is from 65 to 75 maunds of oil, and the annual profit is something like Rs. 15,000. The present proprietors paid only Rs. 25,000 for the concern. The mill at Nalchiti has 100 *ghanis*, and the engine is of 40 horse-power. The seed is all bought locally. It is a joint stock concern, with a capital of a lakh, out of which Rs. 85,000 have already been collected.

At Dacca there is a flourishing mill, belonging to Jadu Nath Basak and Brothers the wealthy cloth merchants of the town. A new machine has been purchased through the agency of Martin & Co., and the mill is capable of producing 100 maunds of oil daily. The gross monthly profits come to about Rs. 2,000. Mustard last year was bought at Rs. 6-6 per maund and the oil sold at Rs. 18 per maund. The oil-cakes sell at Re. 1-8 per maund.

It is satisfactory to note that no oil-cakes are exported out of the province, but are used as they should be, either for feeding cattle or manuring the soil.

There are mills at Chappermukh in Nowgong, Chandpur, Saidpur and other parts of the province.

189. Almost all the mills I have visited seem to be doing well. There is room for many more mills in the province, especially in Assam. Profitable character of the industry. There is no reason why Assam should not supply Eastern Bengal with mustard oil instead of Calcutta. As the cost of management is so much cheaper in native firms than in European ones, and as no special expert knowledge is necessary, there is a special field for Indian enterprise in this industry. The points to be remembered, however, are—

(1) Sufficient capital should be laid out, and most efficient machinery should be employed. The Dacca mill before purchase of the new Rustom & Co.'s machinery was a losing concern. In all the mills oil is pressed in *ghanis*, and in some *ghanis* of Neem wood instead of iron ones are still in use. The new mill (Lakhimpur Oil Company) at Dibrugarh thought of employing hydraulic presses for pressing the seeds, but the idea was abandoned. I am informed that a French firm in Calcutta (Messrs. Bagram & Company) is using a new process of extracting oil, and that it is buying up oil cakes from the market, and has succeeded in extracting 8 per cent. of oil from the cakes. The refuse matter, after extraction by the new process, makes better cattle-food and manure, than the ordinary oil-cake. I have not had an opportunity of visiting this firm.

Mr. Cumming advocates the introduction of the recently-invented American continuous-extracting press, which requires an engine of 40 horse-power, and can crush 25 maunds of vegetable oil-seed per hour.

(2) In order that the staff and the machinery should be fully utilised throughout the year, it is very important that the factory should combine such other business as rice-hulling, flour-milling, etc., with oil-pressing. The Assam Trading Company's mill has shown commendable enterprise by combining oil-pressing with rice and flour-hulling and cotton-ginning.

(3) The firm should have some standard of purity of the oil. I cannot understand how the Calcutta firms can manage to undersell the local mills in their own markets. The explanation which has been given to me is that the Calcutta oil is very largely adulterated. If this be the case, and there is still a great demand for it, even in places where better oil is available, the inference is that the average consumer is not over-particular about the class of oil he uses. But I think a certain standard of purity is a

commercial necessity. The Kyan mill at Gauhati is not so popular as the Assam mill, because the public have greater confidence in the purity of the oil of the latter mill.

## 4. TEA.

190. The only manufacture of importance in the province is that of tea. There were at the close of the year 1906-07, 930 gardens in all, 281 in the Surma Valley, 439 in the Assam Valley, 185 in Jalpaiguri, and 25 in Chittagong. During the year (1906-07) 13 gardens were amalgamated with other gardens, and one new garden was opened.

The total area leased by planters was 1,338,753 acres, of which 423,828 were under tea. Of the area actually under cultivation, 407,277 acres, are owned by Europeans and 16,551 by Indians. The area of land newly planted was 6,280 acres, and that of cultivation abandoned 9,940 acres.

The total outturn of tea for the province amounted to 2,07,670,288 lbs. In the Brahmaputra Valley the yield increased from 87,494,884 lbs. to 96,478,490 lbs., and in the Surma Valley from 65,281,934 lbs. to 66,585,473 lbs. In Eastern Bengal the total outturn was 44,606,325 lbs. In 1906 the daily average number of labourers employed was 485,960, of whom 10 per cent. were temporary hands. The average rate of wage earned by Act labourers on the total labour force amounted to Rs. 5-13-1 for men and Rs. 5 for women, and for non-Act labourers Rs. 5 for men and Rs. 3-11-10 for women.

Seven hundred and thirty-three maunds of the seed were exported from the Brahmaputra Valley, and 133 maunds from the Surma Valley. No tea-seed was imported into the province during the year.

The average prices of tea obtained per pound in Calcutta and London, as furnished by the Secretary to the Indian Tea Association, are given below:—

| 1906.         | Brahmaputra Valley. |                  | Surma Valley.       |                  | Jalpaiguri.         |                  | Chittagong.         |                  |
|---------------|---------------------|------------------|---------------------|------------------|---------------------|------------------|---------------------|------------------|
|               | Number of packages. | Price per pound. | Number of packages. | Price per pound. | Number of packages. | Price per pound. | Number of packages. | Price per pound. |
| 1             | 2                   | 3                | 4                   | 5                | 6                   | 7                | 8                   | 9                |
|               |                     | £ s. d.          |                     | £ s. d.          |                     | £ s. d.          |                     |                  |
| London sale   | 680,606             | 0 0 8½           | 304,228             | 0 0 5½           | 223,828             | 0 0 6½           | 5,511               | .....            |
|               |                     | Rs. s. p.        |                     | Rs. s. p.        |                     | Rs. s. p.        |                     | Rs. s. p.        |
| Calcutta sale | 167,068             | 0 6 6            | 262,983             | 0 4 1            | 185,694             | 0 5 5            | 12,061              | 0 4 2            |

The prices for teas from the Brahmaputra Valley and Jalpaiguri showed an increase of one farthing, while those of the Surma Valley showed a decrease of one farthing and of Chittagong of a half-penny. The average price for London sales for the Brahmaputra Valley was 9¼d. compared with 8¾d. in 1905, and for the Surma Valley was 6¼d. and 5¾d., respectively.

191. The prospects of the industry may be described as hopeful. It is reported, however, that expansion is checked by the short supply of labour. The Commissioner of the Assam Valley Division remarks—

“The year (1906-07) was, on the whole, a prosperous one for the tea industry, the yield being generally good, while prices rose in consequence of increased demand, especially for ‘outside’ markets. The prospects of the industry would be good, if it were not for the labour difficulty, which promises to become more acute in the near future.”

The great tea-drinking countries of the world are the United Kingdom, Russia, and the Australian Colonies, and in Russia alone is there much room for development, for, in the other countries the consumption has reached the point at which future increases can only take place with an increase of population. There are also possibilities of increased consumption and expanded trade in the United States and in Persia. It is even possible that in course of time China, which has been so largely superseded as an exporter, may import tea from India and Ceylon, even as India now imports far more sugar than she ever exported. In India itself the demand, which is at present insignificant, may develop considerably, but this will be the work of years. With the exception of some 7,000,000 lbs. mainly consumed by the British troops and by the European and Eurasian communities, all the tea produced in India is exported, the United Kingdom being the best customer.

192. Though the share of Indian capital and enterprise in the development of the tea industry is yet insignificant, yet the industry is the most paying form of business in which Indians are engaged. The following table of Indian gardens will give some idea of the lucrative character of the industry in Jalpaiguri district, for it seems that some gardens declared as much as 120 and 125 per cent. dividends :—

| Serial No. | Names of Companies.                       | Acreage under tea. | Capital. | Net profits. |             | Dividend declared. |           | The balance spent on the improvement of the garden.                       |                                   |
|------------|---|--------------------|----------|--------------|-------------|--------------------|-----------|---|-----------------------------------|
|            |   |                    |          | 1906.        | 1907.       | 1906.              | 1907.     | 1906.   | 1907.                             |
|            |   |                    |          | Rs.          | Rs. a. p.   | Per cent.          | Per cent. | Rs. a. p.   | Rs. a. p.                         |
| 1          | Katalguri Tea Company, Limited.           | 378                | 75,000   | 17,955 4 2   | 29,968 4 2  | ...                | 15        | 17,955 4 2  | 8,718 4 2                         |
| 2          | Atiabari Tea Company, Limited.            | 408                | 75,000   | 14,083 2 11  | 29,368 1 0  | ...                | ...       | 14,083 2 11   | 29,368 10 0                       |
| 3          | Jalpaiguri Tea Company, Limited.          | 539                | 0,000    | 21,230 5 1   | 38,097 9 10 | 8                  | 56        | ...   | To pay commission and bonus, etc. |
| 4          | Northern Bengal Tea Corporation, Limited. | 460                | 85,400   | 15,634 4 9   | 17,870 6 6  | 20                 | 20        | The deficit of the amount of dividend given from the last year's balance. | 790 6 6                           |
| 5          | Anjumari Tea Company, Limited.            | 927                | 1,25,000 | 69,783 1 8   | 77,264 13 0 | 30                 | 33        | 4,283 1 8   | 5,264 18 0                        |
| 6          | Chuniakhora Tea Company, Limited.         | ...                | ...      | ...          | ...         | ...                | ...       | ...   | ...                               |
|            | Chamurohi Tea Company, Limited.           | 490                | 50,000   | 55,000 0 0   | 68,000 0 0  | 100                | 120       | ...   | ...                               |
| 8          | Gurjangkhora Tea Company, Limited.        | 556                | 50,000   | 3,000 0 0    | 65,000 0 0  | 60                 | 125       | ...   | ...                               |

Similarly, in Silchar there are seven gardens owned by Indians : of these Jirighat and Venerpur are making large profits. I have visited two Indian tea estates in Jorhat, the Matejan Tea Estate owned by Faiz Dost Ali, and the Latekoojan Tea Estate owned by Babu Debendra Nath Barua, son, of Rai Bahadur Jagan Nath Barua. Both the concerns are doing well, and at Latekoojan the factory is quite as well equipped with machinery, etc., as most of European factories. The cost of management being much cheaper in native factories than in European concerns, and the price of tea being on the increase, this industry offers a very good investment for Indian capitalists. It is a good sign that some of the best native tea gardens are Joint Stock concerns. I had a talk with some of the managers of these estates, and the reasons assigned by them against any further expansion of Indian enterprise in this industry are said to be—

- (1) difficulty of getting suitable land for tea gardens;
- (2) the exorbitant charges for forest produce made by the Forest Department;
- (3) the shyness of Indian capital to flow into any new channels.

But it is to be hoped that, with the opening up of the country and extended knowledge of the lucrative character of the industry, these difficulties will be successfully overcome.

#### 5. TOBACCO.

193. Tobacco is one of the important crops of the province. For the ten years ending in 1900 the average area under this crop for India was 1,700 square miles, out of which more than half the area was in Bengal. In this province the area under this crop in 1906-07 was 359,404 acres, or 562 square miles. The major portion of the crop is grown in the Rajshahi and the Dacca Division. The area under this crop in Jalpaiguri was 119,600 and in Rangpur 172,000 acres, the average acreage of the latter district being 194,100 acres. 318,515 maunds of unmanufactured tobacco, valued at Rs. 31,97,820, were exported from the

province during 1906-07. Besides the well-known Rangpur tobacco, large quantities of which are exported to Burma for the manufacture of what is known as Burma cigars; *Matamari* tobacco from Chittagong is also sent to Burma for the same purpose.

194. About the year 1829 the East India Company commenced making experiments towards improving the quality of the leaf and perfecting the native methods of curing and manufacturing tobacco. Progress of the tobacco industry. These were repeated, and gradually the industry became identified with three great centres—

- (1) Eastern and Northern Bengal, more specially the district of Rangpur.
- (2) Madras, Trinchinopoly, and other places in Central India.
- (3) Rangoon and Moulmein in Burma.

195. But at the present time, although the bulk of the tobacco is grown in Bengal, little or no tobacco is manufactured there, the bulk of the leaf being exported in the crudely-cured form. Yet in Madras cigars are being successfully manufactured, and the export of cigars from Madras and Burma is expanding daily, and in 1903-04 the export of cigars from India was valued at eight lakhs. Possibility of establishing tobacco factory in the province.

Quite recently, the Peninsular Tobacco Company, financed by an Anglo-American Syndicate, which has already a factory at Karachi, has built a large factory near Monghyr for the manufacture of cigarettes for the million.

196. It is fortunate that a Joint Stock Company with a capital of a lakh of rupees has been floated, called the Rangpur Tobacco Company, Limited. The Company propose for the present to manufacture cigarettes only, but it is also intended to add the manufacture of cigars and snuff to the business of the Company later on. It is estimated that the Company will be able to pay a dividend of Rs. 20 per cent. The Company has recently purchased the machinery, stock, etc., of the Star Tobacco Company, Bombay, of Edalji Warden and Dinshaw Sorabji Warden. The factory will be worked for some time by the men who had been running the Star Factory, till local labour is trained in the industry. The projected Rangpur factory.

Since 1907 experiments have been made in the Demonstration Farm at Rangpur, to grow superior tobacco with seeds from Greece, Sumatra, and other places. It has been shown that the best varieties of tobacco can be successfully grown in the district, and cigarettes of superior quality can be made from them. I tried some of the cigars and cigarettes manufactured at the farm, but the samples given to me did not appear to be very successful. It is to be hoped that the factory will be able to turn out better articles. The tobacco for the cover will, I believe, have to be imported for some time to come.

I understand that the Maharaja of Cooch Behar is also experimenting with the tobacco grown on the estate, with the object of starting a tobacco factory. But there is room for more than one factory in Eastern Bengal. The manufacture of tobacco is a promising industry. The export trade has grown, while local consumption has increased; and if cigarettes can be produced to compete with the cheap qualities now imported in great quantity for native consumption, there seems little doubt that the industry will attain large dimensions. What is essential for success, however, are latest and up-to-date machinery and expert management. It is to be regretted that the Rangpur Company did not import machinery from America or England, instead of buying up the machinery of a firm very little known, and which has apparently failed.

## 6. RICE MANUFACTURE AND WHEAT MILLING.

197. In a paper read before the Calcutta Industrial Conference, Mr. H. Ghosh strongly urged the adoption of up-to-date methods of manufacturing rice, and abandonment of the crude, expensive, and time-consuming methods now in vogue:—

“The conditioning, husking and cleaning of paddy, or the manufacture of rice, as it is briefly termed in America,” says Mr. Ghose, “being associated in this country with the cultivation of paddy, has so far received very little attention. But in America, Burma and Siam it is worked as a manufacturing industry, which is the more correct system, as the processes relating thereto are quite distinct from the agricultural operations connected with paddy. This system, of separating the agriculture and manufacture of a great produce has been adopted in India with regard to wheat, and there are sufficient grounds for introducing it in the case of paddy. The manufacture of rice in this country is an extensive industry. The value of rice produced here far exceeds the value of all the other agricultural produce of India put together.” Suggestion about introduction of “Rice manufacture.”

"This enormous industry is, however, being conducted at present on the most primitive methods, which are extremely slow, laborious, and expensive, to persist in which would not be sound economy. Apart from the question of reducing the cost of production and thereby lowering the price of the staple food of this country, the adoption of the improved method will result in a vast amount of time and labour being saved, which may be more profitably employed in others.

"The indigenous method of rice preparation, in which the pounder (*dheki*) or the mortar and pestle (*hath masuli*) plays an important part, apart from being extremely crude, tedious and expensive, does not yield a clean produce, free from impurities. The average cost of preparation by this method is 6½ annas per maund of rice. This cost increases to about 7 annas for boiled (*ushna*) rice, and decreases to about 6 annas for unboiled or sun-dried (*alloh* or *attab*) rice. The working time required by one person to prepare a maund of boiled rice by this method is about 21 hours."

Then Mr. Ghosh proceeds to explain the method of "conditioning" of paddy by machinery, which again consists of the process of separation or refraction, the soaking process, the boiling operation, and the drying process. After treatment of the aforesaid processes, paddy is brought to a condition fit to be husked. It is said that some of the best rice-milling machines come from America and Burma. As regards the husking process, it is said that on a small scale the most complete and satisfactory husking machine is the Engelberg Huller No. 2, which husks about 60 maunds of medium Bengal paddy in 8 hours. The price of the huller is Rs. 700.

The next process is "cleaning" and then "polishing" for rice that is exported.

"By the processes above stated," concludes Mr. Ghosh, "the cost of rice preparation per maund would be approximately 2 annas 6 pies for unboiled and 3 annas for boiled rice, unpolished, such as would be needed for home consumption. Rangoon millers reckon an average of 3 annas as the cost of preparing polished rice. If a system of artificial drying is introduced, the cost of boiled rice should be reduced by 6 pies approximately. It will, therefore, be evident that, by the introduction of the Rangoon and American systems of manufacture, the price of the greatest staple food of our country will be reduced by about 4 annas on the maund, and an enormous quantity of labour will be set free for more profitable industries."

198. I am not quite so sanguine, however, that by the adoption of machinery the saving in cost or labour will be quite so great as is anticipated by Mr. Ghosh. The interest on the capital sunk in the new industry has not been taken into account. Nor has due allowance been made of the fact that most of the work in connection with the "rice manufacturing" industry finds employment for a large number of females and other members of the family of agriculturists, who are satisfied with very small wages, and for whom it would be difficult to provide any other form of remunerative labour. I therefore suggest that if the industry is to be taken up it should be confined, to begin with, to treating the paddy which is exported from the province in the husk. In 1906-07, in spite of unfavourable agricultural conditions, 393,791 maunds of rice in the husk, valued at Rs. 12, 77,667, were exported.

199. A more suitable industry for this province will, however, be the manufacture of wheat flour by milling wheat by machinery. The total import of wheat into the province amounted to 46,802 maunds, valued at Rs. 1,62,673, and of wheat flour to 453,861 maunds, valued at Rs. 22,83,428. I am informed that Mr. Jas. Stuart of the Assam-Bengal Railway is of opinion that he might be able to arrange to bring down wheat by rail to Gauhati (after the extension to Gauhati is opened) for the same freight as is charged for transport by rail to Calcutta, so if a large wheat mill were started at Gauhati or Dacca, a very profitable industry could be established.

The mill of the Kamrup Industrial Company at Gauhati already does some amount of work in wheat, and 2,962 maunds of wheat flour were milled by them in the year 1907. It is to be hoped that they will extend this part of their business.

## 7. INDUSTRY IN FRUITS AND FRUIT TREES.

200. Mr. Dakhina Ranjan Ghose writes :—

Of all the neglected sources of wealth in India perhaps there is none which requires comparatively speaking so little skill and capital to develop it as the trade in fruits. There are parts of the country where some of the best fruits on earth grow in natural abundance, and with a little skill and culture, they could be brought to grow in perfection. But here again apathy and ignorance are responsible for the utter neglect of an almost boundless source of national wealth.

The above language might be slightly hyperbolic, but there can be little doubt that the planting of orchards and cultivation of fruit trees on a commercial scale, ought to prove a very remunerative occupation to persons who have some capital to invest, and who are fond of leading a healthy and out-door life. In this province, as almost in the rest of India, fruit cultivation as an occupation is seldom resorted to by Indians. Indeed, except in the case of the mango cultivation in Malda, and oranges in Sylhet, most of the fruit orchards are chiefly for private consumption. Yet the industry in the export of fruits and vegetables is by no means insignificant. In 1906-07 fresh fruits and vegetables, valued at Rs. 8,72,435, were exported, and 362 maunds of dried fruits and nuts, valued at Rs. 6,487, were also exported.

201. If we wish to develop the fruit industry we must either find a sufficiently large market for the fresh fruit, or establish an industry in the manufacture of some other article from the fruit besides its demand as fresh fruit. The difficulties in the way of such a development are that there is always a ready sale for most fruit and a ready return for one's investment; and, secondly, that a manufacturing industry in fruit will require much more capital and business knowledge than the average fruit-growers possess. But this is only a portion of the general difficulty. If India is to advance commercially, her people must be prepared to take to more centralised and more highly organised forms of industry than are in vogue at present.

I think industries in the following fruits and fruit-trees, if undertaken on a commercial scale, are likely to pay, and are therefore worth considering :—

#### PINE-APPLE.

202. Pine-apples grow in most parts of the province. The variety known as Japanese pine-apple seems to do splendidly in Nowgong, Tezpur and other Assam Valley districts. Sylhet also grows very fine pine-apples. The Khasi pine-apples are also good. An industry in the preservation of pine-apple in syrup, ought to be a lucrative industry. Tinned pine-apple from Singapur has a large sale.

The pine-apple fibre is also reported to be a valuable article of commerce, and is said to be worth about £30 per ton in London. The difficulty, however, is about extracting the fibre, as no suitable machines appear yet to be in the market.

The Agricultural Department is making experiments in the preservation of Shillong pine-apples, and the following process was adopted :—

The pine-apples were stripped of bark and eyes, and sliced into pieces. The tins were filled with the sliced pieces, which weighed 3 *pawis*. They were then filled in with a syrup consisting of one part sugar and four parts water, brought to boiling point, the syrup weighing about half a seer on an average in each tin. The tins were then closed, leaving only a pin hole on the top. A shallow iron vessel was previously filled in with water, and placed over a fire, till the water reached boiling point. The tins were now dipped into the boiling water in the iron vessel, leaving about half an inch of the can over the water. In a few minutes, bubbles began to ooze out of the hole; the tins were then taken out and the holes closed.

The average cost of canning one tin came to 5 annas in one lot, and 4 annas in the second lot. It is perhaps yet premature to say anything about the value of the experiments which have been made, but results up to now have been very satisfactory.

#### ORANGE.

203. It is well known that the Khasi Hills bordering the Sylhet district grow the famous oranges known as the Sylhet oranges. The export trade in the Khasi orange is in the hands of Bengali traders, who are mostly men of the Sylhet district. During the season the men come up with their boats to the various weekly markets lying at the foot of the hills, and buy up the oranges. The usual wholesale price of oranges varies from Rs. 10 to Rs. 20 per "hundred" which is equivalent to 2,300 fruits. The fruits intended for export to Bengal are taken down to Chhatak, where the bulk is bought up by the wholesale merchants and supplied to Calcutta and Eastern Bengal.

Khasi oranges can be preserved for almost a whole season, according to Mr. Basu, by placing them on a bamboo trellis, suspended from the roof of the house. They are placed thinly on the trellis with a little space between each fruit, and are carefully picked out from time to time. Very few oranges preserved in this manner are however offered for sale. Besides the Khasi oranges, the *Sumathira* sweet orange of Barpathar and Tengakhat in Dibrugarh, is also a well-known variety.



204. I have tasted Speed's Marmalade which is said to be manufactured from Sylhet oranges. The flavour is decidedly superior to the flavour of the English marmalade imported into this country, but fermentation seems to set in very soon after the tin is opened for use. It would seem that there is great scope for opening of a "Marmalade" manufacturing industry somewhere near Chatak.

Manufacture of marmalade.

#### PLANTAIN.

205. There is a large and growing demand for good plantains in all the big towns of the province. Plantain cultivation on a commercial scale ought to be a very paying business. The cultivation of the plantain is a very easy matter, and a field can easily be kept under a crop of bananas for many years. It is true each tree produces one bunch of fruit only, but while it is growing up and maturing its fruit, it is at the same time sending up from its roots other young plants or suckers, perhaps eight or nine in number, and each of these will produce its own bunch in time. The old trunks can be used to manure the farm. The world gets its supply of bananas from the Canary Islands, from Jamaica and from Costa Rica. If a rich fruit Syndicate were formed in India, there does not seem to be any reason why a flourishing export trade in bananas should not spring up. The Rampal (Munshiganj) plantains have a great reputation, and some superior varieties are also grown in South Sylhet.

Demand as fruits.

206. Besides being in great demand as a fruit, the Banana flour, or Bananine, is reported to be an excellent food "specially suited for infants and persons of delicate digestion, yet at the same time possessing a higher value as food than beef." It appears from Mr. T. Ponnombalam Pillai's paper on the plantain industry, that in Cochin and Travancore plantain flour is being used and appreciated.

Other uses.

The plantain fibre is also reported to be capable of many profitable uses. In addition to fabrics of delicate texture, lace and embroidery works, coarse cloths, carpets, and curtains may also, it is reported, be manufactured from this fibre. It appears that a ton of plantain fibre fetches an amount varying from £20 to £35 in the London market. In the Travancore School of Arts plantain fibre extracting machine can be made at the cost of Rs. 10 only. In the Comilla Jail I saw plantain fibre being used to ornament cane and bamboo chairs. Ropes were also being made of this fibre. As the fibre is so easy to separate, and as there are such large numbers of wild plantains in the Cachar hills and other jungles, I think experiments to develop this branch of the industry deserve State attention.

#### MANGO.

207. The district of Malda is well-known throughout India for its mangoes. The ordinary variety known as *Guti* is easily raised from seed, while the superior kinds (*Kalam*) are propagated by grafting. There are a large number of celebrated varieties of mango in Malda, of which the more famous are *Gopalbhog*, *Brindabani*, *Khirsapati*, *Lambabhaduri*, *Jalibandha*, *Kuapaharia* and *Fazli*. Mango cultivation is one of the most important industries of the district. In favourable seasons it forms the chief food of the poorer classes for some weeks. From the latter end of May till the beginning of August most of the inhabitants of the district are directly or indirectly engaged in the mango trade. Mangoes, worth about five lakhs, are exported in favourable seasons, chiefly to Calcutta and Dacca. The estimated area under the mango crop is 50,000 acres, nearly three-fourths of which lie within the radius of ten miles from the headquarter station of the district, to the south-east of the Mahananda, which part is considered specially suited for this crop. The soil to the north-west of the Mahananda, called the *Barind*, is not suited to its favourable growth, and it is notorious that the same grafts when taken to other districts do not yield the same quality of fruits. This industry is steadily extending year after year, as people find it more profitable to grow mango than any other crop. Each tree in a mango orchard can be safely relied upon to yield on an average Rs. 10 per annum if the garden is situated anywhere within easy reach of the town. An acre generally carries about 70 to 80 trees, overcrowding of orchards being the chief defect of the present system of cultivation. It is almost certain that if the trees were more thinly planted, the average yield will be much greater. After six or seven years the income per acre of a mango garden will be at least about Rs. 500 per annum, without any further outlay for eight to ten years to come. Under favourable circumstances, a net profit of over Rs. 1,000 is often obtained from a suitable mango garden.

Locality and nature of industry.

The practice of receiving *dadans*, or advances, and selling the trees in advance, is a quite common custom. Almost all the best fruits are sold out of the district. But the mango crop suffers from vicissitudes of the season, as all other crops, and showers when the trees are blossoming, or high winds when the fruits are just coming on, cause great damage. As a rule there is one good season in three years.

There is also brisk trade in mango grafts, and it is reported that nearly thirty thousand rupees worth of mango grafts are annually exported from the district.

Fruits which cannot be sold at an advantage, are converted into thin cakes, known as *amsat*, the juice being strained, spread on a mat, and dried.

If an enterprising fruit Syndicate were to be formed, and fruits exported to Europe in steamers suitably fitted with refrigerating machines and "Sirocco" fans, much larger profits than are at present made are certain to be realised.

#### THE COCOANUT TREE.

208. The cocoanut grows extensively in the districts of Bakarganj and Noakhali, and also in Chandpur and Chittagong. Separate figures to show the export of cocoanuts are not available, but large quantities of dried cocoanuts are exported to all parts of Assam and Bengal, and from these districts they are generally carried in boats during the rains, and on their return journey the boatmen either bring back oil-seeds or paddy or some other form of merchandise. In such districts as Bogra or Malda each fruit is sold for about 9 pies, and the local shop-keepers sell the same fruit later on for about double the price.

209. From the Trade Report it appears that only 26 maunds of cocoanut-oil, valued at Rs. 512, were exported from the province. In Noakhali a fair quantity of the oil is extracted for home consumption by the following process: The ripe cocoanuts are first of all cut into fine particles by means of an instrument called *kurni*. These are then (a) put into hot water, and (b) compressed with hands, and (c) then the water is wrung out through a thick piece of linen. This process (a), (b) and (c), is repeated so long as the water does not lose its milky appearance and becomes colourless. Then the mixture is boiled and the water evaporates, leaving cocoanut-oil in the pot. Householders who know the process generally manufacture this oil not for sale but for home consumption. In the winter or the dry season 12 cocoanuts will give one seer of oil, whereas in the rainy season not less than 16 nuts will be required to turn out a seer.

210. In connection with this industry, the point which needs inquiry is whether in this province we have a sufficient supply of cocoanuts to make the manufacture of cocoanut-oil a profitable industry. As is well known, the manufacture of cocoanut-oil is a very profitable industry in south India, specially Cochin. The oil-extracting industry is combined with coir-rope-making from the fibre. The method of extracting the oil by drying the fruit and breaking it on a mill is fairly primitive, but the business is paying. There is no doubt that there is a very large demand for the cocoanut fruit for eating purposes in Bengal, but I think it is not improbable that a combined oil and fibre industry will prove to be much more profitable than the present industry in fruit only. For Noakhali it is calculated that there are annually 16,731,600 cocoanuts available for manufacturing cocoanut-oil, from which no less than 26,000 maunds of cocoanut-oil could be extracted of the value of 7 lakhs of rupees. In any case, the entire neglect of the fibre of the cocoanut seems to be such a waste now. Coir cordage ought to be in great demand in the towns, specially Chittagong, yet I was informed that some jails cannot find a sale for the coir ropes they manufacture. An extension of the area under cocoanut would appear to be both simple and profitable.

#### BETEL-NUT INDUSTRY.

211. Bhola, Patuakhali, Noakhali, Chandpur, Madaripur, and Karimganj, are the principal places of production in the province, though a certain quantity grows in almost all the districts of East Bengal. The principal industry is in nuts, and in 1906-07, 418,000 maunds of betel-nuts were exported, 82 per cent. from the Bakarganj block, and 14 per cent. from the Tippera block. It is curious to find that in 1905-06, while only 5 lakhs of maunds of betel-nuts were exported from India, as much as 7 lakhs of maunds were imported into the country. East Bengal ought easily, if a little more trouble were taken, be able to supply this large demand of betel-nuts in the country.

212. A new industry in connection with the betel-nut tree has recently sprung up in some of the districts. The inner skins of the sheaf covering the nut bunches, are being exported to Burma, for cigarette wrappers. In the north-western part of Noakhali, in thanas Raniganj and Lakhipara, trade in this leaf is very brisk. In every market in this locality, the Burmese have set up godowns, where large bales of this betel-nut paper, locally known as *khoi*, are stored. From three centres in Noakhali alone, *viz.*, Sonai, Muri, and Chowmahani, as much as 430 maunds of this paper were exported. It would thus appear that a profitable industry in betel-nut trees can be developed by supplying the demand for cigarette wrappers, which is bound to grow larger every year.

---

## CHAPTER X.

## INDUSTRY IN FOREST PRODUCTS.

## I. RUBBER.

213. Most of the information contained in the first part of this section is taken from a note prepared by Mr. Copeland, Deputy Conservator of Forests.

214. Assam rubber is the product of the *Ficus elastica*, which is indigenous in Assam, and is found as a dominant tree, sparsely scattered, and overtopping the evergreen forests. The commercial value of the article is due to its possessing qualities of elasticity, to its being a non-conductor of electricity, and to being impervious to air and water. It cannot be produced artificially, and no good substitute for it has yet been discovered. Its commercial value was greatly enhanced by the discovery of its property of hardening and getting vulcanized when heated with sulphur. At present the world's demand for rubber is supplied by the Para rubber of Brazil, the Central American rubber (*Castilloa elastica*), the Ceara rubber (*Manihot glazevii*) and the Assam rubber (*Ficus elastica*). The Para and the *Castilloa* rubber are considered to be the best and command the highest price.

215. The India rubber (*Ficus elastica*) was discovered in Assam soon after the country was occupied by the British, and its working out was begun by Europeans as early as the commencement of the tea industry in the province.

The earlier leases for working out India-rubber (from 1852) were given free of payment, the only condition being that a certain number of trees were to be planted by the lessee. In 1863 the first annual lease was made to Mr. C. P. Bruce, of Tezpur, on payment of Rs. 1,525. The industry developed fast, and we find in 1877-78, 10,743 maunds of rubber were exported from the Assam forests. About this time, the collection of rubber from Government forests was prohibited, except from the Garo Hills, though in practice a good deal of rubber came from the Government forests. This fact was recognised, and in 1879 the Inspector General of Forests recommended the sale by public auction of Government rubber in *mahals*, and this system was adopted about 1881. Since 1891-92, after the amendment of the Forest Act, a uniform rate of royalty and duty has been imposed on all rubber produced in Assam, from trees the property of Government, and on rubber imported from beyond the frontier. In the annual settlements, since 1863, the Kyan mahajans have competed with European bidders, and have got the *mahals* oftener than any other traders.

216. At first, Mikirs, who are said to be the best tappers in Assam, were employed on a daily wage of eight annas per day. Nepalese and local Assamese were also engaged, and paid Rs. 30 and Rs. 20, respectively, per maund of rubber collected. At present Garos and local Assamese are employed. They are paid four annas per pound of rubber collected.

217. The native methods of tapping, specially root-tapping, are most destructive, and it is a pity that no stringent rules were passed to prevent the destruction of the natural rubber trees by these destructive methods of tapping. Quite recently, in 1906-07, the duty on root rubber has been raised to Rs. 50 per maund, while the duty on tree rubber has remained the same, i.e., Rs. 17 per maund. But in the meanwhile the mischief has been done, and the natural trees have mostly been killed off, and as a result there has been a marked falling off in the production of Indian rubber, as the following figures will show :—

|         |     |     |     |     |     | Mds.   |
|---------|-----|-----|-----|-----|-----|--------|
| 1877-78 | ... | ... | ... | ... | ... | 10,743 |
| 1905-06 | ... | ... | ... | ... | ... | 4,535  |
| 1906-07 | ... | ... | ... | ... | ... | 2,098  |

Even of this limited quantity, nearly two-thirds of the supply came from the forests beyond the frontier.

218. The difficulty of protecting the natural rubber trees was early recognised, and, in order to maintain the permanency of the supply, it was decided in 1873, to start the artificial cultivation of the tree. Plantations were begun simultaneously at Kuli in the Kamrup district, at Bemoni Hill near the station of Tezpur, and at Charduar, 18 miles north of Tezpur.

In the Kulsi plantation, which has an area of 100 acres, the whole of the capital invested was recovered with compound interest in 1905-06, and the small area has yielded a profit of Rs. 6,580 in 1906-07. The crop of 1907-08 has been sent to England for sale. The Charduar plantation has an area of 2,754 acres.

219. In an article contributed to the IV number of the *Agricultural Journal of India*, Dr. Mann discusses the commercial prospects of the Assam rubber. The following is the concluding paragraph of his paper :—

The prospects are so doubtful and, even if successful, so poor as compared with the culture of *Para* or *Castilloa* rubber in Ceylon, the Malay States or even South India, that one is inclined to consider any large extension of the culture of *Ficus elastica* in North-East India as out of the question. And I must say that this impression has been very strongly confirmed by almost all that I have seen in these districts, if the Assam rubber is to be cultivated as a separate industry. On present evidence, the length of time which it is necessary to wait for returns, the smallness of the returns when they are obtained, the doubt as to the market fifteen to twenty years hence, would seem to make investment in Assam rubber culture, as a separate venture, a very doubtful speculation in North-East India. At any rate, I do not see how, at the rate of outturn obtained now at Tezpur, more than Rs. 15 to Rs. 18 per acre of profit could be obtained per annum, and even if this were multiplied by 4, it would hardly be attractive enough to induce an investor to wait over twenty years for the result. In fact, the only possibility of *Ficus elastica* culture would seem to be as a bye-product to tea culture, on land now waste and unsuitable for tea. In this case, the growth of Assam rubber may afford a means of turning land to profitable account which could otherwise only remain useless to its owners. It may be that future discoveries with regard to improved methods of growth, means of tapping the plants annually without injury, or of growing a larger number of healthy heavily-yielding plants on the same area, may alter the opinion above expressed. But as it stands, and with the data before us, I feel that no other conclusion is possible than that Assam rubber culture can only continue as a dependent of another larger and more profitable industry, and then can only occupy the inferior land.

I had a talk with Babu Manmohon Lahiri of Tezpur about the prospects of this industry from an Indian point of view. He informed me that his Company, the Assam Valley Trading Company, in 1900 lost nearly Rs. 50,000 in this business. They bought the *mahals* for Rs. 22,000, spent about a lakh and fifty thousand in collecting the rubber, and when they wanted to sell they found prices had fallen, and, although the rubber was sent to England, there was a loss of nearly 50,000 rupees. According to Babu Monmahon Lahiri, the industry cannot possibly pay now, as the price of rubber has greatly fallen, being only Rs. 65 per maund in Calcutta, whereas about a couple of years ago it was about 150 rupees per maund. On looking at the *Para* market chart issued by the India Rubber Journal, I find that prices have greatly declined since 1906. It was selling at 5s. 4d. per lb. in 1906, and only at 3s. 2d. in 1908. The cost of collection too has greatly increased, according to Babu Monmahon Lahiri, and now comes to something like Rs. 50 per maund, and after paying the royalty of Rs. 17 per maund, no profit is left. Mr. Copeland, however, informed me that, though the Company lost in 1900, yet some of their servants made handsome profits out of the business, and, according to him, it is quite possible to make a rubber plantation in Assam a paying and profitable concern, if the business is managed properly, and proper methods of collection of rubber are followed.

## 2.—LAC.

220. The Maritime Trade Report of Bengal for 1907-08 contains an exhaustive account of the industry in lac. Mr. E. P. Stebbing's "Note on the Lac Insect" deals with the culture of the insect.

221. The industry is one of the most ancient of the minor industries of India, and is said to have an antiquity of several thousand years. The cultivation and collection of lac was, and is still, almost entirely in the hands of the aboriginal races dwelling in the poorer parts of the country, and the methods of propagation and collection have remained unchanged for centuries. These methods satisfied the Indian demand for the article, and until recent years, the demand of the export trade also. In fact, until comparatively recently there was little foreign demand for lac-resin, as its properties were not fully appreciated. At the beginning of the 19th century, the exports of lac-dye were five or six times more valuable than those of the resin. Between 1868 and 1900 the value of the exports of lac-dye fell from Rs. 4,45,612 to *nil*, while that of the shellac exported rose from Rs. 18,41,491 to Rs. 92,65,600. Lac-dye is now a waste product, and it is hoped in future to avail in whole or in part the troublesome necessity of extracting it by postponing the season of collecting the stick-lac, until after the swarming of the young lac larvæ, to whose presence in the lac cells much of the colouring matter is due. Lac dye has been robbed of its commercial value by the introduction of synthetic dyes.

222. Lac is reared in a varying extent in almost all the districts of the province, but Kamrup and the northern parts of the Khasi and Jainta Hills bordering on the Brahmaputra Valley are the chief seats of the cultivation. In Kamrup lac-rearing is chiefly confined to the south bank of the Brahmaputra. The bulk of the lac exported from the district is, however, obtained from Garos inhabiting the northern slopes of the Khasi Hills, who bring it down to the weekly markets at Palasbari and Chhaygaon and Boko. A small quantity is also brought down by Bhutias to the annual cold-weather fairs at Darranga and Sabankhata in the north of the district. A good deal of lac is also cultivated in Nowgong. In this district it is grown entirely by hill people, mostly Mikirs, in mauzas Kangkhang and Duar Amla, etc., and to a small extent in Jaunanulka. In the Garo hills lac cultivation is confined to about 58 villages. These villages are to the east of the Ghurasi river, and to the south of the Goalpara district. The Akewes and Chisaks are the principal Garo tribes who grow lac.

Sources of supply and method of collection.

223. The lac which is exported from Assam is collected either—

- (1) from natural trees beyond the British frontier,
- (2) from natural trees in the Government forests,
- (3) from trees cultivated chiefly in the *jhums*, and to very small extent on leased land.

In the Garo Hills lac is reared on the *Arkar* (*Cajanus Indicus*) and *Bolmango* (*Grewia Serabida*). There are two crops of lac in the year, namely, the main crop, which is put on the trees in April, May and gathered in September, October, and the minor or the seed crop, which is put on in October and collected in April. The second crop is raised mainly for providing seed for the main or summer crop and leaves little for sale.

The lac is collected by breaking off twigs containing the lac incrustation some days before the young larvæ swarm out.

224. As a rule Kyans, and sometimes other petty traders, purchase lac from the hill people, to whom they advance money. In the Mikir *jhums* near Lumding, Mr. Basu found the simple villagers being ruthlessly exploited by the Kyans, who make advances to them on condition of their returning stipulated quantities of cotton or lac, and they manage to realise two or three rupees in place of one which they advance. Major Howell, however, thinks that there is another side to the picture, and the Kyans sometimes lose money to villagers, who never pay back. The Nepalese last year, however, outwitted the Kyans by arranging to sell directly to Calcutta firms, and not through the local Kyans' firms, who offered ridiculously low rates. At the same time, the Garos who cultivate lac are reported to be doing very well, and the industry is reported to bring a profit of two lakhs of rupees to the 58 lac-growing villages.

225. In the market, a duty of Rs. 2 per maund is realised by the Forest Department from the purchasers. Besides, all purchasers of lac are required to take out licenses by paying a fee of Rs. 3 per license. On this point, Mr. Basu remarks "The duty, though levied on the exports, falls ultimately on the growers. The Kyans at Lumding, I am told, have been using the existence of the duty as a pretext for lowering the price of lac by 2 annas per seer, or Rs. 5 per maund. As far as I have been able to gather, there is no wild lac to be found in the forest, and the plants on which lac is raised have to be cultivated or tended with some care. Considering this, and also considering that the villagers have to pay a house-tax in lieu of land revenue, in virtue of which they acquire the right to cultivate forest land, I fail to see the propriety of levying an additional tax on the produce of their cultivation." The Settlement Officer of Darrang also informed me that the levying of this duty and the granting of licenses to the Kyans have interfered a good deal with the cultivation of lac in Darrang, and no assessments on lac cultivation could be made in some villages. I understand the wisdom of the existing policy of the department is under discussion, and it is to be hoped that some method of collecting revenue will be adopted which will not interfere with the cultivation of this valuable merchandise.

226. Some five years ago (1903), the price of lac went up from Rs. 8 to Rs. 40 per maund. For some months it was even sold for Rs. 60 a maund. This brought about a great extension of the lac industry. But the price has again fallen to Rs. 20 or Rs. 25 per maund. The fall

Prices and volume of the industry.

in the price of lac, the action of the Forest Department, and the advance of the tea industry, which has made the cultivation of bamboo a more profitable occupation, have all tended to restrict the cultivation of lac in Assam, in recent years. In 1906-07, 45,028 maunds of lac, valued at Rs. 22,49,629, were exported from the province.

227. "In India lac enters very largely into the agricultural, commercial, artistic manufacturing and domestic operations of the people. In the village it is used either as a varnish or colour medium in the production of tables, bedposts, chairs, boxes, platters, etc. Silver and coppersmiths, swordsmiths, and carriage manufacturers employ it on their trades. It is used in the painted pottery industry in Bengal, Lucknow and Oudh generally, and in the Punjab, and by jewellers and makers of bangles throughout India. It is extensively used by book-binders and makers of *huka* pipes, and for colouring toys and fans, while marbles, pens, sealing-wax, ink-bottles and imitation flowers and fruits are made out of it. Its use in the form of a spirit varnish is spreading in India among manufacturers of certain classes of articles, such as carriages and furniture, but in this form it is imported from Europe, India not yet having begun to make spirit varnishes, owing to the want of cheap industrial alcohol. In Europe and America it is widely used as a varnish, particularly as a spirit varnish and polish for furniture and metal, as a stiffening material for hats, as an ingredient in lithographic ink, and as sealing-wax. The increasing utilisation of varnish and lacquer in the manufacture of motors, bedsteads, cycles and gramophone records, and as an insulating medium in electrical appliances, has resulted in the demand far exceeding the supply of shellac, with the result that prices have risen rapidly in foreign markets, and much of India's commercial lac is exported either in its crude state or at a very early stage in its manufacture. There is every reason to anticipate a great expansion of the industry. The uses of lac are more likely to be extended than to be restricted, and it is threatened by no rival. The artificial substitute, the discovery of which was announced some years ago in Germany, has not been brought into use. There is further immense scope for the development of the sources of supply. India virtually enjoys a monopoly of the raw article, Indo-China, the only competitor, exporting only an insignificant quantity of an inferior kind."

228. Mr. Stebbing, in his note on the "Lac Insect" says—

It would seem a pity that the question of lac cultivation is not taken up more seriously in Assam. It would appear advisable for the Forest Department to take up the question with the object of showing what can be done by scientific management and by the introduction of better methods of cultivation and collection of lac. The chief improvements required to be made are in the direction of the formation of regular areas of coppice, either from seed or cuttings, which should be worked on a definite rotation. Experiments also required to be made with such shrubs as *Cajanus indicus* (*arhar dal*). It is reported that this latter plant, if sown in November, in Assam, will be fit to plant out at the close of the following rains, the plants being by then stout saplings, averaging four feet in height. Planted in rows 4 feet by 8 feet apart (1,280 to the acre) it will, if well cultivated, be ready to receive the insect exactly two years after first sowing. If this is really the case, and experiments will easily demonstrate the truth of the statement, it is almost inconceivably surprising that the cultivation of lac has been so neglected in the Province of Assam. Further, it is stated that lac reared on *Cajanus indicus*, which is said to be the best lac produced in Assam, can be put on to other lac-rearing plants such, as *Ficus cordifolia*, *Ficus comosa*, *Ficus elastica*, *Ficus religiosa*, *Zerzyphus Jujuba* and *Ficus altissima*. Crops of lac on the *arhar dal* could thus be raised in nurseries in the forest, from which the seed-lac could be put out on to trees in the forest or distributed to the inhabitants of forest and other villages. *The formation of these lac-nurseries is strongly to be recommended in Assam, and in fact in many parts of India, with a view to demonstrating their usefulness to the people, and thus improving the methods of collection and increasing the amounts available for export.*

As regards collection, the exact stage when the lac should be collected deserves more attention. As the lac is required for the resin and not the dye, it is possible that there will be less trouble in removing the dye from the stick-lac if the collection is made after the larvæ begin to swarm out. But no finality on this point appears yet to have been arrived at. In any case, it would take a long time for the uneducated villagers and hill people to change their present custom. Some efforts to improve the existing methods appear to have been made in the Garo Hills, but without success.

229. It is satisfactory to note that Mr. T. E. Severin is trying experiments according to Mr. Stebbing's suggestion in the cultivation of lac. He has begun on a small scale, but has applied for a lease of 400 acres of land. According to him, about 1½ acres of land ought to yield 20 maunds of lac, and ought to bring in about 400 rupees annually. He calculates that if Rs. 50,000 be invested in this industry in the Garo Hills, there will be probably loss for two years amounting to something like Rs. 30,000. But from

the third year the venture ought to pay, until in the fifth the profit ought to be over Rs. 60,000. Mr. Severin has not yet been able to get the capital he wants. He is quite willing to be financed by Indian capitalists, and there would thus seem to be a most profitable opening for Indian capital. The Assam Valley Trading Company told me that they are willing to invest money in any profitable undertaking that could be recommended. I think they could not do better than start this business under Mr. Severin's management.

230. All the lac is exported raw from Assam. If the industry be taken up on a larger scale, the feasibility of starting factories for the manufacture of shellac should be considered. As far as one can see these factories ought to pay in Assam. If factories are started, the suggestion made by Mr. Cumming about the introduction of more mechanical power in the factories should be remembered.

Opening for a lac factory in Assam.



## CHAPTER XI.

## MINERAL INDUSTRIES:

## I. COAL.

231. For information about the area and locality of the various mineral products of the province, I have made extracts from the Provincial Administration Reports. Mr. Bentinck, I.C.S. Deputy Commissioner of Lakhimpur, has sent me an interesting note on the coal and petroleum industry at Margherita and Digboi.

232. The mineral of the first economic importance to Assam is undoubtedly the coal, which is found on the north-western face of the Eastern Naga Hills. The existence of coal here has been known since 1825. The question of opening out the fields was reported on by a coal committee, assembled at Calcutta in 1840 and 1845. The localities were summarily examined by Mr. Medicott, of the Geological Survey, in 1865; and in the seasons 1874-75 and 1875-76 Mr. Mallet, of the same Survey, made a careful inspection of all the coal outcrops from the Tirap to the Desoi river. His report, which contains a detailed description of the several fields, will be found in Volume XII of the Memoirs of the Geological Survey. The coal measures extend along a distance of about 110 miles, but are exposed only where the river valleys have cut into them. Five coal-fields have been described and named by Mr. Mallet, *viz.*, the Makum, Jaipur, Nazira (Dikhu and Safrai), Jhanzi and Desoi fields. The most important is the Makum field on the Dehing river, where the seams reach an immense thickness. Several desultory attempts had, from time to time, been made to work the coal there; but owing to difficulties of labour and transport, due to the uninhabited character of the country and the difficult navigation of the Dehing river, no large quantity had, at any time, been brought out until 1881, when the mine was leased to the Assam Railways and Trading Company, and a railway was constructed from the Brahmaputra at Dibrugarh to the coal measures on the Dehing. Since that time the mines, of which an account is given below, have been vigorously worked, and the output of coal has risen steadily.

A portion of the Dikhu or Nazira field, situated a short distance within the hills south of Sibsagar, whence that river issues, is held on lease by the Assam Company, but, except for the needs of the lessees, has not yet been worked to any extent. The other outcrops, the Jaipur field in the Dehing, which is very favourably situated for working, and the Jhanzi and Desoi fields, which are less accessible from the plains, have not yet been exploited.

Coal has also been found in the Garo and Khasi and Jaintia Hills. This coal is of two very distinct kinds, the older or cretaceous coal and the newer or tertiary in the nummulitic limestone. The largest field of cretaceous coal is situated in the valley of the Someswari in the Garo Hills near Darrangiri. The coal measures cover an area of about 50 square miles, but the only area in which they could be profitably worked is a tract about 20 square miles in area, between Darrangiri and the Ranchi stream. The coal varies very much in quality, and no serious attempt has yet been made to work it.

Cretaceous coal is found in the Khasi Hills, at Maobehlarkhair near Maoplang, at Langrin on the Jadukata river, at Borsora, Wapung, and Leakensmit. The former has been worked several years by the native villagers in a primitive way, for the local supply of the Shillong station, which is some 20 miles away. It is an excellent quality of coal, similar to that found in the Garo Hills, but the seam extends over a small area only. The Langrin seam extends over an area of some 30 square miles, and, being at the foot of the hills, is in a very accessible situation; the seam is, however, only some 3 feet thick. Coal is also found at Langlai and on the Nambor river in the Mikir Hills, but it is poor in quality and would hardly pay to work.

The largest deposits of nummulitic coal in the Khasi and Jaintia Hills are found at Cherrapunji, Laitrengew, Maolong, Mustoh, Maosanram, Maodon, Thanjinath, Lakadong, and Narpo.

The Cherrapunji coal-field has been estimated by Mr. LaTouche (*vide* Records of the Geological Survey, India, Volume XXII, Part III) to contain over, 200,000 tons. Owing to its high elevation (4,560 feet), it is however difficult to arrange means of transport from this field.

The Lakadong field is situated some way to the east, and has been also surveyed and reported on by Mr. LaTouche (*vide* Volume XXIII, Part I, page 4). It is thought that there are about a million tons of coal in this field, but the cost of conveyance to the plains would be considerable.

Coal-beds have recently been discovered in the vicinity of the Shillong-Gauhati road, 8 miles north of Shillong, but the geological system to which they belong has not been determined.

233. The coal-mines are five in number, the property of the Assam Railways and Trading Company. The mines at Ledo Valley, Upper Ledo and Tikak were opened in 1882, that at Namdang in 1897, and a new mine at firap was opened in 1906. The Margherita Digboi coal-mines. The total outturn for the calendar year 1907 was 295,695 tons, against 285,402 tons in the previous year. In the year 1903 the output was 239,328 tons. There has been a steady increase in output of about 1,000,000 tons annually for some years past. The mines gave employment in 1907 to 1,716 labourers, of whom 602 worked above ground and 1,114 below. Labour is all imported and is drawn from widely-extended areas. The majority are Santhals, but at Tikak number of Mekrams are employed. The output might be almost indefinitely increased were additional labour available. The coal is of good quality, little inferior to Welsh, with a high calorific factor: it is, however, finely laminated, and in consequence small. The coal is found in seams running through the hills usually at an angle of 45 degrees or more. All the mining is done into the hill sides, and the galleries generally tend upwards from the entrance. The 80-foot seam at Namdang is claimed as the largest in the world. The coal crops out on the surface at many points, and when so found was gathered by the neighbouring Nagas, but no mining of any kind was done by them. The Company maintains a large plant for brick-making and pottery, using for this purpose the shale found along with the coal seams.

## 2. PETROLEUM.

234. Petroleum is found in the neighbourhood of the coal of Upper Assam. It is a heavy oil, containing a comparatively small proportion of the light illuminating hydro-carbons, but has excellent lubricating qualities, and yields a large proportion of paraffine wax. The earliest experiments in working it were made at Nohor Pung, in the Jaipur field where they were a failure, and near Makum, where a considerable amount of oil was extracted in 1868. A concession for working petroleum in the Makum field was granted to the Assam Railways and Trading Company in 1882-83, and two similar concessions in the same neighbourhood were granted in 1892, one to the Company already mentioned, and the other to a Syndicate. In 1900 the Assam Oil Company was formed and took over these concessions from the original proprietors. A large refinery was erected at Digboi, and a big business is now done in lubricating and illuminating oils, candles and wax, of which a short account is given below.

Besides the petroleum of Upper Assam this mineral is also found in the Khasi and Jaintia Hills, and in Cachar. In the latter district oil is found at Masimpur and Badarpur on the banks of the Barak, and on the Larang, a small stream which rises to the north of Damcharahaja. Traces of it have also been seen at various places in the Saraspur Hills. The natural oil springs, which have long been known to exist in the Khasimara valley on the southern slope of the Khasi and Jaintia Hills, will possibly prove to be of great importance, recent analysis having shown that this oil is free from wax and of high lubricating power.

235. The oil-wells at Digboi and refinery are property of the Assam Oil Company, Limited. Up to the end of 1907, 31 wells had been drilled, The refinery at Digboi. but only a part of these are in operation, the deepest go down over 2,200 feet. The output of crude petroleum in 1907 was 3,156,665 gallons valued at annas 9-5 per gallon. After refinery, the outturn of kerosine oil was 1,484,726 gallons, of lubricating 3,65,910 gallons, of sundry oils 124,458 gallons, of dangerous oils (petrol) 48,017 gallons.

The balance consists of benzines, for which there is no market, as they are heavy and highly inflammable, they are used to a small extent to lubricate machinery, but the bulk is allowed to run to waste.

The kerosine oil is of fair quality, but cannot compete with American. The petrol is of fair quality, but generally heavier than imported petrol; it holds, however, the largest share in the Calcutta market, but under some difficulties, on account of the freight

being heavier than in the case of sea-borne oil. The Company also does a large business in wax and candles, the crude oil being rich in petroleum. The outturn in 1907 was 16,38,649 lbs. Wax is readily exported to Europe and America, and candles are sent in large quantities for use in the South African mines.

Labourers, both at Marghèrita and at Digboi, earn Rs. 10 a month for men and Rs. 8 or Rs. 9 for women.

236. The capital employed in working both the above industries in coal and oil is entirely British, and both industries owe their initiation and development entirely to British enterprise. Both at Margherita and at Digboi the areas available for further development are controlled by the existing Companies.

Possibility of Indian enterprise.

But, as noted above, the coal-fields at Jaipur and the fields near Shillong, for which tenders have been recently invited, are very favourably situated for working, and afford splendid fields for Indian enterprise. The petroleum in the Khasi Hills might also be successfully exploited. It is very satisfactory to note that a Syndicate composed of Indian and English gentlemen propose to work the Khasi oil mills, and with that object have already submitted preliminary applications to Government. I had a talk with Mr. P. Sen, the prime-mover of the Syndicate, and from what I could gather, the Syndicate appear to have got sufficient capital, and have also secured the assistance of qualified experts. It is to be hoped that the Company will soon be able to begin active operations. Besides working the oil mines, the Syndicate want to start operations in coal and lime, and with that object wish to develop the rather primitive means of communication which now connect the southern part of the Khasi Hills with the plain districts. The Syndicate deserve encouragement and help from Government.

### 3. LIME.

237. Next in importance to coal in this province are the vast stores of limestone which exist on the southern face of the Khasi and Jaintia Hills, where the downward-bending strata of the numulitic rock have been worked as a lime-supply from a period long anterior to British rule. "Sylhet lime" was a monopoly of the Mogul Governors of Bengal, and, as such, figures in the early sanads, farmans, and treaties by which the East India Company acquired command over that province. The limestone is found from the exit of the Someswari river in the Garo Hills to that of the Hari river in Jaintia; but it can only be economically worked where special facilities exist for its transport from the quarries to the kiln. The most important of these quarries are those situated on the Jadukata and the Punatrith rivers, which debouch near Laur in Sylhet, the Dwara quarries to the east of these, the Shella quarries on the Bogapani, Sohbar, and Borpunji quarries, which lie immediately under Cherrapunji, and the Utma quarries a little to the east, on an affluent of the Piyan. Those beyond have rarely been worked, the advantages possessed by the quarries nearer the great limestone marts of Chhatak and Sunamganj enabling the latter to undersell them. Altogether, there are 32 limestone tracts, which are separately treated as quarries in the Khasi and Jaintia Hills, one in Sylhet and one in the Garo Hills. The Government is the sole proprietor of all the quarries in the Jaintia and Garo Hills, and the one in Sylhet, as well as eight in the Khasi Hills, the remainder (with one exception) are the joint property of the Khasi rulers or communities and the British Government, the latter administering the estates and reaping half the profits. Limestone is also extracted in small quantities from the Doigrung, a tributary of the Dhansiri, a few miles south of Golaghat. A description of this formation, which has not yet been systematically worked, will be found in the Records of the Geological Survey, Volume XVII, page 31. There are also considerable deposits of good limestone on the Deopani, Hariajan and Jamuna rivers in the Mikir Hills, but they are too inaccessible to repay the cost of extraction.

238. One of the principal difficulties with which Sylhet lime has to contend is the difficulty of transport. The streams that issue from the hills do not admit of the passage of large boats, and the stone has to be conveyed over the rapids in small canoes. Below the rapids, it is generally reloaded on larger boats, and carried down to the Surma river, on the banks of which it is burnt into lime during the cold weather. The kilns are of a primitive description, being mere excavations in the river bank, faced and roofed with clay. The fuel used consists of the reeds and grasses of the swampy tract which stretches along the foot of the hills. There is thus a considerable waste of heat, as the European system, under which the burnt lime is withdrawn from the

Transport and method of manufacture.

bottom of the kiln and fresh stone fed in at the top, is not in vogue. Kilns of this nature would, however, necessitate the use of coal as fuel, and coal would at present cost more than the reed jungle. This industry gives employment to a great number of people, the quarriers being generally Khasis, and the boatmen and lime-burners Bengalis of Sylhet. A certain quantity of limestone is also exported to Calcutta to be burnt there.

239. The importance of the industry may be judged from the fact that over two million maunds of lime and stone were exported from Sylhet in 1902-03. The following figures quoted by Mr. Allen (Gazetteer of Sylhet), give some idea of the cost of the different stages by which limestone cliffs in the Khasi Hills are converted into slaked lime at Calcutta. The approximate charges for laying down 1,000 maunds of stone at Chhatak are—quarrying Rs. 30, dynamite Rs. 2, trollying to river's bank Rs. 10, boating from Therriaghat to Chhatak Rs. 50, and Government royalty Rs. 20. One thousand maunds of stone at Chhatak fetch from Rs. 125 to Rs. 130, and the cost of burning is Rs. 120 to Rs. 150. A Chhatak maund of stone weighs 102 lbs. and yields one *phera*, or about 92 lbs. of slaked lime. The cost of 1,000 nominal maunds of slaked lime at Chhatak is thus from Rs. 245 to Rs. 280, and the price is said to vary from Rs. 290 to Rs. 400. Freight to Calcutta is from Rs. 200 to Rs. 230 per 1,000 maunds.

#### 4. SAND-LIME BRICKS.

240. Connected with the industry in lime, we may refer to the possible industry in the manufacture of sand-lime bricks. The need for building materials in the new province, particularly in the towns of Chittagong and Dacca, will continue to be very great for some time to come. It is worthwhile considering, therefore, whether an industry in sand-lime bricks cannot be established in Chittagong and Dacca. The ingredients necessary are sand and lime. There is plenty of sand both near Chittagong and Dacca, and lime could be taken by river all the way to both places from Sylhet. With the help of suitable machinery, brick factories in America can turn out 19,000 bricks in a day by 14 workmen. An installation of sand-lime brick machinery has already been erected near Calcutta.

Among the advantages claimed for sand-lime bricks are the following :—

No softening when wetted. They do not absorb more than 10 per cent of water, whereas many well proved and tested sandstones will absorb up to 15 per cent. of moisture. Sand-lime bricks harden with age owing to increased combination between the lime and silica and to absorption of carbonic acid, which action practically converts them into silicate of limestone. They are manufactured independently of weather conditions. Only first-class bricks can be turned out. Owing to the bricks being absolutely true and of a good face, it has been estimated—by a very experienced Civil Engineer holding a responsible position in India—that the economy in their use is equivalent to a saving of 150 bricks and 6 cubic feet of mortar per hundred cubic feet of masonry with careful laying. Lime is the most costly item in the manufacture of sand-lime bricks, and this necessarily renders their cost a few rupees per thousand higher than the ordinary first-class clay bricks, but the advantages already pointed out go far to make up for the extra price, when quality and strength of the material are considered.

I think if a Joint Stock Company were to be formed for the manufacture of these bricks, large profits should be made, as the damp climate of this province would appear to make these bricks peculiarly suitable to this locality.

## CHAPTER XII. POSSIBLE INDUSTRIES.

### 1. MATCH FACTORIES.

241. It is fortunate that, at the initiation of the Imperial Forest Economist of Dehra Dun, enquiries have been recently made by the Provincial Forest Department, the object of which has been to ascertain the number and quantity of woods obtainable in our forests, which are suitable for the manufacture of matches, and also to fix upon sites which will be convenient for the opening of the match factories.

Recent inquiries as to available materials for a match factory in the province.

242. While asking for information, Mr. Troup, the Imperial Forest Economist, circulated a note regarding sites suitable for match factories. In this note it was pointed out that match factories might be either for the manufacture of match-sticks only, or for the manufacture of finished matches, in which latter case other materials besides wood have to be brought to the factory. But in either case the essential conditions in choosing a site for a match factory are (1) a sufficient supply of suitable woods in the green state, not dry: these woods should not be too expensive; (2) fairly cheap transport: water-transport is the best, as it is cheap, while the wood remains moist; the wood has to be extracted in the round in logs or pieces at least 1 foot in diameter (excluding bark) and at least 1 foot 2 inches long.

Requirements of match factories.

The best site is one close to the forest, and connected with a railway or navigable river by a good road or other export line.

Mr. Troup also wrote "that he has been informed that the *Bombax Malabaricum* (the Simul tree) cannot be surpassed by any wood in the world for match-making, and that it is superior to the poplar wood, of which Swedish matches are manufactured." A list of 34 trees of wood suitable for match-making, and obtainable in Assam, was also sent round. It was also pointed out that for a match factory the minimum quantity of timber in the rough required annually is—

(1) 35,000 cubic feet of match woods.

(2) 10,000 cubic feet of miscellaneous woods (soft to moderately hard) for making packing-cases.

Total 45,000 cubic feet.

Sufficient fuel is obtainable from wastage in conversion. It has been pointed out by Mr. Kanjilal that for the purposes of the manufacture of matches and match-boxes, it is necessary that the wood should be easy to split and at the same time elastic and strong enough not to break in splitting or in bending to make the boxes, and for matches it is also necessary that it should take fire easily, and should continue to burn steadily with a flame when ignited.

243. From the reports of the Forest Officers of Kamrup, it appears that for a factory for the manufacture of match-sticks only, an ideal site will be on the Kulsi river, about 7 miles from Palasbari. The areas of different kinds of suitable woods available near the place are extensive. For a factory for the manufacture of finished matches North Kamrup, near the crossing of the Manas river by the Gauhati extension, Eastern Bengal State Railway, will be a first-class site. It has also been suggested that Mandakata opposite Gauhati, on the Bornadi, would be an excellent site in the Kamrup Division, as there are large quantities of *Bombax Malabaricum* which could be floated down the Bornadi to Mandakata.

Suitable sites in this province.

In Goalpara, Kokraghar has been suggested. It is on the Eastern Bengal State Railway and the Gaurang river, close to which are evergreen forests, which contains species of woods in any number suitable for the purpose.

For Lakhimpur, Nahorkutya has been recommended to be a first-class site for a match factory for the manufacture of finished matches. Nahorkutiya is on the Assam-Bengal Railway and the Dening river, and is connected by road and river with forests. *Alstonia scholaris*, *Bombax Malabaricum*, *Anthocephalus*, *Kuddamba*, and *Salix tetraspernia* are available in large quantities.

244. As the result of the inquiries already made, I should think that a match factory either in Lakhimpur or Kamrup ought to be a very profitable concern. Specimens of classes of timber considered to be suitable for match-making have been sent to Europe for practical test in match factories. If the result be favourable, profit and loss estimate of a working factory might be drawn up by an expert, and private companies may be invited to take up the business, suitable concessions for the forest produce, etc., being granted by Government.

Indian capitalists might note that since 1907 the *Bandemataram* factory has been started in Calcutta by Dr. Rash Behari Ghosh and Babu Sailendra Kumar Mitra. The wood used is Genwa (*Pexoecoria Agallocha*), but it has to be brought all the way from the Sunderbans. In this province Babu Mohendra Chandra Nandi of Kalikach, in the Brahmanbaria subdivision of Tippera, manufactured matches for some time with the help of a hand-machine invented by himself, and which cost him Rs. 100. The work has been stopped since May last, but I saw some specimens of match-boxes made by Mohendra Babu which were not satisfactory. I understand that about 12 men used to be employed in the concern, and the total outturn for a day was six gross of matches. The factory worked for nearly a year, and the total sale was only Rs. 100 worth of matches. The wood used was *chatian* and *kadam*. The starting of a business like the above is an example of misspent energy, because it ought to have been self-evident that the manufacture of matches as a cottage industry, with the aid of hand-machines, can never hope to compete successfully with the products of large factories employing up-to-date machinery, and steam power to drive them.

## 2. PAPER.

245. There is practically no indigenous paper industry left in the province. The bark-made paper (from the *Sachi* tree) once so extensively used in Assam, is now very rarely used. Its use is now confined to the priestly class, astrologers and horoscope-makers, in the districts of Kamrup, Darrang, and Sibsagar.

The industry of hand-made jute paper is followed by about 15 families in the Shirajganj subdivision of Pabna, in the Patia thana in Chittagong, and in two villages in the Manipur State. The paper-makers in Shirajganj, who carry on the industry during the cold weather only, are reported to earn 60 or 70 rupees per family during the season, and there is a fair amount of demand for country paper amongst the local Marwaris and other mahajans of Shirajganj. The sale price of the hand-made paper seems to be very variable, for whereas it is said to cost only Rs. 7-8 per ream in Chittagong, the paper sells Rs. 14 per ream in Shirajganj and as much as Rs. 30 in Manipur.

But the existing hand-made paper industry of the province has no future, and is bound to disappear altogether in the near future.

246. But the large quantity of bamboos and soft wood procurable in Assam would point to the possibility of opening at least one flourishing paper mill in a suitable site in Assam. Mr. R. W. Sindall's report on the "Manufacture of paper and paper pulp in Burma" is full of valuable and suggestive information.

Result of Mr. Sindall's experiments in Burma. 247. As the result of the careful inquiries and experiments made by him, Mr. Sindall found:—

- (1) That it would take  $2\frac{1}{4}$  tons of bamboos to make one ton of paper pulp, the cost of raw material for one ton of finished pulp being Rs. 10-8, or £1 1s. A ton of unbleached bamboo pulp could be produced for £5 10s. and, inclusive of freight, etc., would cost £7 10s. delivered in London where it is sure to fetch from £8 to £9 per ton, having regard to the excellent quality of the pulp prepared. *The prospects of an export trade in unbleached bamboo pulp for paper-making appear to be excellent.*

The value of the pulp for local use in a paper mill in Burma itself is also undoubted and the manufacture of paper from bamboo pulp as a new industry for Burma is an attractive proposition, especially in view of the large demand for paper and similar products in the populous towns.

- (2) The pulp produced from the Burmese woods experimented with, may certainly find a local use in Burma itself in the manufacture of certain qualities of cheap papers, but would not enter into serious competition with the high-class wood pulp obtainable in England, if exported as paper pulp to that country. Though altogether inferior to the spruce pulp, it would find a sale in outside markets if the selling price was suitable.

Besides wood pulp and bamboo pulp, other vegetable products suitable for the manufacture of paper are the *mung* grass and the *bhabar* grass. These are now being largely used by the Indian paper mills.

248. From enquiries made from the Conservator of Forests, it appears that Assam is almost similarly placed with Burma as regards the supply of soft wood, though the quality and quantity of the bamboo available is perhaps not so large and the quality is also inferior. But still during 1906-07, 12,298,245 bamboos were removed from the forests of the total value of Rs. 29,663. Suitable kinds of grasses are not available, as in Upper India, but wild plantains are most abundant, and plantain fibre may suitably be utilised in place of grass for the manufacture of paper.

249. The following circumstances are in favour of the opening of a paper mill in Assam:—

Favourable circumstances and difficulties.

- (1) There is not a single paper mill in the province. Its demand for paper is large and is likely to expand daily. The import of paper and paste-board into the province last year amounted to 27,774 maunds, valued at Rs. 2,45,635.
- (2) There is abundance of raw materials suitable for the manufacture of paper.
- (3) The existing paper mills in India, which chiefly use (i) rags, (ii) old paper, (iii) *bhabar* grass, and (iv) old hemp cordage, are, for various reasons, such as the existence of plague, meeting with a growing difficulty in getting their raw materials.
- (4) There are specially suitable sites for the location of a "paper mill" in Assam. If Barpathar in Sibsagar, on the banks of the Dhansiri, one of the largest tributaries of the Brahmaputra, were selected, for instance, we will have our mill—
  - (a) close to the raw materials, the area of the reserve forests in the vicinity being alone 45 miles long by 20 miles broad;
  - (b) on the Assam-Bengal Railway line;
  - (c) there will be special facilities of fuel from the forest trees;
  - (d) there will also be facilities for floating down the raw materials by the river Dhansiri to the mill.

The chief difficulty will be, no doubt, about labour, but the mill will probably be able to afford to pay fairly high wages, and there is no reason why, as in the case of tea, the labour difficulty would not be successfully overcome. The cost of the supply of necessary chemicals from England will only be very slightly greater in Assam than in Bengal or the North-Western Provinces.

250. Taking all the above facts into consideration, there seems to be very little doubt that there is a very good opening for a flourishing paper mill in Assam. Yet it is strange that, even in Burma, private enterprise seems to be very diffident, and Messrs. Thomas Routledge, to whom concessions were granted in 1882, and who was the exponent of the suitability of the bamboo pulp for paper, and Messrs. A. Scott & Co., to whom also special concessions were granted in 1894, did not start work. It may interest Indian capitalists to know that one of the most successful paper mills in the United Provinces, the Lucknow Paper Mill, is managed to a large extent by Indians; and Mr. Chatterjee informed me that the Secretary, Mr. B. Sinha, will be very glad to give every information to any one who would like to start a paper business in any other part of India. If, however, private capital be not forthcoming, without some inducement, I have suggested (in Part II) that Government may guarantee interest on the capital invested, for a definite period, and thus help the industry to be established in this province. But, whether Government or private enterprise take up the business, it is absolutely essential that the most up-to-date machinery be employed, for, according to the opinion of an expert, the chief reason of the difficulty which Indian mills find in competing with the papers of the foreign mills, is due to the use of comparatively antiquated machinery by the Indian mills.

### 3. GLASS.

251. The total value of the import of glass and glassware into India in the year 1907-08 was nearly a crore and 44 lakhs, against a crore and 21 lakhs in 1906-07. The imports were only 55 lakhs in 1900-01. The largest quantity of glass comes from Australia, of a cheap quality, consisting of lamps, chimneys, tumblers, cheap table

Demand and supply of glass in India.

glass, etc. The imports from China and Japan consists of bangles, while Belgium sends out sheet-glass for windows. From the United Kingdom comes glass of superior quality and higher price.

252. In 1904, Mr. Wagle made special inquiries with a view to ascertain whether the manufacture of glass would be a commercial success in Bengal. Mr. Cumming has also made special inquiries about glass manufacture. Mr. Wagle pointed out that the materials for the manufacture of glass—fuel, sand, soda, potash, lime—are all available in Bengal.

253. The failure which has hitherto attended efforts to establish the manufacture of glass in India are, in the opinion of Mr. Wagle, mostly due to preventible causes. The industry can be looked upon from two points of view: (1) production, (2) distribution or commerce.

As regards production, Mr. Wagle does not see any reason why factories in India should not be able to manufacture most of the glass which India consumes, and also have an export trade with China, where no glass is manufactured from sand. In order to succeed, however, we must have sufficient capital and suitable expert management for the different branches of the industry; we must select a suitable site, erect proper furnaces, and engage in the manufacture of those special class of goods only which can be most economically produced in the country, and for which there is already a ready market. It is also necessary to take advantage of the latest inventions and machinery. The greatest difficulty in India being the dearth of skilled labour, such inventions like Ashley's patent and Owen's patent, which practically do away with the need of much skilled labour in the manufacture of moulded ware and pressed ware should be largely utilized. The Titagarh and Sodepur glass factories would have done well if, instead of starting with the manufacture of blown glass, which requires a good deal of trained skill, they had started with the manufacture of pressed and moulded glasswares only, such as bottles, plates, chimneys, etc.

But the real difficulty of the situation, according to Mr. Wagle, lies not in the production of glass and glassware, but in successfully competing with the imported articles from foreign markets. For although an Indian firm might succeed in producing the ordinary class of glass and glassware, which now comes from Australia, Germany and Belgium, and make a great saving in freight and breakages, yet the new enterprise in India will find a great difficulty in competing with Germany and other continental countries, where the industry is already well established, and which can afford to sell almost at cost price, especially as the articles imported to India by these countries are of comparatively inferior quality, and the firms concerned make all their profit over the better class of goods which find a sale in Europe.

254. In order to help the pioneers of the glass industry in this unequal struggle, Mr. Wagle suggests that Government should, if possible, impose a duty on imports. He also suggests that all Government requirements should be supplied by Indian firms, and that Government should, in Bengal, themselves pioneer this industry. Mr. Cumming, however, does not think that Government will be justified either in imposing a special import duty, or selecting glass as the industry which they should pioneer. He, however, fully endorses Mr. Wagle's recommendation that the different departments of Government (and it might be added of Municipalities, District Boards) should get all the supply required by them from any firm that might choose to start this business. There are no special reasons in favour of the imposition of an import duty. But as regards Mr. Wagle's proposal that Government should pioneer this industry, I think that, as there are admittedly special difficulties in the way of establishing this industry in India, and as the demand for glass is already a large one, and is expanding so rapidly, the reason is not clear why Government should not render more assistance to any individual or individuals who should like to start a "glass factory" in these provinces. Mr. Chatterji told me that the United Provinces Government was prepared to assist the owners of the "Ambala Works" with a loan of a lakh of rupees, but unfortunately the firm has just failed and stopped business.

Bengal has perhaps some advantages in the supply of coal, etc., over this province, but I think the demand for plate glass is very great in Assam, and I think Gauhati would be a suitable site for the manufacture of glass, and a "glass factory" at Gauhati ought to be a paying concern. In the case of this industry also I have recommended that Government should encourage enterprise by guaranteeing interest on capital for a definite period.



## 4. CHEMICAL WORKS AND ALKALIES.

255. There are no industries in this province connected with chemicals and alkalies.

Mr. Cumming has noted the successful and profitable career of the "Bengal Chemical and Pharmaceutical Works, Limited, Calcutta," which is financed and managed entirely by natives of the country. Besides the manufacture of drugs and acids, the manufacture of laboratory apparatus, which requires skilled craftsmen in wood and metal, has been also taken up by this firm. Of this institution Mr. Cumming remarks "the enterprise shows sign of resourcefulness and business capacity, which should be an object lesson to capitalists of the province." It is greatly to be desired that a branch of this institution should be opened at Dacca with Indian capital and under Indian management.

The following figures show the import of chemicals and drugs into the province in 1906-07 :—

|                                 |     | Maunds. | Value.<br>Rs. |
|---------------------------------|-----|---------|---------------|
| Chemicals (excepting saltpetre) | ... | 90,631  | 4,16,808      |
| Drugs—Medical preparations      | ... | 7,739   | 23,21,480     |

256. I find Mr. Basu has recommended the introduction of small chemical industries, e.g., manufacture of various articles of ordinary use from rubber and also celluloid, varnishes, paints and enamel and perfumery. All these industries will need only moderate capital to start with.

## 5. MISCELLANEOUS.

257. I find Mr. B. C. Basu, Assistant Director of Agriculture, has recommended the introduction of the "manufacture of starch from arrowroot," cassava and potato. Cassava and "arrowroot grow extremely well in Eastern Bengal and Assam," continues Mr. Basu, "and in places potatoes may be obtained at a sufficiently cheap price for the extraction of starch." Sweet "cassava" has also been recommended as food and one Babu Man Gobinda Chaudhuri of Silchar is experimenting with this edible root. For information on the subject of the cassava reference may be made to the Agricultural Ledger (No. 10 of 1904),

Tapioca is made from the better "cassava" after the poison has been extracted by heat. That enterprising gentleman, Babu Man Gobinda Chaudhuri, has also been making various experiments with ground-nut oil, sun-flower oil and numerous fibres, and I think he deserves some encouragement from Government. I know Mr. Hart appreciates his enterprise and will be glad to help him if he can.

In the Government nursery at Shillong lemon-grass oil is being manufactured. I am told it is possible to grow the grass on a commercial scale and make it a profitable business.

I also learnt that experiments will be made by the Forest Department to extract turpentine and resin from the pine forests in the Khasi Hills. Successful experiments have led to the establishment of a Government factory at Nainital. The quality of the turpentine manufactured at Nainital is reported to be excellent. In 1904-05 62,000 trees were tapped in the Nainital Forest division, and they yielded 4,259 maunds of crude resin, or 2'74 seers per tree, 6,128 gallons of turpentine and 3,318 maunds of bye-products (colophony) were manufactured at a cost of Rs. 14,300 and sold for Rs. 26,830. There was thus a large margin of profit, and the industry, according to the Government report, has been an assured success.

Mr. Puran Sing, F.C.S., has been, for the present, appointed the Chemical Forest Expert for this province. He has already published a useful brochure on "The utilisation of Khair Forests." It is to be hoped that the resources of the Government forests, and of the vegetable resources of the province, will be minutely scrutinized by the expert, with a view to enable Government to pioneer industries in the most promising products.

## CHAPTER XIII.

## MISCELLANEOUS INDUSTRIES.

## 1—SOAP.

258. There is only one soap factory in the province with steam machinery, the  
 The Boolbool Soap Factory Boolbool Soap Factory at Gandaria in Dacca. It was  
 awarded first and special gold medal at the Indian Industrial Exhibition, Calcutta, 1906-1907.

It is a purely indigenous concern, the proprietors being Krishna Chandra Saha, Satiya Mohan Das and Akshoy Kumar Das. The business has now been in existence for four years. The Manager, Sarojendra Guha, was trained at the H. Soma Soap factory at Simbaşu, Tokyo. The present working capital of the concern is about Rs. 30,000. There are about a dozen operatives on regular pay, getting from Rs. 8 to Rs. 15 each per month. The establishment cost comes up to about Rs. 1,000 a month. There is a double set of machinery, which cost Rs. 8,000. There are 23 advertised varieties of soaps manufactured here, of which about a dozen varieties are in constant demand. Considering the quality of these soaps, their price is fairly moderate, three cakes of Daffodil (scented soap) selling for 15 annas a box. The outturn may be increased more than fourfold with the present machinery, and there is a market for this additional outturn. But it cannot be done for want of capital. It is a pity that such a promising concern should fail for want of capital. It has been working at a loss for the past three years, the total loss up to, now amounting to Rs. 15,000. There is a slight improvement in its financial condition just at present. The Manager now gets an allowance of Rs. 80 per month, and he has 4 annas share in the profits, though he supplies no capital. Raw materials are purchased at Dacca and Calcutta. The scent and chemicals are foreign, while fat, oil and other ingredients are purchased locally. The firm has a contract with the Eastern Bengal and Assam Government to take all the lemon-grass oil produced in the Shillong farm. The Director told me, however, that they have failed to pay for the oil and thus further supplies have been stopped. This factory has to compete with the newly started Calcutta firms, *e.g.*, the Bengal, the Oriental, the National, and the North-West Soap Factories. It has got almost a monopoly of the Dacca market, though outside Dacca these soaps are not widely used.

Causes impeding success. 459. The following are the main causes of the ill success of the firm :—

(1) Keen and sometimes unfair competition amongst rival firms.

The commission system of these factories is simply suicidal. In order to monopolise the whole market to itself, each factory vies with its rival in allowing the highest rate of commission to its agent, which reaches 30 to 35 per cent. of the cost price. This practice unreasonably raises the market price of these soaps, without benefiting the manufacturers. For instance, the cost price of a box of Daffodils comes to only about 9 annas, but, on account of the high rate of commission, it has to be sold at 15 annas per box. All the profits go to swell the pockets of the agents. It is not only a source of loss to the firm individually, but it is detrimental to the cause of this nascent industry. If this state of things continues, country-made soaps cannot hope to compete long with foreign soaps. Dr. N. Sirkar, who owns the National Soap Factory and who takes such great interest in the industrial progress of the country, also complained to me of similar unscrupulous competition on the part of some of the Calcutta firms. The only solution of this difficulty lies with the manufacturers themselves. There should be something like a trade union amongst them, which should fix the rate of commission allowable to agents and other business details.

(2) Want of capital. Though there is considerable demand in the market, the outturn cannot be increased for want of funds. Concerns like these cannot be successful unless carried on, on a large scale. The factory sometimes borrows capital at 12 per cent., but even at this high rate of interest, sufficient funds are not available.

(3) The factory entered into a contract with one Madan Mahon Keshab Lal Das of Dacca, and made him the sole agent for India for two years. He was, however, to have purchased soaps worth Rs. 50,000 a year from the factory, but he has not taken more than Rs. 35,000 worth of soaps a year, and has made no efforts to extend the sale of the soap outside Dacca. The proprietors have, therefore, quite lately, modified the arrangements with their agent, and are taking steps to secure sale outside Dacca.

The business is in need of immediate financial assistance, and I have elsewhere recommended that a loan of Rs. 20,000, on favourable terms, be granted to the firm.

260. Another factory on a very small scale, called the Indian Soap Factory, has been recently started at Nimtoli by M. W. Takeda, the Japanese soap-maker, who had been so long attached to the Boolbool Factory. His capital is only Rs. 700, and he has not been able to purchase any machines. The soaps are now made by hand. But, though their price is very low, these soaps can hardly compete with machine-made soaps in the market. M. W. Takeda knows all about his business, but cannot proceed further for want of capital.

261. The Assamese, as a rule, have not yet taken to using soap, and although cocoanut-oil fat ought to be cheaper in this province than in Bengal, I do not think any more Indian soap factories need be started till the Boolbool Soap Factory is established on a more sure foundation. That Company should be turned into a joint-stock concern, and more capital should be invited to flow into the business.

262. Besides the factory for the manufacture of toilet soaps, Dacca has long been a famous centre for the manufacture of country washing soaps. More than 100 artisans, all Muhammadans, live upon this trade and earn from Rs. 10 to Rs. 12 per head per month. Ali Mia, Munshi Monir Hosen, Mukdum Bux and Asraf at Farashganj and Abdul Gani at Faridabad are some of the principal dealers. Til oil, animal fat, chalk powder and chemicals are used for the preparation of these soaps. The ingredients are boiled in big caldrons, and sold in lumps at annas 6 to annas 7 a seer. These soaps are in great demand amongst the poor and are largely exported to Assam and Mymensingh. There is no reason why this industry should not be taken up in centres like Gauhati and Dibrugarh.

## 2. DAIRIES.

263. There are three successful dairies in Shillong—the first belonging to Golam Hyder & Sons, which is really the old Government dairy, which was sold to them in 1900. The second one belongs to Jammatullah and Sons, and the third to Sharat Goala, a man of Sylhet. All the three dairies use English machines, the centrifugal cream-separator and the English churn. A chattak of butter is obtained from a seer of milk, and a pound of cream or butter is sold at Re. 1-2 per lb. Almost all the butter and cream produced by the three dairies are locally used up. A very small amount of butter is also tinned and finds a ready market in Dibrugarh and other parts of Assam. All the three dairies are profitable concerns. They were lately inspected by an expert, and it is to be regretted that the precincts of the farms, and the appliances, were found in a dirty condition. Dairy farmers must realize that cleanliness is the first requisite of a successful dairy business.

At Silchar there is a small dairy belonging to one Babu Asvini Kumar De. He also uses the centrifugal separator and makes butter and ghee, most of which is used up locally. The Deputy Commissioner says that it is a much appreciated enterprise, the product being generally excellent. The firm also exports about 100 lbs. of butter to Dibrugarh. His monthly income is Rs. 50 to Rs. 80.

At Dibrugarh itself an attempt is being made to start a small dairy.

264. There is a splendid opening for dairies at Dacca and Chittagong, where the local demand for all kinds of dairy produce, including milk, is very great. Good milk sometimes sells at 2 seers for the rupee in Dacca. In Dhubri district, there is a great opening for a successful dairy to supply Calcutta, East Bengal and Assam with ghee and butter. Excluding the permanently-settled areas, the figures for the Eastern Duars in the Dhubri district were—bulls and bullocks 28,984, cows 23,687, buffalos (bulls) 1,419, cows 3,723, young 26,076 (for 1904-05). A large proportion of the cattle belong to the Meches, who do not use milk. If the Raja of Gauripur, who owns most of the land near Dhubri, opens an up-to-date dairy on a large scale, it is bound to be a most paying concern. It is hard to believe that 43,586 maunds of ghee, valued at Rs. 17,47,406, were imported into the province in 1906-07, whereas only 3,051 maunds, valued at Rs. 1,42,953, were exported. It is most surprising that, in spite of the vast herds of cattle, and extensive pasture lands in Assam, no efforts are made to establish a dairy farm in the province on a sufficiently large scale.

265. In connection with this subject, reference should be made to the industry of cheese-making, which is pursued in Dacca and Mymensingh. Cheese is manufactured by the ordinary cultivators of Joanshahi pargana (district Mymensingh) and exported to Dacca and Calcutta, at which place it is known as Dacca cheese. It is prepared only from buffalo milk. The season begins in December and ends in June. There are only about 20 families who make cheese. The average annual outturn is about 700 to 1,000 maunds. The retail price is Rs. 30 to Rs. 45 a maund, and the average monthly earnings of dairymen amount to Rs. 15 to Rs. 17 during the cheese-making season. A fair amount of Megna cheese is made in the Megna islands. Buffalo milk is more suitable for cheese-making than cow's milk, because it contains almost twice as much solids as the average cow's milk, the increase being mainly in fats and caseine. From Mr. Basu's Note (1890) it appears that Mr. Howman, an expert, was of opinion that besides home consumption buffalo-milk cheese may be largely made in India for export to foreign countries. The Italian cheese, Gorgonzola, is said to be made from buffalo milk, and there seems to be no reason why it should not be made in India.

### 3. STATIONERY.

266. In Dacca, since the *swadeshi* movement, various articles of stationery are being manufactured by hand on a small scale.

- (1) *Ink, Bronko*.—Banerjee & Co., S. Mitra & Co., Chakravarti & Co., are manufacturing ink, bronko, blacking, etc. The ingredients are all imported from Calcutta. There is a ready market in Dacca, but most of the shop-keepers have started business with too small a capital to make their business a commercial success.
- (2) *Envelopes*.—Babu Romesh Chandra Chakravarti, "an intelligent, but needy young man," with a very small capital, has started the business of making envelopes by hand. He employs four men, who earn about Rs. 10 a month. Various kinds of envelopes are made, and there is a ready sale for all the articles which can be turned out.
- (3) *Manufacture of pen-holders*.—The Golbadan Swadeshi Factory at Becharam's Dewry does this business. The factory was started about three years ago. Twenty-three different varieties of pen-holders are manufactured now, all by hand, of which about a dozen varieties are in great demand. Some of the holders are well shaped and comfortable to use, and are easily mistaken for machine-made holders of England or Germany. The price is also moderate, varying from 2 annas to 9 pies a holder. The holders are all made of wood,—Guava, Latka, Bel, Pataka being the woods generally used. Some are made of Sandal wood also. The demand for these holders is daily increasing, and they are largely exported to all parts of Bengal. There are about a dozen operatives in regular pay, half of whom are Muhammadans. Their income varies from Rs. 10 to Rs. 25 per head, a month. The present working capital is about Rs. 5,000. The proprietors and promoters of this business are all intelligent and educated men, having their heart in the business, and with some money. They want these holders to be introduced in Government offices, and they are confident they will be able to compete in price with those already in use. They may reasonably expect the patronage of Government.

### 4. PRINTING PRESSES.

267. I have made inquiries in several towns. There is not much opening in this line in the province. The Bengali literature is supplied almost exclusively from Calcutta. In Assam there is not much demand for books or magazines or newspapers. The local magazines published in the province have all a very limited circulation, and have their own presses. I think every town has as many presses as are wanted. In Jorhat the Darpan Press gets all the local business. In Dibrugarh there are no less than five different printing presses :—the Press of the Assam Railway and Trading Company, the Times of Assam Press, the Planters' Store Press, the Mercantile Press, Press of the Assamese Agency, but none of the presses is provided with steam machinery. The only way that indigenous enterprise can be encouraged is by giving them Government work, but Government has already a press in Shillong, and a much more extensive and up-to-date press has been set up in the Dacca Jail.

## 5. FACTORIES FOR MANUFACTURE OF AERATED WATER AND ICE.

268. The consumption of aerated waters is enormous, and is growing every day. Almost every town has two or three aerated water manufacturing machines. The use of aerated water is rapidly extending into villages also.

In Dacca there are several aerated water manufacturing shops, Kaloo Mistry's firm in Patuati being one of the oldest. The most well-known firm in the province is that of David & Co. in Narayanganj. In Chittagong there are about 15 machines working, but the firms of Edward Stanford and Cheap John manufacture the best waters. I think there is room only in Chittagong for an up-to-date ice and aerated water manufacturing factory.

The Nawab of Dacca's ice factory at Kumartoli, if not a very paying concern, is certainly a much appreciated institution. The business was regularly started in 1892. The present machine can turn out 20 maunds of ice in 36 hours. There are 10 operatives employed regularly during the working season, February to November, and the cost of the establishment comes to Rs. 800 a month. Ice is sold at the rate of annas 2 per seer retail and Rs. 3 per maund wholesale. A large factory has been opened at Narayanganj by David & Co., and ever since the starting of this new ice factory, which is selling ice at Rs. 2 per maund, the Dacca factory is working at a loss.

## 6. MANUFACTURE OF BRICKS AND MORTAR AND TILES.

269. "Mortar and brick" manufacturing is a paying industry in Dacca and other large towns. There are no less than 10 firms who manufacture bricks in Dacca, and turn out between 30 to 70 lakhs of bricks every year. The factories are all situated in the outskirts of the town, and each has got one or two surki mills attached, the Pabna Bank (loan office) propose to start a brick and surki manufacturing factory. The industry is a profitable one.

270. The successful manufacture of building tiles by Babu Prokash Chandra Roy of Itakhola is an excellent example of indigenous enterprise in this province. I have seen these tiles. They look, and I think are, quite as good as the tiles manufactured at Raniganj by Burn and Company. The firm has had numerous calls from the Public Works Department, but for want of funds it cannot manufacture tiles on a commercial scale. After an examination of the tiles by the Chief Engineer, I think an advance of money may very properly be made to this firm by Government.

## 7. POULTRY.

271. The poultry industry is daily assuming larger proportions and proving more profitable to those engaged in it, in all the most advanced industrial countries of the world. In the countries of Europe,—like France, Belgium, Denmark, Germany,—the industry is fairly old, but in America, within comparatively recent years, the most gigantic poultry industry of the world has been built up. The census of 1900 showed that altogether 250,681,673 birds of different kinds were raised in America, valued at 85,794,996 dollars. The American farmers reckon to make a profit of a dollar a year on each head of their laying or breeding stock. Canada and Australia have also developed most profitable industries in poultry, and export large quantities of eggs and fowls to England. In India, however, poultry-rearing on a commercial scale is almost unknown. Yet there are several good reasons why poultry-rearing should prove a most profitable and suitable industry in India:—

- (1) The population is mostly agricultural, and the industry can very well be combined with agriculture.
- (2) The climate in most parts favours the raising of comparatively good breeds; and there is sufficient land available, with enough water in the neighbourhood for extensive poultry farms, accommodation for buildings, etc.,
- (3) The industry can be started with a small capital to begin with, and gradually enlarged as business increases.
- (4) There is always a ready local demand for poultry. The price of eggs and fowls is going up in all parts of India, and the consumption of fowls, ducks and eggs is no longer confined to Europeans and Eurasians only, but almost all classes of well-to-do and advanced Indians have now taken to eating them.

- (5) There is also room for a flourishing and paying export trade. Burma already gets her supply mostly from the districts of the Chittagong division, and the south-west coast of India has also some export trade. There is no reason, however, why, if Canada and Australia can supply England with eggs and fowls, a large and profitable industry with England should not be established in India.

272. There are more beels and low lying water channels in East Bengal suited to the establishment of duck farms than in almost any other part of India. The climate of Chittagong and the neighbouring districts appears to be well suited for the culture of special breeds of fowl. The majority of the population is Musulman, and almost every Musulman family keeps some hens, and the people are likely to take to the industry to a much larger extent as demand increases, and its profitable character is made clear to them. There already exists a very flourishing export trade with Burma, which is capable of great expansion. The towns of Chittagong and Dacca are growing rapidly, and there is no reason why an export trade with Calcutta and other large towns of India should not also be established.

273. Throughout East Bengal, almost all Muhammadan families rear a few hens, mostly for home consumption, and also for sale by the poorer sections when they have any birds to spare. In the districts of Noakhali, Tippera and Chittagong, however, the industry is more developed than in other parts of the province, because of the export trade with Burma, and also because of the existence of special breeds of fowl in these districts. Last year fowls, ducks, and eggs (duck's eggs chiefly) to the value of four lakhs of rupees were exported to Burma from the Chittagong Port, but out of this nearly two lakhs represent the trade of Noakhali, one of Tippera, and the remaining one of Chittagong. Babu Ambica Charan Dutt, Deputy Collector, was put on special duty last year to make inquiries with a view to ascertaining the possibility of developing the poultry industry in the above districts, and to improve the breed of poultry in the province generally. He made inquiries in Noakhali, and his excellent report gives interesting information about the poultry industry in that district.

274. It appears in Noakhali the following varieties of fowl are known :—

- (1) Kolong,—more or less pure breed Chittagonian, with high and upright bearing of head and neck.
- (2) Tambuli—a short-legged variety.
- (3) Cemo—domesticated jungle fowl.
- (4) Karaknath—distinguished by their black feathers.
- (5) Habsi—have feathers turned inwards.

In Chittagong the fowls known as the Chittagong breed, most probably of South Malayan extraction, are to be found in thana Anwara, in three villages, Mahadehpur, Bhaigapara and Kumarpara. In these villages no country fowls are kept, and the breed may therefore be considered fairly pure. The Chittagong hens lay from 8 to 10 eggs on each occasion, and hatch two broods of chickens annually. The ordinary Noakhali hens lay 30 eggs in a year, although some have been known to lay as many as 80 eggs in a year. One can imagine what improvements are possible by scientific culture, when we hear that it is quite usual for American breeders to get as many as 196 eggs in the year from their hens. A duck, however, lays from 160 to 180 eggs in the year. No particular trouble is taken in the breeding of either ducks or fowls, and epidemics of cholera and roup are not infrequent.

The Chaumohani hât, the Panchgachia hât and Banser hât are the principal centres of the poultry industry in Noakhali. One or two full-grown birds are sold by most families on each hât day, and the families thus earn from Rs. 3 to Rs. 4 monthly from this source. The price of an ordinary fowl is 6 annas, and of a capon from 14 annas to Re. 1-4. A pair of Chittagonians, however, sell for Rs. 3, and the Chittagong breeders make an income of Rs. 15 per month from this industry. The industry of duck-keeping has greatly increased in Noakhali within recent years, and large flocks are reared in the 'beel' country in Feni, Senbay, Begamganj and adjacent villages. The Hindus have no objection to keeping ducks. Ducks are not so universally kept as fowls, but those who do keep them generally have 8 or 10 ducks. Duck's eggs are sold at 5 annas to 6 annas per 20, i.e., at Re. 1-8 to Rs. 2 per hundred. Thus, a family keeping 10 ducks derives an income of Rs. 24 annually.

275. There are commissioned agents of Chittagong importers at the principal hats, who purchase poultry for their principals from the local breeders, and receive a commission of 4 annas per dozen. The traders again get similarly paid for supplying poultry to the agents. The commission on duck's eggs is 8 annas per thousand. In Burma the fowls which cost 6 annas per head, in Noakhali, are sold from 14 annas to one rupee, and a duck's egg from 6 pies to an anna. A great impetus to the industry has been given by the opening of the Assam-Bengal Railway. Feni and Chaumohani are the principal railway stations in Noakhali where poultry are booked.

Babu Charu Chandra Chatterjee, Deputy Collector, calculated that 211,000 birds are annually exported from Noakhali. Nearly 3,000 jars full of duck's eggs are also exported. The eggs are preserved in a thick solution of lime. About 3 to 4 annas worth of lime is required for preserving 1,800 eggs. Experiments with silicate of soda were tried, but are reported to have been unsuccessful. The Agricultural Department is making experiments with a view to finding out a cheap and efficient process.

Suggestions for improvement.

276. Babu Ambica Charan Dutt suggests—

- (1) That through accommodation should be provided for poultry booked at Chaumohani for Chittagong *via* Laksham.
- (2) That proper ventilation and some water should be provided in the waggons for the birds.
- (3) The re-introduction of the system by which the egg-exporters could book their jars direct to Chittagong Jetty, and thus were able to ship their goods to Burma with the least delay and expense.

277. He also suggests that some efforts should be made to improve the breed of fowl by introducing the Langshan variety from China or the Straits. These birds are good layers, good table-birds, and are hardy, and therefore make excellent all-round fowls. The Chittagong cocks should be much more largely used for improving the breed of village fowls. The last suggestion is that Government should have a poultry farm in Noakhali, where the Deputy Collector knows of a suitable plot of Government land of about 40 bighas near the railway station. Considering the great potentialities of the industry, I also strongly recommend the opening of a Government poultry farm at Noakhali or Chittagong. A branch may be opened at Dibrugarh, where I know the Deputy Commissioner is very anxious to start a farm. Private capitalists are sure to make a very good income, if well-equipped poultry farms are started at such suitable centres as Dacca, Narayanganj, or Chittagong.

A Government poultry farm recommended.

## **PART II.**

**Conclusions and Suggestions for Improvement.**



## CHAPTER I.

## PRÉLIMINARY.

278. Government aid to assist and develop indigenous industries is certainly as urgently needed in India as in any other country in the world, and if the Government take up a more pronounced and definite attitude with regard to this question than it has hitherto done, its action will be fully justified on the example of all the civilised countries of Europe and Asia. But the task will be no easy one; in fact, it will be one of the most difficult and most important of the many administrative problems, with which the Government is now faced. The present decadent condition of the indigenous industries, is the result of many economic and political causes, which have worked uninterruptedly for many generations, and it will be no easy task to arrest the disruption which has followed. For while India has lost her own arts and industries, other nations are in the possession of her markets, and the great start which they have gained, coupled with their manifold resources in modern methods, machinery and organized and almost unlimited capital, will make the struggle a most unequal and difficult one. Nor is it the manufacturer outside of India alone whose rivalry the future "industrialist" of India will have to face, he must also safely count upon a good deal of opposition from the foreign manufacturers and capitalists, who have already started business in this country. The instinct of self-preservation is as active in industrial as in animal life. In broadly stating that the progress of industrial enterprise in Bengal has been one of continuous development within the last twenty years, sufficient emphasis has hardly been placed by Mr. Cumming on the fact that this progress has been almost entirely confined to European enterprise, whereas before the present industrial movement in the country, native enterprise in industrial spheres was almost non-existent in this part of India. Mr. Chatterton makes the following observations with regard to the situation in Madras:—"Industrial India has of late years developed rapidly, as a reference to the trade returns will show, but the work has been due to foreigners and to imported capital, and the profits accruing therefrom, instead of accumulating in the country, are remitted abroad, so that the people of India benefit by the establishment of these prosperous undertakings only to the extent that a certain number earn wages in subordinate positions or by doing coolie work. The management and direction of such enterprises are not in their hands, and no fund of experience is being accumulated in the country which will enable further progress to be made. For nearly a century in industrial matters stagnation has prevailed, and enterprising Europeans and Parsees have monopolised progressive methods of working, with the result that now, when Indians begin to realise the necessity of doing something, they find all points of vantage occupied, and they are either appalled at the difficulties which confront them or go lighthearted into foolish ventures, which can only end in failure and the loss of their capital." In this province, however, even European capital and enterprise have not yet been sufficiently attracted to industrial fields, and there is plenty of room for indigenous Indian enterprise to exploit the untouched and virgin resources of the country, only if Indian capitalists would even now wake up, and fully realise the gravity of the present industrial situation in India.

279. The peculiar difficulty in India is that her native industries are the relics of a past order of things; and though the beauty and artistic excellence of her art products and manufactures need not be disputed, yet the only important question which is of moment at the present crisis, is whether in utility and cheapness there is any possibility of the products of Indian indigenous industries holding their own against the products of Western industry. The raising of this point is not a mere platitude, for it is most important that whatever assistance Government is able to render, must be wisely given. There should be no avoidable false starts, and no energy should be wasted in wrong and impossible directions. To speak more concretely, we should attempt to assist only those forms of the existing indigenous industries which may have a future, and which it is commercially possible to revive. It is more than probable, however that our efforts, if successful, would end in our securing a diversion rather than a revival of the old channels of industrial enterprise in India, and the establishment of those new methods of industrialism which now command the commerce of the world.

280. As we have seen in the foregoing account of the industries of the province, they fall mainly under two classes, *viz.* :—

Broad division of industries.

- (1) Old industries which are indigenous to the country, and the production of which gives occupation to the old occupational sub-castes, such as weavers, goldsmiths, blacksmiths; and of which the distribution is under the control to a great extent of commercial castes and guilds like the Basaks of Dacca, the Natbs of Comilla, the Shahas of Malda, or the Kyans of the Assam districts.
- (2) New industries which have sprung up in the country either directly through European enterprise or under the example set by the West.

Broadly speaking, the condition of the indigenous industries is very similar all over India. But the growth and development of "new industries" has been very different in different parts of India. Into the causes which have led to such disparity as exists between a province like Bombay and our own, for instance, it is not necessary to enter here. Our task is to see how best it is possible to stay the decline of the old industries, and if possible, to revive and revivify them, and to lead Indian enterprise and capital into the paths of modern industrialism. Two points only might be noted here—

- (1) It is at least as important to establish new industries as to try and revive the old ones.
- (2) That the requirements necessary for a revival of the old industries are different from the measures which Government will have to adopt to encourage Indians to embark on new forms of industrial enterprise.

281. As regards old industries, there cannot be any question that the cheapness of machine-made articles is the chief cause of the decadence of the hand industries of India, and if we hope to give them a fresh lease of life, we should be prepared to devise means by which the existing methods of production could be made less expensive. If this could be done without impairing the artistic excellence of some of the native handiworks, it would no doubt be a consummation greatly to be wished for.

Of the chief reasons which militate against large industrial enterprise being undertaken by Indians, Mr. Chatterjee has noticed the following :—

- (i) The insufficiency of fluid capital. This, however, is only a minor expression of the real trouble, namely, the unwillingness of Indian capitalists to invest in industrial enterprise. We may take two examples from our province: insufficiency of capital to enlarge its present sphere of business appears to me to be the chief difficulty of the new ginning factory at Chittagong and the Bool-bool Soap Factory is admittedly languishing for want of funds.
- (ii) The second great difficulty arises in connection with skilled supervision in technical matters.

For some time to come Indian capitalists in this part of India will do wisely to get their expert supervisors from more advanced parts of India, or better still engage properly qualified and competent Europeans. It must be known to most educated Indians that the Japanese did not permit any false sense of national dignity to stand in the way of their taking the assistance of European experts in their memorable struggle for industrial ascendancy. It is only right, therefore, that the tobacco factory proposed for Rangpur is going to get the assistance of Parsee experts; and there can be no doubt that the hitherto unsuccessful career of the Weaving Mill at Jalpaiguri is entirely due to the lack of expert management.

- (iii) The third difficulty in the path of any rapid extension of Indian industries is the want of trained labour. The difficulty of establishing the glass industry in India, for instance, is due almost solely to this cause.
- (iv) The lack of knowledge of business methods is rightly considered by Mr. Chatterjee to be the most serious difficulty of all. Very often a business has failed because it had really no opening at all, and would never have been undertaken if the promoters had sound business knowledge and training.

The present position therefore is, that although there are signs of an awakening of industrialism amongst Indians, their achievements up to now have been most scanty in this province, and already there are signs that unless these efforts are controlled by

more business knowledge, they may end in hopeless failure and disappointment. Fortunately it is possible for Government to render material assistance to the cause, by not only setting examples of commercial success which will whet the desire of Indians to partake in such undertakings, but also by education and other means make them more fitted than they are at present, to successfully manage any business which they might undertake.

In what lines industries to be developed.

282. Here we may also note that an expansion of industrial enterprise in the province will result either in—

- (1) Supplanting the consumption of imported articles of foreign manufacture by articles manufactured at home.
- (2) The export of such manufactured articles to other parts of India.
- (3) The export of these manufactures to places outside India.

It is hardly necessary to add that the natural line of progress should be in the order noted above, and that for a long time to come, our exporters of manufactured articles should attempt to secure markets in other parts of Asia, like China, etc., instead of attempting to compete with European manufactures in their own homes. It is equally superfluous to point out that industrial openings should first be sought for in the manufacture of those commodities—

- (1) for which there already exists local demand ;
- (2) for which the raw material is locally most abundant :
- (3) and for which the difficulty about labour, both skilled and unskilled, is the least serious.

To take a concrete example, it would be wiser, for instance, to open some mills for milling wheat locally in the province, as there already exists a large demand for wheat flour, than to open mills for extracting oil from cotton seed, as there is no demand at present for such a commodity in this country.

## CHAPTER II.

### ECONOMIC AND INDUSTRIAL POSITION.

283. Before proceeding to elaborate a scheme for Government assistance to Indian industries, it will be useful to survey briefly the existing economic and industrial condition of the province. It is no exaggeration to say that India has once more been thrown back to the "agricultural" stage of material civilisation. Of all the males occupied in England, for instance, only 10.5 per cent. are engaged in agriculture, and there are no less than four other industrial groups in which the number of workers is greater than in agriculture. In India, on the other hand, agriculture is of such overwhelming importance that all other industries are reduced to insignificance in comparison.

And even for India, as far as industrial progress is concerned, this province is perhaps one of the least advanced of all the larger provinces. With the exception of the factories for the manufacture of tea, and the oil and the coal factories at Digboi and Margherita, there are no large centralized industries in the province. There are no cotton weaving mills worthy of the name, no cotton-spinning mills, there are no jute manufacturing mills, no wool or paper mills, glass factories or pottery works. Out of the total joint stock companies for India, numbering 1,728 in 1906-1907, there were only 68 organised in this province. The exports of the province are also all in raw materials, and amount to 62.4 per cent. of its total trade. There are no large industrial centres like Bombay, Madras, Cawnpur, or Calcutta, and out of the 62 larger towns of India it possesses only one (Dacca) with a population of over 50,000 souls, and in only four other towns, Rampur Boalia, Serajganj, Narayanganj and Chittagong, does the number of inhabitants exceed 20,000 persons. We also find that in the province, as a whole, out of every 100 persons 98 live in villages and only 2 in towns.

284. The total value of the trade of Eastern Bengal and Assam with other provinces in 1906-1907 was 49.59 crores of rupees, of which 18.66 crores represented imports and 30.93 crores represented exports. The grand total of the trade for India during the same year was 317.78 crores of rupees, of which the exports amounted to 182.27 crores, and the imports to 135.51 crores.

The following table shows the principal exports and imports of the province :—

|                                | Value<br>Rs.<br>(lakhs). |                                | Value<br>Rs.<br>(lakhs) |
|--------------------------------|--------------------------|--------------------------------|-------------------------|
| Cotton piece-goods ... ..      | 439.2                    | Jute, raw ... ..               | 2,128.2                 |
| Cotton twist and yarn ... ..   | 92.0                     | Gunny bags and cloths ... ..   | 17.0                    |
| Rice not in the husk ... ..    | 273.1                    | Tea ... ..                     | 541.6                   |
| Rice in ditto ... ..           | 100.2                    | Hides of cattle ... ..         | 74                      |
| Iron and steel ... ..          | 140.8                    | Tobacco, unmanufactured ... .. | 32                      |
| Sugar, refined ... ..          | 71.0                     | Lac ... ..                     | 22.4                    |
| Sugar, unrefined ... ..        | 58.6                     | Oil seeds ... ..               | 21.5                    |
| Mustard oil and rape oil... .. | 97.4                     | Cotton, raw... ..              | 18.5                    |
| Salt ... ..                    | 69.7                     | Silk, raw ... ..               | 10.7                    |
| Kerosine oil ... ..            | 62.3                     |                                |                         |
| Grain and pulse ... ..         | 46.9                     |                                |                         |
| Betel-nuts ... ..              | 39.1                     |                                |                         |
| Wheat flour... ..              | 22.8                     |                                |                         |
| Chillies ... ..                | 20.2                     |                                |                         |

285. Turning to the province as a whole, we find a great disparity between Assam and Eastern Bengal, and attention is at once arrested by the comparatively backward condition of the indigenous population of the Assam Valley, specially of the northern districts, as compared with the rest of the province. Owing to a combination of causes, the indigenous population of the Valley is in a decadent condition, and the chapters containing statistics of the growth of population of Assam (in the reports of Messrs. Gait and Allen) do not form very encouraging study. The population is sparse, being only 108 to the square mile, at the last census, in the Brahmaputra Valley, and 28 in the Hill Districts, against 471 in Bengal and 411 in the United Provinces. In 1891 the purely Assamese castes formed nearly 80 per cent. of the population in the five upper districts of the Valley, but during the decade ending in 1901, the decrease amongst them amounted to no less than 6.4 per cent. The physical enervation of the ordinary Assamese raiyat cannot also fail to strike even the most casual observer. And everywhere I heard the same complaint about the ingrained indolence of the Assamese, and their refusal to work after the primary wants of hunger have been satisfied.

The increase of opium-eating is also another discouraging symptom. Reference may be made to paragraph 60 of the Excise Administration Report for the year 1906-1907, and paragraph 21 of the Government Resolution on it. From official figures, it appears that there was an increase of 106 maunds 36 seers in the consumption of opium in the Assam Valley districts during 1906-1907. It has also been pointed out in the District Reports, that the indigenous native population is mainly responsible for the increase, rather than the tea-garden coolies.

Looking back to the past, the historical antecedents of the people do not point to the existence of any large industrial enterprise in any part of the province. The weavers and other artisans who flourished during the Ahom Rajas had all to be imported from beyond Assam. Mr. Gait has pointed out that the absence of any occupational sub-castes amongst the Assamese, like those to be found in other parts of Bengal, accounts for the low standard of skill attained by the Assamese artisans in such industries as metal work, pottery, etc., and the comparative ease with which imported articles have supplanted the local industries. Nor are there any commercial castes or guilds in Assam, as far as I could find out, corresponding to the Sharnabaniks, or the Shahas, or the Telis of Bengal; the Agarwallahs of the North-West; the Par-sees of Bombay; or the Chitties of Madras.

Even the elementary industry of agriculture cannot be considered to be in a very flourishing condition amongst the indigenous inhabitants of the province. It is needless to point out that agriculture is the basis of all other industries in India. For, as observed by Sir John Hewett, agricultural staples not only afford the raw materials for the manufacture of commodities, but unless agriculture is in a flourishing condition, there cannot be any large local demand for the product of the manufacturing industries. It is very discouraging, therefore, to find that the indigenous Assamese are losing ground, even as

an agricultural people, before immigrant coolies of the tea gardens, who, as a rule, are the refuse of the agricultural classes of other provinces. While on the subject of agriculture, I may mention that Srijut Rajani Kanto Bardalai, Extra Assistant Commissioner of Silchar, urged before the Deputy Commissioner and myself, that the rents fixed at the latest settlements were comparatively too high, for the indolent and the physically enervated raiyats of the northern and central districts of the Assam Valley, and thought that some special consideration might be shown to them.

286. In Assam proper, barring Goalpara, there are no zamindars, and there is not a growing plutocracy of Assamese lawyers as there is in Bengal. Nor are there any local merchants and traders who have amassed wealth in commercial pursuits. As far as I could make out, most of the well-to-do pleaders are either resident or naturalised Bengalis. As far as I know, there is one purely Assamese Joint Stock Company in Gauhati, called the Kamrup Industrial Company.

Industrial enterprise, specially on modern lines, is therefore still very much in its infancy amongst the indigenous Assamese. For the lower classes agriculture is, and will in all probability continue to be, the most profitable industry for a long time to come. The sufficiency of agriculture for the Assamese, the sparseness of their numbers, and the existence of vast tracts of fertile land, not only account for the poor and decadent condition of the indigenous industries of Assam, but the "labour problem" now is, and will continue to be, the greatest difficulty in the way of the establishment of new industries in this part of the province. Amongst the more educated classes Government service still continues to give employment to a very large percentage of the young men, and there is therefore not the same incentive to find out new openings for her younger generation in Assam, as there is in other parts of Bengal. Accordingly, we find that, as far as the old methods of business are concerned, the ubiquitous Kyan mahajan, like an octopus, is omnipresent, and has filled up all the profitable avenues of trade and commerce throughout Assam. And as far as the new forms of industry are concerned, the lead is as yet being taken by the Bengali pleaders resident in the Assam districts, e.g., the Tezpur Hosiery Mill, and the various tea-gardens in Silchar. But signs of an awakening are not altogether absent, even amongst the Assamese, and it is to be hoped that the closer association of Bengal with Assam brought out by the creation of the new province, will in due time infuse fresh life amongst the Assamese, and a competition with a more advanced people rouse greater enterprise and energy amongst them.

287. Turning to Eastern Bengal, we find that at present it is by far the most progressive and prosperous part of the province; and perhaps the most tenacious, enterprising and industrious section of the Bengali people live in Eastern Bengal. The majority of the population of Eastern Bengal is Muhammadan, and as a rule they are a virile and strongly-constituted race of agriculturists, whereas amongst the Hindus, such as the Basaks of Dacca, are to be found some of the most skilful artisans in the whole of India. Agriculture, thanks chiefly to jute and the natural advantages of the land, is in a more prosperous and flourishing condition in these parts than in any other part of India, and it dominates and overshadows all other industries almost as completely as in Assam.

288. But for the purposes of this survey, the birth of a spirit of industrialism amongst the leaders of the people of this part of the province, and to some extent amongst the masses, is a most encouraging feature. This spirit has found expression in the following ways:—

- (1) A desire on the part of the people to encourage and patronise their own manufactures.

The above proposition perhaps needs some qualification, but it might be accepted as generally correct. The revival of the cotton-weaving industry as a result of this feeling of the people has already been noticed.

- (2) The desire on the part of the moneyed people to take part in industrial enterprise:—

- (i) Zamindars, like the Nawab of Dacca, the Nawab of Bogra, Maharaja Manindra Chandra Nandy, the Raja of Gauripur, have all taken active interest in industrial matters in recent years.

- (ii) The merchant castes, who hitherto devoted their attention solely to the old forms of commerce, have also taken to new forms of enterprise. The opening of the ginning factory at Chittagong by the old firm of Nityananda Das is a notable example.
- (3) The desire on the part of the middle classes, specially the lawyers, to take to industrial enterprise. The Silchar Joint Stock enterprise, the Dacca Leather Company, the Gauhati and Tezpur Assam Valley Trading Company, the successful tea-gardens in Jalpaiguri, have all been initiated by the enterprise chiefly of pleaders.
- (4) The advent of the literary classes in the field of industry. When I saw two young men, who had both passed the Entrance Examination, cheerfully going through all the dirty manual work in connection with the unhairing of leather in the small leather factory at Dacca, for which work even in the Chrome Leather Factory at Madras local chamars are employed, I must confess I was very agreeably surprised. The hosiery firm of Gupta & Co. in Dacca is being worked by a young graduate, whose father is a well-to-do pleader. In Bogra I met with a graduate who had settled down comfortably as a dealer in rice and jute. The new industry of button-making in Dacca is being largely pursued by men of the higher castes.
- (5) The organisation of capital, *e.g.*, the starting of loan offices and town banks, and the formation of a few Joint Stock Companies, to which some reference has already been made in Part I. These loan offices, if they have not yet done much to help industrial enterprise, still have been useful in keeping down the rate of interest, and in some cases the directors are already beginning to find out that the most fruitful way of using the bank's capital is by developing industrial enterprise. The Cachar Native Joint Stock Company, which finances three tea-gardens, and the Jalpaiguri Joint Stock Companies, which are utilising their capital for a similar object, and the Pabna Town Bank, which has recently started a brick and soorky manufacturing industry, and is about to start a well-appointed oil-mill, are all examples of the new industrial spirit.

289. Of the above factors, the keenness of the middle classes, and the desire on the part of the people to use their own manufactures, are the only ones which have made a perceptible impression on the industrial position of the province. A far greater and sustained forward movement in all the above lines is necessary, before there will be any substantial change in the industrial position of the people of the province. For it should be remembered that the industrial prosperity of the country will be reached not so much by the help of the thews and sinews of her labourers, or the skill of her artisans, as by the brains of her intellectual leaders, and the capital of her plutocrats.

290. Besides the growth of the industrial spirit, the richness of the mineral and agricultural resources of the province, and the great facilities for commerce afforded by the various water-ways of the country, are all in favour of its future industrial progress. Eastern Bengal has a great advantage over the sister province, inasmuch as, in addition to a fine harbour close to Chittagong, there is at least one other port, at Chandpur, which can be reached by fairly large seagoing vessels.

291. Taking the situation as a whole, therefore, the outlook to my mind is by no means discouraging. There is a general awakening of industrial feeling throughout the country, and that feeling has already taken practical shape in a few cases, and efforts are being made by the people themselves to launch into new forms of industrial enterprise. It needs, therefore, no powerful effort of the imagination to picture the day when, with her wonderful mineral and agricultural resources, and with her great natural advantages for both internal and foreign commerce, this province will surely occupy a prominent position in the industrial regeneration of this country. What part, however, native capital and enterprise will take in the future development of the province, is the question most vital from the point of view of this inquiry.

### CHAPTER III.

#### TECHNICAL AND INDUSTRIAL SCHOOLS.

292. A short account of the existing organisation for imparting technical and industrial education should, I think, also naturally precede any suggestions for the elaboration of a more complete scheme. The existing institutions of this province have hitherto formed a part of the system which was developed and maintained for the

Technical schools of the province a part of the Bengal system.

province of old Bengal. For a history of the institutions which at present exist in Bengal, and the manner in which it is proposed to develop and enlarge them, the reader must be referred to the exhaustive and able report of Mr. Cumming (Part I of the Special Report). The same report contains an excellent summary of all the authoritative literature on the subject of technical education in India, and the views of the Imperial Government, on the reports submitted both by Committees and individual experts. Not the least valuable part of the report is concerned with an account of the manner in which the present policy of the Government of Bengal with regard to this important question has been slowly evolved. The following points, however, may be noticed here :—

- (i) The subject of Industrial and Technical Education has received the earnest attention of the Government of India for some time past, and there is ample and instructive literature on the subject to guide any attempt that might be made to organise a system for this province.

But as Sir Arthur Lawley has pointed out, the actual work in India in the matter of Technical and Industrial Education might be considered to have just made a beginning.

- (ii) That technical education, divorced from a commercial atmosphere, is of very little avail, and it is necessary "to connect technical education with practical industrial work."
- (iii) That whatever our schemes may be, the great difficulty in India appears to be the securing of the right type of men to take charge of our industrial and technical institutions. To take one example, the opening of the weaving school at Serampur has received the sanction of the Secretary of State last year, but the institution has not yet been opened for the want of a suitable officer to take charge of it.

293. As regards the existing institutions of this province, a full account is to be found in the Educational Department Report on the Progress of Education, 1901-1902 to 1905-1906, from which the following extracts have been made. The system is comprised as follows :—

- Existing institutions.
- (1) The Central Dacca School of Engineering.
  - (2) Six technical schools managed by the District Boards.
  - (3) Seven B-classes attached to high schools.
  - (4) The industrial or artisan classes in the technical schools and the Dacca College ; the industrial schools at Bogra, Shillong and Kohima ; the weaving school at Maldah ; and a private school in Chittagong.
  - (5) Railway workshop schools.

294. There is no institution in this province answering to the "Engineering Department" of the Sibpur Civil Engineering College. For instruction in the higher branches of engineering, this province looks to that institution. But according to the arrangements made with the Government of Bengal, three vacancies in the Engineering Department of the Sibpur College are to be annually reserved for natives of Assam, and, excluding these three vacancies, one-fourth of the total number of vacancies are to be reserved for natives of Eastern Bengal. It has also been decided that the pupils from this province will participate in all scholarships (except Forbes' scholarships) that are attached to the Sibpur College. The Engineering and Technical Schools of the province have grown up around the Sibpur College, to which all (except the Ahsanulla School of Engineering) were affiliated, in accordance with the principles enumerated by the Government of India in 1886. The Principal of the Sibpur Civil Engineering College still inspects the Technical Schools of this province, and controls the examinations. But the examinations of both the Engineering and Technical Schools will now be entrusted to a Board, to be called the "Technical Examination Board," in which two members from this province will be included.

295. The principal Engineering institution of this province is the Ahsanulla School of Engineering attached to the Dacca College. This school was established in the year 1876, as a Survey School. Up to the year 1897 the course was of two years ; and students, at the end of that course, were eligible for appointment as Surveyors, Kanungoes, or Amins. In the year 1897, the course was revised, and it was decided that students should be entitled to an Amin's certificate, on passing the first-year examination, to a Survey Final Certificate of

passing the second-year examination, and to a Sub-overseer's certificate on passing the third-year examination. It was also arranged that students, who had passed the third-year examination, and who wished to pursue their studies further, should be allowed to join the third-year class of the Apprentice Department of the Civil Engineering College, Sibpur.

In the year 1902, in pursuance of a scheme drawn up by Mr. Slater, the then Principal of Sibpur Engineering College, it was decided by Government to constitute the Dacca School of Survey into a School of Engineering, for the purpose of training students up to the Overseer Standard. Measures have accordingly since been taken to carry this decision into effect, with a grant of Rs. 60,000 from Government, and a handsome donation of Rs. 1,12,000 from the Nawab of Dacca, after whom the school is named. A new building has been erected for the school on a suitable site, and is being provided with furniture, apparatus, etc. At the same time, to enable the new school to work on advanced lines, a Head Master, on the usual pay of the members of the Indian Educational Service, has been recommended, and a European Foreman and other teachers on higher rates of pay have been appointed.

The Dacca School of Engineering thus comprises the four overseer classes, and pupils presenting themselves from it at the Sibpur College Examination are eligible for Overseer certificates. But the final 18 months' course of practical training, which leads up to the Foreman Mechanics' certificate, and which is an integral part of the Overseer Standard, was not until lately arranged for at Dacca. Steps have now been taken to remove this want by fully equipping the workshops. The original Survey School still exists in the shape of Amins and Survey classes. The number of pupils was 140 in 1901-1902. Since its establishment as an Engineering School, the total has more than doubled. It amounted, in 1905-1906, to 289, and in 1906-1907, to as much as 304. In 1907-1908 the enrolment of the Apprentice Department has increased from 161 to 184, and that of the Survey Department from 108 to 141. The majority of these students are Hindus; but the enrolment of Muhammadans showed a perceptible rise during recent years. In 1904-1905 their number was 18, in 1905-1906 it increased to 27, and it stood at 29 in 1906-1907.

An Artisan class was opened in the workshop of this school on the 15th January 1907. The class was started with 15 artisans. Several stipends of the total value of Rs. 30 a month have been sanctioned by Government for the students of this class: three of the value of Rs. 5 each are awarded by the District Board of Dacca, and others by that of Mymensingh. The fitting shop seems to be the most popular of all, as, out of fifteen candidates, in 1906-1907, eight were working there. The rest were in the carpenters' and the moulding shops. There were 12 pupils in this class in 1907-1908, against 15 of the previous year.

#### B CLASSES.

296. In accordance with the recommendation of the Education Commission that "in the upper classes of High Schools there be two divisions, one leading to the Entrance Examination of the University and the other of a more practical character intended to fit youths for commercial or non-literary pursuits," 'B' classes were opened in five schools in Eastern Bengal for the first time in 1901.

There are now 'B' classes attached to the Engineering School of Dacca, the zilla schools at Mymensingh, Barisal, Rangpur, Pabna and Comilla, and the collegiate school at Rajshahi. Candidates who have passed the annual examination of the 3rd class of any English High School are eligible for admission. Practical work is done in the workshops attached to the local Technical schools, with which these classes are all connected. The training lasts for two years, and success in the 'B' class examination entitles the students of those classes to enter the second-year class of the Sub-overseer course. After a further period of instruction, and after successfully passing the Sub-overseer Examination, they are eligible for admission to the third-year class of the Apprentice Department, either at Dacca or Sibpur.

In some of these schools difficulty is felt owing to the dual control over the pupils, who do most of their work in the High Schools, and receive their practical training in the Technical Schools.

These classes appear to have been very successful in this province in marked contrast with their moribund condition in the Western province. During the year 1907-1908, there were 290 pupils in the seven B classes attached to the Government High Schools, against 175 of the previous year. The most remarkable increase was at Comilla, where it is said, as the result of the distribution of a pamphlet showing the advantages of technical education, at the suggestion of the Director, the number in the class rose from 4 to 40. Sixty-seven students appeared at the B final examination, of whom 36 passed and 9 secured scholarships.



## TECHNICAL SCHOOLS.

297. Parallel with the first two years of the Dacca School of Engineering and led up to by the 'B' classes, there are 5 schools, *viz.*, Barisal, Rangpur, Pabna, Comilla, and Rampur Boalia, under District Boards in Eastern Bengal, which are affiliated up to the Sub-overseer standard of the Sibpur Engineering College. There is another school of a similar character, but not yet affiliated to Sibpur at Mymensingh, which however is more an industrial than a technical school. There were, during the period 1901-1902 to 1906-1907, 843 pupils in all these schools, of whom 126 passed the Sub-overseer examination. In the artisan or purely industrial section of these schools, there were 123 pupils in 1907-1908, against 72 of the previous year. The following is a brief account of these schools :—

- (1) *Kashi Kishore Technical School* in the town of Mymensingh is an institution under the direct management of the District Board. It was first established in 1893, with the aid of a generous donation (Rs. 10,000 plus Rs. 2,000 per mensem, the latter being subsequently compounded by an additional gift of Rs. 15,000) from Rai Bahadur Jogendra Kishore Rai Chauduri of Rangopalpur. The pupils receive instruction in carpentry, together, since 1905-1906, with the vernacular three "R's." During same year, a weaving class was also started under the impetus of the *swadeshi* movement; but it collapsed during the following year for want of students. The number of boys on the rolls of this school on the 31st March 1907 was 31, against 59 and 13, respectively, on the corresponding dates in 1905-1906 and 1901-1902. The artisans proper numbered 13 in 1901-1902 and 10 in 1906-1907, the fall in the number being ascribed to the stipends being inadequate to maintain the boys in these times of rising prices. Of the 15 passed students of the school, four were under training in 1906-1907 in the Sibpur Engineering College in blacksmith's work, and nine had taken to the profession of carpentry. As an encouragement to these boys two scholarships of Rs. 10 each, tenable for three years at the Sibpur Engineering College, are now awarded annually by the Board to the two best senior artisan of this school for supplementing their carpentry by learning blacksmith's work. A scheme for the improvement of the school is under consideration.
 

*Kashi Kishore Technical School, Mymensingh.*
- (2) *The Barisal Technical School.* This school has two different sections, *viz.*, the sub-overseer side (leading up to the Sub-overseer examination) and the artisan side, where carpentry and blacksmith's work is taught. The number of pupils on the 31st March 1907 was 50 (36 in the sub-overseer classes and 14 in the artisan class) against 18 artisans on 31st March 1906.
 

*The Barisal Technical School.*
- (3) *Rangpur Bailey Govinda Lal Technical School,* which is under the direct management of the District Board, is affiliated to the Sibpur Engineering College and has four departments, the Sub-overseer, the Amin, the artizan and the agricultural. It has six teachers, including one carpenter teacher for the artisan class and one blacksmith. The roll number on the 31st March 1907 was 97, of whom 60 were Hindus, 33 Muhammadans and 4 Buddhists. Of the total number of students, about 25 were in the sub-overseer class, 44 in the amin class, 10 in the artisan class, 13 belonged to 'B' classes of the Rangpur Zilla School and 3 were in the agricultural class. Total income from all sources amounted, in 1906-1907, to Rs. 6,313. There is a boarding-house attached to the school for Hindu students.
 

*Rangpur Bailey Govinda Lal Technical School.*
- (4) *The Pabna Technical School* had 105 pupils on the rolls in 1906-1907, against 122 in the previous year (1905-1906). The roll number included 50 students of the zilla school who attended the 'B' classes. There are three departments in this school, *viz.*, the sub-overseer, the amin and the artisan.
 

*Pabna Technical School.*
- (5) *The Diamond Jubilee Institution* at Rampur Boalia is managed by the Rajshahi District Board. It has three departments, *viz.*, Sericultural, Weaving and Engineering. The Engineering Department, which has three separate sections, *viz.*, sub-overseer class, survey or amin class and artisan class, was opened in January 1905, and has recently been affiliated
 

*The Rajshahi Diamond Jubilee School.*

to the Sibpur Engineering College. The management of the sericultural department was taken over by Government in 1907; it has a mulberry garden attached to it, and deals with mulberry cultivation, microscopic examination of seeds, and with detection and prevention of silkworm pests. The weaving department imparts training in reeling, weaving and bleaching of silk, but there were no students in the weaving class when I visited the school this year. A smithy class was started during the year 1906-1907 for the benefit of the sub-overseer class students to learn blacksmith's work. There was an agricultural class also, but it was discontinued from June 1906. The school had, in 1906-1907, 101 pupils on the rolls, distributed among the different departments, and consisting of 85 Hindus and 16 Muhammadans. Sixteen were in the Sub-Overseer department, 77 in the Surveying department, 3 in the Artisan department, while 5 were in the Sericultural department.

Two prizes of Rs. 100 each were awarded to a Hindu and a Muhammadan student for starting seed nurseries on an approved plan, in their own houses.

(6) The only school of this class in the Chittagong division is the Elliot Artisan School at Comilla. This also is managed by the Board. It came into existence in 1892-93, and receives a yearly grant of Rs. 800 from

The Comilla Elliot Artizan School.

the department. "The name indicates the origin of this and other similar schools, which, starting as artisan institutions for the sons of workmen, have gradually grown into elementary engineering schools for the middle classes." It has two departments, the Apprentice and the Artisan, both affiliated to the Sibpur Engineering College. In the Artisan department, the works of tinsmith, blacksmith and carpentry are taught. The Apprentice department teaches the course of the sub-overseer class. The number of pupils in the two departments and the expenditure for the year 1906-1907 are given below—

|                       | No. | Amount of expenditure. |
|-----------------------|-----|------------------------|
| Artisan class         | 28  | Rs. 8,969              |
| Apprentice department | 38  |                        |

This year, when I visited the school, there were 65 boys in the Apprentice Department and 35 in the artisan classes, 25 in the carpenter's class, 5 in the blacksmithing and 5 in the tinsmithing class.

There are 11 stipends attached to the Artizan department varying in value from Rs. 3 to Rs. 4. These are paid from the district funds. No fee is charged in the Artizan department. The full course in the artisan class generally extends over four years. But it has been found difficult to induce the pupils in the Artisan department, who generally come from the lower classes, to complete the full length of the course.

In addition to these, there is a small Survey school at Silchar for the training of patwaris. Twenty-three pupils were trained in it in 1906-1907.

298. I have visited most of these schools, and regret to have to observe that almost all of them, with the exception perhaps of the Comilla technical school, appeared to be doing very little useful work, as far as purely industrial education is concerned. The inclination of the boys is all in favour of the amin and the sub-overseer classes, which hold out the prospect of employment, either under Government or the District Board or private parties. In spite of the offer of scholarships, it is not easy to keep boys for the full term of years required for training in the industrial classes. In my opinion almost the sole reason of the comparative inefficiency of these institutions, is to be found in our failure to organise a system which will combine instruction, with a commercial opening for the students who receive training at these institutions. This point has been further developed in the last chapter of this report.

#### INDUSTRIAL SCHOOLS.

299. Turning now to those institutions which may more properly be termed "Industrial," we have the artisan classes, which for the sake of convenience have already been described under the schools to which they belong.

Besides these, we have "The Victoria Technical Institute" at Chittagong, which was started in 1904 by the private enterprise of Dr. Durga Das Dutt, and is managed by a Committee of fourteen members with the District Magistrate as President. Carpentry, weaving, goldsmith's and tinsmith's work are taught there. When I visited the school, in August, there were 33 pupils on the roll, 8 in the goldsmith's class, where a Kayastha goldsmith gives practical instruction to pupils, who all belong to

Victoria Technical Institute.

the three higher castes of Brahman, Vaidyas, and Kayasthas, and some of whom had passed the Middle English examination. In the carpentry class there were six boys, four Hindus and two Musalmans. There is quite enough demand for the furniture turned out in the school, and if the enterprise had more capital, a paying factory could be started. There were as many as 19 boys in the tinsmith's class, and some very fine specimens of steel trunks and cash-boxes, etc., were shown to me. The institution deserves the support of Government to a far greater extent than it appears to have received up to now. The present grant is only Rs. 30 a month.

The District Board of Malda also started a small weaving school for weaving and dyeing towards the close of the year 1905-1906. It is reported to be doing well, and there were 16 pupils in 1907-1908.

The most important institution of this nature however is the "Bogra Industrial School, formally opened in the beginning of this year only. There are already 39 boys, most of whom are in the carpentry class, and some in the weaving section. There was some difficulty in getting a trained weaver from Serampur to take charge of the weaving class. A blacksmith's class is also about to be opened. The public took a great deal of interest in the establishment of this school, and the handsome sum of Rs. 12,000, part of the money subscribed on the occasion of the coronation of His Majesty, was set apart for the initial expenses of the institution. Thirty-four scholarships have been sanctioned, 30 by Government and 4 by private persons. The Government has also sanctioned a recurrent expenditure of Rs. 4,500 in round figures, of which Rs. 600 annually will be contributed by the Board. An energetic Superintendent has been appointed.

It is noteworthy that there is no technical or artisan school in Assam now, the one at Dibrugarh having been abolished in 1905.

Absence of such institutions in Assam.

300. There are no mining classes in this province corresponding to those that have been opened in connection with the Apprentice Department of the Engineering College at Sibpur. The mining classes there form a part of the Overseer's course. It has been decided that six vacancies in these classes will be reserved for pupils from this province. It is under contemplation to create scholarships to be awarded to pupils from this province who seek admission to these classes.

#### RAILWAY WORKSHOPS.

301. In Assam, apprenticeships are given for the training of youths, as carpenters and blacksmiths, tenable at the Dibrugarh, Jorhat, and Tezpur Railway Workshops. The measures that were adopted formerly for this purpose not having proved satisfactory, a new scheme was elaborated in 1904.

Instruction in drawing forms an essential feature of the course. At Tezpur and Jorhat, the Railway Workshop authorities have kindly undertaken to arrange for having the apprentices taught drawing by a member of their staff.

Apprentices in the Dibrugarh Workshops receive lessons in drawing from a subordinate in the Executive Engineer's office. The Instructor is, in all cases, allowed a fee of Rs. 2 per mensem for each pupil.

To encourage attention to the apprentices by the workshop staff, a bonus of Rs. 100 is paid to the workshop authorities on the satisfactory completion of the course of each apprentice.

The total number of apprenticeships which may be held in railway workshops at any one time under these rules is —

|                            |     |     |       |     |    |
|----------------------------|-----|-----|-------|-----|----|
| Dibrugarh Railway Workshop | ... | ... | ...   | ... | 6  |
| Tezpur Railway             | "   | ... | ...   | ... | 4  |
| Jorhat                     | "   | ... | ...   | ... | 5  |
|                            |     |     | Total | ... | 15 |

Of these only nine were taken up in 1907-1908.

Of the amount annually expended, Rs. 2,400 is drawn from the income of the "Williamson Endowment," and the apprenticeships are known as "Williamson apprenticeships."

Three apprentices have undergone the prescribed three years' training in the blacksmith's shop attached to the Dibru-Sadiya Railway workshop, but their progress has not been very satisfactory, owing to their irregular attendance, and in many cases inattention to their work.

Two more apprentices were admitted in the carpenter's shop during 1906-1907, and are continuing their training.

In the Tezpur-Balipara Railway workshop two apprentices have been under training for the last three years in carpenter's work, and can do any ordinary carpentry; but neither of them has the special qualifications needed to make a highly-skilled artificer. Their progress in drawing has not been very satisfactory. They are now in the fitter's shop and making good progress.

Two apprentices have undergone the prescribed three years' training in the Jorhat workshop. Three more apprentices were appointed in 1905-1906. All the five lads, the full number sanctioned for this railway, are being trained in blacksmith's as well as in carpenter's work.

#### ART SCHOOLS.

302. There were also two unaided, so-called, Art Schools at Dacca, in 1906-1907, teaching photography, painting, and drawing. They were attended by 54 students, but the schools were mere apologies for art institutions, and have now ceased to exist, apparently for want of public support.

303. From the above review, it is clear that there are practically no institutions in this province which can be of much practical assistance to any industrial enterprise, either of the old or new types. There are no colleges suitable for the training of mechanical engineers to manage the machinery of factories, etc., or for turning out chemical experts to take charge of any new industry in leather, sugar, etc.

There are no art institutions to develop the art industries of the province, or to introduce new artistic designs. Nor are there any institutions which have any appreciable influence in either stimulating or improving the old hand industries of the province.

#### STATE AND OTHER TECHNICAL SCHOLARSHIPS.

304. We may conclude this section by a brief reference to the recent institution of State scholarships by the Government of India, to enable Indian and domiciled youths to complete their education in subjects connected with industrial science and research, particularly such industries in which native capital and native enterprise are likely to be engaged. Full information on the subject is to be found in Chapter V of Mr. Cumming's Report. At the end of 1907 it was decided to offer from 1908 and onwards one scholarship annually to each province. New rules for intending applicants have also been issued.

The scholarships are tenable for two years at the rate of £150 a year.

The Government of Bengal has decided to devote these scholarships to the coal-mining industry for some time, and after that the manufacture of leather.

For 1908 the following subjects have been selected :—

|        |     |     |  |
|--------|-----|-----|--|
| Madras | ... | ... | Textile chemistry.   |
| Punjab | ... | ... | Textiles.  |
| Bombay | ... | ... | { (1) Chemistry of bleaching, dyeing and printing.<br>(2) Mechanical and Electrical Engineering. |

It appears for this province—

(1) Mr. Himansu Mohan Mitra was selected for the study of electrical engineering and mining for 1906.

(2) Mr. Digendra Nath Nag for mining engineering for 1907.

For 1908 it is proposed to select Mr. Prabhat Chandra Chaudhuri for silk weaving and dyeing.

I am informed that Mr. Prabhat Chandra Chaudhuri has not much practical knowledge of silk-weaving as practised in this country, and is now studying the subject in Murshidabad.

As I have said in Part I, the development of the silk industry of the province is full of promise, and the selection of this subject for this province appears to have been most appropriate. It is to be hoped, however:

- (1) That before going abroad, Mr. Chaudhuri will receive a preliminary training in India. Besides Murshidabad, Mr. Choudhury should visit at least Malda, Benares and Bombay.
- (2) That in Europe (whether France, Italy or England) he should receive training, both in hand-loom and power-loom weaving, with some instructions about the management of the machinery required in power mills.
- (3) That after he finishes his education, he will visit Japan, Italy and France and other centres of the industry, and learn something of the commercial aspects of the industry.

The period of two years for which these scholarships are available, appears, in my humble opinion, to be too short, at least for the more important industries. At least 3 years would be required by the type of young men we are likely to get, for these scholarships, to enable them to acquire anything like a sound business knowledge of any new industry. It is most important to have these men as well trained as is practicable, and it is better that we should have fewer, and more highly qualified men, than a larger number of men but who are not fitted by their training to take charge of important industries.

305. Besides the State scholarships, there is no separate private organization in this province, like the Calcutta Association for the Advancement of Scientific and Industrial Education of Indians. But the organization appears to be for the whole of old Bengal and also Assam. A very sympathetic notice of the good work being done by this Association is to be found on page 28, Chapter V, of Mr. Cumming's report. Mr. Cumming has noted that of the 79 candidates selected by this Association for the present year, no fewer than 44 came from this province. It might also be noted that Mr. Chakraverty, the present Sericultural Superintendent of this province, was sent to Japan by this Association; and Mr. Lalit Mohan Das of Goalpara, another scholar of this Association, has just returned after studying sericulture and agriculture in France. Mr. Cumming has recommended that the Bengal Government should subsidise, under certain conditions, this Bengal Association. I am sure a similar subsidy from this province will be amply justified. The only condition that I can think of, is a guarantee that the scholar will have completed a sufficiently long and efficient course of study, to be of practical utility in this country.

306. Besides having scholarships for sending out youths out of India for industrial training, I think the Government might very well have few scholarships of their own to help young men to obtain purely "Industrial Education" in any suitable institution or factory, in any other part of India. Under the scheme which is now being elaborated for the whole of India, it will neither be possible nor desirable that each province should have a complete educational system of its own, and the most efficient as well as the most practical policy to pursue would be for each province to utilize to the full all the educational resources of India as a whole, in addition to the facilities which might exist in the province itself. Perhaps it may facilitate matters if the Government of India would see that proper facilities are afforded, as far as practicable, at all provincial institutions, for students of other provinces. I see Mr. Cumming has recommended that the Bengal Government might send students to the Cawnpore Leather Factories to be trained in that industry. But Mr. Chatterji informed me that there are no facilities for the training of Indian youths either in the Government Military Factory at Cawnpore, or the private factory of Mr. Allen Cooper. There are some students from Bengal, who watch the operations of the Government Chrome Leather Factory at Madras, but really the institution has no facilities for imparting any regular training to students.

#### CHAPTER IV.

##### SUGGESTIONS FOR A "SCHEME" FOR THIS PROVINCE.

307. An elaborate and carefully thought out scheme has been prepared for the North-West Provinces, and I understand it now awaits the sanction of the Secretary of State. The skeleton of the scheme recently adopted by the Government of Madras at the Ootacamund Conference is also before the public. For Bengal, Mr. Collins' original suggestions, the resolution of the Government of Bengal on those proposals, and the recent recommendations made by Mr. Cumming are also available. With regard to these schemes, one criticism which

naturally suggests itself is their lack of co-ordination with each other, from an all-India point of view. It is not inconceivable therefore that when they reach a central authority, they may be considerably modified, and a self-contained and properly co-ordinated scheme for the whole of India substituted. The perusal of these schemes also leaves the impression, that even if there be no other objections, the difficulty of obtaining so many experts of different kinds will impose an almost insuperable obstacle in the way of our launching so many schemes simultaneously in different parts of India. In proposing a scheme for this province we shall be well advised, therefore, if we take into account our immediate and positive requirements only, and also make due allowance for the assistance which the proposed schemes of the other provinces are likely to render us. In other words, our object should be to make our scheme as practical as possible.

308. We can have no possible hesitation, however, in accepting the proposal which has been placed in the forefront of their schemes by the other Governments, namely, the creation of a separate department for this work. The Nainital Resolution on this point runs thus : "There should be a special department to deal with industrial questions and control technical education. The department should be directed by an officer to be styled the Director of Industrial Enquiries and Education. He should have experience of the country, and, if possible, be an engineer, with a knowledge of chemistry and some acquaintance with industrial work. It is important that he should deal direct with Government."

The Madras Government has also decided to have a separate department. In Bombay, too, I understand there is a Director of Industrial Inquiries. For Bengal Mr. Cumming, in Section 2, Chapter I, Part I, and Chapter VII, Part II of his report, has also recommended that there should be some controlling and guiding power, and a whole-time expert should be appointed as Director of Industrial Inquiries, and Inspector of Industrial Schools. But it appears that in Bengal, although Mr. Earle, the Director of Education, held "that all branches of professional training should finally be under the guidance of a co-ordinating authority or department not connected in any way with education, but concerned with the industrial development of the country," yet it was recommended that the new department should be attached, for the present, to the Office of the Director of Public Instruction. The United Provinces Government however expressed itself very strongly on this point. "Sir John Hewett is convinced," wrote of Mr. Taylor, "that to hand technical education over to the Education Department would throttle it at its birth."

The qualifications necessary for the required post would appear to be—

- (1) Knowledge of engineering.
- (2) Knowledge of industrial chemistry.
- (3) Business and commercial experience with special reference to the conditions prevailing in this country.
- (4) Administrative experience.

I think it may be safely presumed that it would be quite impossible to get one person to answer to all these qualifications. It is a question, therefore, which will need careful consideration, whether the officer who will on the one hand deal directly with Government, and on the other control and guide the various industrial and Technical Schools, Government pioneering factories, the various administrative measures which may be necessary to bring the people of the country in touch with the work of Government, should be a chemical and engineering expert, or a senior civilian, with administrative experience and knowledge of the country. Mr. Cumming has expressed the following opinion on this point : "What the capitalists who are anxious to embark on industrial enterprise most desire is disinterested advice, and this can best be obtained from a Government officer who possesses scientific training, direct experience of the country, enthusiasm and business capacity, and the primary object of whose appointment is to advise and assist such capitalists in industrial enterprise. I hold strongly that one practical enthusiast who would inspire confidence is more required at the present juncture, than any departmental scheme, in order to break down the dead wall of want of enterprise, absence of mental trust and lack of business capacity, which are the real obstacles to indigenous industrial development in the province."

It may not be out of place to point out here that the sphere of the duties of the Director of Agriculture, and the Registrar of Co-operative Credit Societies will in some ways be conterminous with the duties of the proposed department, and all three might perhaps be placed under one Secretary or a Member of the Board (with powers to deal directly with Government).

The duties of the new department.

309. The functions and duties of this department will be broadly speaking threefold—

- (1) Educational.
- (2) Commercial.
- (3) Administrative.

Its educational duties will be to organise and maintain a system of central and local technical and industrial (art) institutions in the province; its commercial functions will be to pioneer new industries, and by rendering financial assistance and by other means to encourage private enterprise; and its "administrative" functions will consist in the difficult task of securing a co-operation of the people of the country in this work by the creation of "Industrial Committees", "Industrial bureaus" and such other similar institutions which might be considered necessary, and in the establishment of Co-operative Credit societies amongst the artisans. Of course the above classification is by no means exclusive, and perhaps it will be more correct to say, that of the measures to be adopted, in some the dominant tone will be educational, in others commercial, and in the third administrative. Speaking broadly it might be said that the schemes of the United Provinces and Bengal are more "Educational," while Madras has followed a more "Commercial" policy; whereas in neither has much stress been placed on the administrative aspect of the problem.

Educational

310. The educational part of the scheme of the other provinces consists of proposals with regard to—

- (1) Modifications in the existing system of general education.
- (2) The establishment of some central institutions for industrial and technical education.
- (3) The establishment of local institutions and schools for special industries.

311. It is not necessary to say much here about the first part of the scheme, for, however important, its bearing on industrial education must be comparatively remote. I agree with Mr. Chatterji, however, in recommending extension of primary education amongst the artisans; but the question is a large one, and is already engaging the attention of the Government of India. There is again a complete unanimity of opinion, both amongst publicists and Government experts, regarding the wisdom of "adjusting general education so as to predispose boys to industrial work." The whole trend of the educational policy of these provinces since 1901 has been in the direction of making it more practical and scientific. Greater importance is also being attached to "manual training" and teaching "through the senses." It is a pity that "drawing" has been done away with from the curriculum of the "matriculation" standard of the Calcutta University.

312. As regard central institutions, three have been recommended for Bengal and the United Provinces.

- (1) An advanced Engineering College to teach Civil, Mechanical, Electrical, Mining and Sanitary Engineering, and for the training of foremen, overseers and managers for the organised industries employing machinery.

For Bengal the Sibpur College of Engineering is being equipped to supply this need. It will probably be removed to Ranchi. For the United Provinces the Rurki College, enlarged and re-organized, will be able to give the required training.

We have seen that there are very few large factories in this province, and the prospects of a very rapid development of large factory industry is still remote. It will not therefore be wise to attempt to have a separate institution of the nature of the Sibpur Engineering College in Dacca just now. We may wait developments, and in the meanwhile this province can well afford to allow this training to be given by the Sibpur College, where special facilities have, as noted before, been already secured.

The electrical installations at Dacca have given scope for the opening of special classes in Electrical Engineering. These might be developed with advantage.

It may be worthwhile considering whether there is not scope for the opening of a mining college, on a small scale, at Dibrugarh, or somewhere near the coal mines at Marghota.

(2) A central Technological Institute, the nucleus of which should be the industrial and chemistry classes, and where the training should embrace the chemistry of leather and tanning, of sugar, of the manufacture of commercial chemicals, and the chemistry of the processes required in the dyeing and printing of textiles and in the manufacture of dyes, perfumes, soaps, varnishes, etc., has been recommended for all the other provinces (Bengal, Madras, and United Provinces). There can be no question that such an institution will be most useful for this province, and if I hesitate to give my unqualified support to such a scheme, it is because I think that it is more important perhaps for this province to concentrate all our energies, for the present, in creating and establishing a few of the most suitable of the possible industries for this province. Till this is done, I am afraid there might be some risk of our being a little premature with our elaborate central institutions. I think the remarks of Sir Arthur Lawley "that Government should rather develop industries, precedent to the introduction of schools" is specially applicable to this province. In this connection, it should also be remembered that, in addition to the Bengal Technical Institute recently started in Calcutta, the Bengal Government propose to have an elaborate Government institution of this nature in Calcutta. But taking all the facts into consideration, I think we will probably have to establish a separate central Technological Institute of our own.

(3) A central School of Art has also been recommended for Bengal and the United Provinces. In Calcutta there already exists a School of Art. It is proposed that the existing school be brought more in touch with the industrial art of the province, by the transfer of the Industrial Art section of the Calcutta Museum to the School of Art, and by carrying out the proposals of the 1905 conference of the Principals of Schools of Art, in preparing and circulating design books for workers. It has also been suggested that in the proposed Bengal School of Art there should be a museum of the industrial art of the province.

A central Art School for the province at Dacca is certainly a most attractive proposition. The course of instruction will have to be, as in the Calcutta Art School, in two divisions—one affording a systematic instruction in drawing and design for drawing and technical Art teachers, draughtsmen, artisans, Art workmen and designers for Art industries; and the other for those who wish to study drawing, painting, and modelling with a view to become painters or sculptors. If an Art school were to be opened at Dacca, it will perhaps be wise to commence with the industrial section of the school. Or, for the present, we may only have a department for designing in the central weaving school, to be opened at Dacca.

I have already recommended that we should have a central Art depôt or museum attached to the Art school. Messrs. Collins, Havel, Chatterton, and lastly Mr. Cumming, all very strongly recommend such an institution.

I have also suggested that if a special Art museum for Bengal be opened in Calcutta, some room should be secured in it for the Art industries of the province.

A fourth institution in the shape of a Nautical School or College at Chittagong, with a course for the instruction of steam navigation and a department for mechanical engineering, with special reference to ship repairing, management of the machines of steamships, and ship engineering generally, ought to be a most useful institution for this province. The special feature of this province is the excellence and abundance of its waterways, its possession of numerous important ports and a first-class harbour close to Chittagong, which all point to the necessity of such an institution. Chittagong is the home of a sturdy race of Muhammadans, who have inherited the seafaring instinct of their forefathers, and who are now largely employed, not only in the subordinate capacity of *lascars* in sea-going vessels, but also as *serangs*, or captains, of most of the steamers of the Assam and Bengal lines. I think it will not only encourage indigenous nautical enterprise, but also be a great gain to steamer and ship services of India, if we had such an institution. The proposal therefore appears to me to be worth considering.

313. As regards local schools, I would strongly recommend that they should be organised on a commercial basis, or in other words, instead of opening schools we must establish factories, with apprentice classes for imparting education regarding the processes of manufacture practised in the factory. I think this is the most important object lesson to be learnt from a comparison of the methods followed in recent years in Bengal and Madras, respectively, in reviving the weaving industry for instance, and the comparative success which has attended official efforts in Madras, and

Local institutions and schools for special industries.



the complete failure of all such efforts both in Bengal, and this province. I have visited most of the so-called technical schools of this province, and the impression which I carried away was that the class—no matter whether it was a smithy class or a carpenter's or a weaving class—was so poorly attended, and it was so difficult to keep boys in these schools, in spite of the award of scholarships, and so few of those trained in these schools could turn to any profitable account the knowledge acquired by them, because the education imparted for any industry had so very little connection with the industry itself. The problem in this province, as well as in other parts of India is, that Government must not only give expert education to the people to fit them to carry on new industries, but also to a great measure create the industries as well.

314. To carry out the above policy into practice I recommend—

- (1) That some central factories, primarily with the object of imparting education, be established.

Central factories.

For the present I recommend—

- (i) The opening of a central weaving factory at Dacca. The sphere of work of such an institution I have already outlined before.

Central weaving factory at Dacca.

- (ii) The opening of a dockyard and iron foundry at Chittagong. This factory may be connected with a College of Mechanical Engineering, with special reference to nautical instruction both in navigation and the engineering of steamships.

The second scheme, however, I am able to recommend with much less confidence than the first.

- (2) The opening of smaller factories, in which the commercial success of the concern will be kept as prominently in view as the imparting of education to the pupils.

Local factories.

- (i) I recommend four such factories for hand-loom cotton weaving to be started at—

- (a) Comilla.  
(b) Pabna.  
(c) Faridpur.  
(d) Bakarganj.

The United Provinces have started three weaving demonstration schools at Tanda, Muradapur and Saharanpore, besides the old school at Barabanki near Lucknow. The capital necessary for starting these factories may be found jointly by Government, the District Board and Municipality, the management being under a Committee with the Collector as President. For technical management we should have a specially trained officer. The general control of these institutions should rest with the Director of Industries.

I may mention here that Mr. Aiyar, Mr. Chatterton's Assistant at the Salem Factory, is available, and P. N. De of Chinsura has some capable assistants who understand perfectly the use and the mechanism of fly-shuttle looms. Mr. Chatterji utilised the services of some of these men in organising the new Demonstration Schools.

- (ii) Two such factories for silk hand-loom industry to be located at—

- (a) Malda.  
(b) Gauhati.

Management, etc., same as above.

The Gauhati factory to be connected with the Gauhati Sericulture Farm.

- (iii) Two such factories for carpentry and cabinet-making to be located at—

- (a) Dacca or Chittagong, and  
(b) Gauhati.

- (iv) One cutlery factory in Barisal or Chandpur.

I think the above will be sufficient to begin with. It is needless to point out that all these factories, except perhaps the Central Dacca Weaving Factory, will have to be made over to private enterprise as soon as sufficient capital and expert management are forthcoming.

How the scheme outlined above is to fit in with the system already in existence, how much of the old scheme will have to be abandoned, and what portion is susceptible of modification, are questions which will need careful consideration.

315. It is in the introduction of new industries into the province that the action of Government would make the nearest approach to commercial enterprise. As has been repeatedly pointed out, the lack of enterprise and the unwillingness of Indian capitalists to invest money in industrial concerns, are the chief drawbacks in the path of the industrial progress of the country. Once Government takes up a new industry and shows it to be a commercial success, it is most likely that Indian capitalists may take advantage of the lesson taught by Government, and take to similar undertakings. Government can help to introduce new industries either—

II.—Commercial.  
Introduction of New Industries.

- (1) By "pioneering" new industries entirely on its own responsibility, and by its own management.
- (2) By guaranteeing interest for a certain number of years, on capital which might be invested in suitable industries.
- (3) By rendering pecuniary assistance to firms or persons who are willing to engage in any profitable industry.

It is true that Mr. Cumming has pointed out that there is a school of opinion which holds "that the capital for large and new industries should be found by private enterprise," and Mr. Cumming himself has not advocated the complete pioneering of any new industries in Bengal by Government. But the only Presidency which has up to now done any positive work in connection with the revival of the indigenous industries is Madras, and there the "Pioneering" of the Aluminium and of the Chrome Leather Industries by Government have been the initial steps, and in the Resolutions just adopted by the Madras Government, the Industrial Board have been given full powers "to embark on the pioneering of any new industries which they might consider necessary, under due control to prevent undue interference with private enterprise." Sir Arthur Lawley has also pointed out that private enterprise "is not so brisk in Madras as to bring Government interference in contact with it." If this can be said of Madras far less is there any danger in this province of Government interfering with private enterprise, if Government decide to pioneer some selected industries. In the scheme of the United Provinces, the pioneering of the leather and the button-making industries has been decided upon. It may also be incidentally pointed out that one of the most important items in the programme of the industrial regeneration of Japan was the pioneering of new industries by the State. "After the Restoration, the new Government systematically encouraged the use of Western methods, setting the example by establishing a model filature, a silk spinning mill, a woollen factory, a cotton-spinning mill, a cement factory, a glass factory, a paper mill, and other model workshops, besides lending money for the purchase of necessary plant. In time, as these enterprises were taken up by private individuals, the Government began to sell its own factories."

I am strongly of opinion therefore that in this province we cannot do better than pioneer one or two carefully-selected industries.

Now the most promising and important future industries of the province are, I think,—

Pioneering and assisting important industries.

- (1) The tanning of leather and manufacture of leather goods;
- (2) The manufacture of sugar;
- (3) The establishment of a power mill for silk-weaving;
- (4) The establishment of a power mill for spinning and weaving cotton;
- (5) The manufacture of tobacco;
- (6) Match factory;
- (7) Paper mill;
- (8) Lac factory.

Of these (3) and (4) are perhaps the most important, but there will be obviously objections to Government directly pioneering such industries. It may be considered, however, whether Government would not be justified in guaranteeing interest on any capital which may be laid out in either of the above enterprises, by any private firms, for a limited number of years. The likely sites for power mills for silk and cotton have already been indicated. As regards (1) leather, and (5) tobacco, joint stock companies have already been floated. I am doubtful, however, whether, without Government aid, particularly in the matter of management and expert supervision, either of these will

be quite successful. Further inquiries into the matter are necessary with a view to ascertaining what assistance will be most acceptable and most useful to the promoters of these two proposed joint stock concerns. My personal opinion is that in the case of the proposed tobacco factory, we might procure a suitable expert manager for the concern and if necessary engage to pay his remuneration for 5 years, but the leather business is so important for the province, that unless the joint stock concern agrees to supervision by Government experts, in return for a reasonable pecuniary assistance, the safest course would be to have a separate Government leather factory at Dacca.

In the manufacture of sugar this province has great potentialities, and I strongly recommended the opening of an up-to-date Government factory at Rangpur. I am informed Mr. A. Shakespeare, of the Cawnpore Sugar Works will be pleased to render every assistance to our Government or to any private firm, if it be proposed to start a sugar factory in this province.

If private enterprise will not come forward of its own accord with the necessary capital, the proper way of encouraging the last three industries (match, paper, and lac) would be for Government to guarantee, for some years, interest on capital which might be invested by private capitalists, who should also be supplied with all the information that they might require. Of course in each case, we must insist on Government supervision as long as the financial aid of Government continues.

316. I also recommend that further inquiries be made by the Department with a view to ascertaining the suitability of introducing, on a commercial scale, the following important industries into the province:—

- (1) Manufacture of enamelled ware.
- (2) Manufacture of aluminium ware.
- (3) Manufacture of glass.
- (4) Manufacture of glazed and painted pottery.

317. In the United Provinces it has been resolved that "the Government may properly make money grants for definite purposes to new enterprises, if the result of the action to be taken with the assistance thus afforded is likely to be of general industrial advantage." It is not clear whether the grant is to take the shape of a loan or be a free grant. I think it should be a loan. In this province I strongly recommend grants to two firms—

Money grants to promising enterprise.

- (1) The Boolbool Soap Factory at Dacca.
- (2) The Tile business of Prakash Chandra Ray & Co., of Itakhola, Sylhet.

I think a grant of Rs. 20,000 to the first and Rs. 10,000 to the second would serve the purpose.

A small grant of Rs. 500 may also be made to Mir Asgar Ali of Silchar to help him to complete the experiments he is now making with a view to inventing a hand-spinning machine.

318. Besides the above mentioned larger industries, the following industries would also appear to have a promising future. Special inquiries and experiments to demonstrate their suitability or otherwise are necessary by the Department:—

- (1) Preservation of vegetables and animal products, e.g., curing and canning of fish, canning and drying of fruits, etc. (both Messrs. Hart and Basu have recommended this industry.)
- (2) Introduction of horn work (combs, sticks, etc).
- (3) Manufacture of starch from arrowroot, cassava and potato (recommended by Mr. Basu).
- (4) Button making.
- (5) Coconut-oil, coir ropes, etc.
- (6) Poultry.

The best method of getting these industries introduced into the province would appear to be—

- (1) For the Industrial Department to have experiments made till it is satisfactorily proved that the industries concerned would be commercially successful.
- (2) Then print in the gazette all particulars about the capital, management, etc., that will be required, and the profits that could be reasonably expected.
- (3) Guarantee interest for the money required, for a certain number of years, if the concern agrees to have the business supervised by the Government Department.

319. Turning to what I have described as administrative measures in connection with a scheme for the encouragement of indigenous enterprise, I think the most important would be the formation of Co-operative Credit Societies amongst the artisans, such as the weavers of textile fabrics and the metal workers. Of all the measures which under existing conditions it is open for the Government to adopt, to encourage what may be called "purely indigenous enterprise," I consider action in the direction of the development of co-operative credit amongst the artisans to be by far the most important. I wish I had an opportunity of examining the working of the societies which are reported to have been established in Madras, United Provinces (Benares), and Bombay (Sholapur), and to be doing such useful work. Before taking any action in this province, inquiries in the other provinces about the method of work adopted should be made.

III. Administrative. Industrial Co-operative credit society. Industrial Societies. A second sphere of administrative action in this connection will be the organization of a net-work of "Industrial Societies," for each Commissioner's division of this province. I have already made a beginning, and can say that the recognized leaders of society, both Hindu and Muhammadan, Bengali or Assamese, evinced the keenest interest in getting an opportunity of acting in concert with Government, in a cause which they realize to be beneficial for all.

Industrial Bureaus. A third requirement would be the creation of Industrial Bureaus. For the present, two may be started, one for the "weaving industry" and the second for the "metal industry." To gradually raise the status of the artisans engaged in the purely indigenous industries, to educate them, to introduce improved machinery amongst them, to reconcile them to its use, to organize Co-operative Credit Societies amongst them, to reorganize the existing artificial condition of these industries, and to bring the producers into close touch with the consumers, will be a slow, tedious and most difficult task; and the new department will, I am sure, welcome the assistance of a bureau, of the nature outlined by me, consisting of a Deputy Collector, and some private gentlemen, who may also belong to the "Industrial Societies" referred to above.

Industrial exhibitions. Lastly, I recommend the holding of annual or biennial "Exhibitions" in different suitable centres. These exhibitions are to be so arranged, that in every year or so every Commissioner's headquarters should be the seat of one of these exhibitions. The Nainital Resolution on this point runs as follows:—

"Exhibitions should be encouraged, specially exhibitions with definite competitions and liberal prizes for products, methods, and workmanship; and advantage should be taken of established *melas* to open exhibitions. In the case of industries connected with agriculture, lectures could usefully be arranged for."

I made special inquiries with the object of ascertaining the views of the people themselves about these exhibitions. All sections seem to realize their importance. Mr. R. K. Saraswati of Gauhati informed me that he brought away some useful ideas from the last Calcutta Exhibition, and the result was the introduction of several new patterns of cloth in his shop. At Bogra, where the Exhibition was connected with a local *mela*, and where lectures were also arranged for, the district was the richer by the introduction of two or three important varieties of paddy, as the result of the Exhibition. The educative and stimulating effect of these exhibitions is by no means inconsiderable, and they help to create an industrial atmosphere, for the time being, in the locality where they are held.

320. To conclude, I must repeat again what I have said before, that the task which the Government has set before it is perhaps the most important as well as the most difficult of the administrative problems with which it is now engaged. To my mind, the most important requisite of success is that the people for whose material advancement the proposed measures will be adopted, should impose complete and unstinted confidence in the policy and intention of Government. Perhaps there will be less danger of any misrepresentation, if I spoke frankly on the point. The education policy hitherto pursued by the Government, has already been adversely criticised by impartial observers, both in this country and in England. If the Ruling Power is now to take steps, and spend money in organizing schemes, with the object of advancing the cause of Indian Industries, perhaps at the expense, at least temporarily, of the interests of English Commerce, it is surely not too much to expect that there should be some guarantee that the action of the Government should not be open to the criticism of increasing the difficulties of the existing political situation, instead of lightening them. In fact, it is my advice to all those of my countrymen

who have the welfare of the country at heart, to realise the supreme importance of the industrial problem in any scheme of the future progress of the country, and endeavour so to shape the action of the body politic as to make it possible for the Government to repose entire trust in them.

In all recent utterances on the subject, it has been repeatedly pointed out, that after all, the industrial progress of the country, like all other forms of progress, must ultimately depend on what the people themselves are capable of achieving. It is hardly necessary to repeat this truism again, for I know its truth is fully realised by the leaders of thought and action of the country. It must also be clear to all thoughtful Indians that (to quote the words of Professor Gajjar) "Boycott by itself can never solve an industrial problem. Scientific knowledge, technical skill, and industrial enterprise and organization, these are the true remedies, the only *positive forces* we can rely on to develop our industries." That the true aim of real swadeshimism has been quite clearly grasped by the leaders of Indian thought would be apparent from the wise pronouncement of the Honourable Bhupendra Nath Bose, now quoted so often: "It is becoming more and more apparent," wrote Mr. Bose, "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."

I therefore feel confident that educated Indians will not fail to respond to the noble call of such generous and whole-hearted rulers like Sir Arthur Lawley, who in opening the last Madras Conference said, "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 specially 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 the tongue or the pen, but by the sweat of the brow and the labour of the hand."

For the Government it is humbly suggested that the key-note of our policy should be sympathy with the shortcomings and failings of the people, that our action should be prompt and vigorous, and that we should be prepared to spend money unreservedly. Delay and half measures are to my mind likely to bear very little fruit. But whatever is done, patience will be necessary, and there will be many halts and perhaps some disappointments before any tangible results are achieved. But the proper spirit with which to approach the task has been shown by Sir Arthur Lawley, when he said, "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 will end with another quotation from the report of Mr. Taylor, the Secretary of the Government of United Provinces, which to my mind concentrates the whole essence of the present position: "The Lieutenant-Governor has no doubt," wrote Mr. Taylor, "the Government will obtain a rich return for its outlay, not only in the increased well being, but also in the greater contentment of the people; for there can no longer be any doubt that the public eagerly desires a vigorous policy of industrial development, and that such a policy is well calculated to unite all classes of the community, and to draw them through material progress along the paths of political peace."

SHILLONG : Printed and published by E. HILL, Superintendent, Eastern Bengal and Assam Secretariat Printing  
Office : (F. & M.) No. 326-100+1,100-24-12-1908.