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PUBLISHERS' NOTE

A number of monographs on various indigenous handicrafts and industrial products were prepared in the state of Bengal on the directions of the Government of India contained in their circulars of 1895 and 1897. These monographs have been based on the district reports or monographs and were supplemented by other published information and personal observations of the authors. All the monographs on different products trace the historical growth of these industrial arts, depict the economic conditions of the artisans engaged therein, describe the product they made and artistic aspects thereof as prevailed at the close of the nineteenth century. These monographs appeared in print at the turn of the century.

It was proposed to reprint all the monographs in one volume. The original monographs, however, were not published in the same page size or print. So in order to reprint them in one volume, some of the monographs had to be ‘reduced’ or ‘enlarged’, as a result of which, the size of the final print could not be uniform.

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November, 1975
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PART I.
THE MULBERRY AND THE MULBERRY SILK-WORMS.

CHAPTER I.

LOCALITIES WHERE SILK IS PRODUCED.

With the exception of the Chittagong Division, all other divisions of Bengal have reported the existence of the silk-weaving industry. In the Presidency Division the industry is reported to be at present confined to Murshidabad. In this district mulberry-growing and cocoon rearing are particularly common in the thanas of Burwa, Burwan, Gowas and Raghuahganj, while silk-weaving is carried on mainly within the jurisdictions of the thanas of Sujaganj, Doulatbazar, Bhagawangola, Gowas, Manullabazar, Apanpur, and Mirzapur. The town of Mirzapur produces the most superior silk fabrics in the whole of Bengal. Among other important silk-weaving centres may be mentioned Baluchar, Islampur, Kadai, Saidabad, Beldanga, and Hariharpura. Berhampur and Jeaganj are the two chief centres of silk trade where the wealthy merchants reside. During the last decade the industry continued to decay in the department of cocoon-rearing and also in that of cocoon-weaving. The Census figures for 1901 show 41,615 persons as being dependent on this industry in Murshidabad, against 55,142 which was the number according to the Census Report for 1891. Studying the Census figures in detail, however, one would be struck with the rapid strides the silk-weaving industry of Murshidabad, as a whole, has made within the last decade, though this improvement has gone on paripusus with the decline in the cocoon-rearing industry. Nadia and Jessore were at one time recognized as silk-producing districts. Mulberry-growing and cocoon-rearing still prevail in the northern part of the district of Nadia. In Khulna there has never been any silk-rearing, though an experiment on a small scale, conducted for three years from 1891 to 1894, was sufficient to demonstrate the possibility of growing the mulberry and the mulberry silk-worms exactly in the same way as it is done in the northern districts. It remains to be seen if local enterprise will prompt the utilization of the mulberry trees which were planted at this time and which are only just ready for rearing silk-worms. The presence of about 100 large mulberry trees within two or three miles of the Sadar station ought to be a sufficient inducement for some poor man, acquainted with the art of rearing silk-worms and making thread, to take up the industry, if facilities are put by local bodies in the way of such a man to do so. The Chairman of the District Board of Khulna, having lately addressed the writer of this Monograph on this subject, the matter may be mentioned here in case it should lead to any practical result in the future. A similar experiment was conducted from 1892-95 in the Magura subdivision of Jessore, but this has given rise to no local enterprise. In the 94-Parganas the cocoon-rearing industry still
lurks in some villages in the neighbourhood of Dattapukur. It may be also mentioned here that at Ulsadanga, near Calcutta, an enterprising Muhammadan gentleman has set up a silk-weaving mill on European principles, which is said to be in a flourishing condition. But as this is not, strictly speaking, an indigenous industry, nothing further need be said about this enterprise.

2. In the Burdwan Division, silk-weaving is reported to be carried on in all the districts. The following interesting history of the silk industry in the district of Hooghly has been furnished by Babu Sukumar Haldar, Subdivisional Officer of Jahanabad:—

"Local tradition points to the existence of an important silk industry in the Jahanabad subdivision as far back as the seventh century. It would appear from old records that at a time not long after the transfer of the Dewani of Bengal to the East India Company, the Company had a factory at Khairpur (now in the Midnapore district), the place which was the head-quarters of this subdivision at the time of its formation in 1846. It is difficult to ascertain the precise date of the establishment of the factory, but it was certainly in existence in 1795, and probably existed prior to 1785, the date of the cession of the Dewani to the Company (see Mr. Toynbee's sketch of the administration of the Hooghly district, paragraph 91). It would appear that the Company, until the winding-up of their commercial affairs, held the absolute monopoly of the silk industry in this district.

"Proofs are not wanting that the industry was in a flourishing condition before it was taken in hand by the East India Company. Dwanganj, on the right bank of the river Dwarakeswar, was the centre of an important silk industry, which still survives, though in a state of decadence. In those early times the trade was almost exclusively an inland one, and was chiefly in the hands of Bunnials from Upper India. Camels were the only means of transport; and traces of an elevated highway used by the caravans of these merchants are still in existence. The character and extent of the trade at this time cannot be ascertained with any accuracy, but there is reason to believe that the trade was an important one.

"Under the East India Company the trade was a river-borne one. Mr. C. Tomschet, the Commercial Resident of Bardhaman, writing in 1790, states that Ghatal on the Sillye in Midnapore was the port of Khairpur, Chandrosa, and Dwanganj. It would appear that during the rains when the river Dwarakeswar was navigable, the silk goods were sent down the river (which from the point of confidence with the Sillye near Ghatal assumes the name of Rupnarpur) in boats from Dwanganj. During the dry season the goods were despatched by pack-bullocks to Ghatal, a distance of eight miles. There was at this time great activity in inland as well as in river-borne trade. In consequence, however, of the monopoly acquired and jealously guarded by the Company, the old direct inland trade with Upper India was at first paralysed and, perhaps, temporarily extinguished.

"For the subsequent history of the industry under the Company, I cannot do better than reproduce the following account from Mr. Toynbee's sketch:—

"The cloths factories in the Hooghly district were gradually abolished, and the buildings and sites were sold off between 1830 and 1839. The silk factories in the Midnapore district appear to have been kept on for some time longer. The commercial concerns of the Company were gradually wound-up by the Board of Salt, Customs and Opium, and the post of Resident appears to have been abolished about 1830. The cause of this collapse was the competition of the Manchester cotton goods which the Collector says could be sold at less than half the price of the cloths made at the Company's factories. The native cloth industry still struggles on in this district, but it cannot survive for many more years, and most of the weavers have already taken to other pursuits and become absorbed in the general population. (Paragraph 92.)

"After the winding-up of the East India Company's commercial concerns, the silk factories were taken up by Messrs. Robert Watson and Company. A part of the industry which still survives continues to be in the hands of that Company in the Midnapore district.

"The history of silk in Jahanabad is the history of an effete industry. Dwanganj, the only place where it survives to any appreciable extent, is noticed by Hunter in his Statistical Account of Bengal only in connection with brass work.

"In the District Census Report, 1891, the Magistrates (Mr. H. G. Cooke, c.s.) thus briefly notice the silk industry:—

"Some mention may be made of the traces of European enterprise in indigo and silk. These industries have absolutely disappeared, but it is not an uncommon thing to come across traces of considerable factories and flaitures in ruins. There was at one time a very flourishing silk trade in Jahanabad and its neighbourhood, but since the importation of European goods this industry only exists in name. The decline of this trade dates so far back that it scarcely affected the density of the population in the two previous decennial periods (Paragraphs 11 and 67).

"The manufacture of silk textures is at present confined to Bali, Dwanganj, Kalagachia, Radhakallipur in thana Goghat, and Kichorepur in thana Khasakul, in the subdivision Dwanganj being the chief centre.

"Silk Textures are at present confined to Gheso, Raghunathpur, Ghoasipur, Tilakarnicak, Kangair, Dhangar, Ghoradaha, Jagtapur and Heosundarpur, all in thana Khasakul.
The thread is utilised in the manufacture of fabrics at Ghatal and places outside the limits of this subdivision. The number of spinners is returned by the police to be 860, which I consider to be an overestimate.

"The silk weavers of Bali, Dewanganj, &c., neither manufacture their own thread nor buy from these spinners. They buy their thread from dealers in Midnapore."

The statement that the silk industry of Midnapore is still in the hands of Messrs. Robert Watson & Co. is not correct, as the only European Company that is at present working silk in that district is that of Messrs. Louis, Payen & Co., the French Company.

3. The Hooghly report does not mention the fact of silk printing on corahs obtained from the district of Murshidabad being carried on on a fairly extensive scale at Serampur, where some silk-weaving also is still done. The census figures would also lead one to infer that the silk-weaving industry of Hooghly was in a more flourishing condition in 1901 than in 1891.

4. In the Burdwan district the silk industry is carried on in the Sadar Katwa and Kalna subdivisions, but not in the Raniganj subdivision.

5. The industry is carried on in the following villages:

In Satgachia thana in the Sadar subdivision—

- At Memari ... ... By about 50 families.
- At Radhakantaapur ... ... 34
- At Santigantur ... ... 8

In Gobli thana—

- At Khana ... ... ... 19
- At JaiKrishnapur ... ... 19

In Sahebganj—

- At Jagdabad ... ... ... 22
- At Panchkula ... ... ... 25

Total ... 173 families.

6. In Kalna subdivision no weaving is carried on, but cocoons are reared to a certain extent, and a good deal of Tusar yarn is also manufactured. Cocoons are raised at Serampur, Kaknaul and Khanduttpura. Spinning is carried on at the above-mentioned villages, and also at Satni, Sigubag, Naimpur, Gachhi, Pathangram, Khanpur, Hat Tare, Nadaha, and Napanna. Employment is given to about 3,000 people, mostly engaged in cultivation, who eke out their agriculture by raising cocoons and by spinning the thread. By caste they are chiefly Satgopis, Chandals, Gandhabanias or Musalmans; the only exception to the rule is one Babu Gour Mohan Bhattacharjee, M.A., Head-Master of the Patuli Entrance School, who has been trying to revive the mulberry silk-rearing industry of these villages in correspondence with the writer of this Monograph. The silk industry was originally introduced into this subdivision from Murshidabad on the failure of the cotton industry; the credit of this being due to one Radhikananda Rai, of Amdanga, a servant of one of the Nawab Nazims of Bengal.

7. In the Katwa subdivision Tusar alone is grown, and a description of the Tusar silk industry of Katwa will be found in its proper place (Part V). According to the Census figures of 1901, the silk-weaving industry of Burdwan has undergone a considerable decline within the last decade.

8. In the district of Midnapore mulberry cocoon-rearing is carried on in Ghatal and Tamluk subdivisions, chiefly within the jurisdiction of Ghatal, Daspore and Garhbeta thanas. The village of Chandrakona, in Ghatal subdivision, is almost as important a centre for silk-weaving as Mirzapur and Baluchar in the district of Murshidabad and Shibdanga in the district of Maldah. The products of the native reel from all parts of Midnapore, and even from parts of Howrah, are utilized in the looms of Chandrakona and the neighbouring villages. The Census figures show that the silk industry of this district is declining very fast.

9. In Howrah, the silk-rearing industry is of minor importance. It is carried on by about 600 persons altogether, who are mostly Kaibartas, Bagdis
and low-class Muhammadans, living in the jurisdiction of the different thanas of the Ulubaria subdivision, viz., Ulubaria, Bagann, Austa, Jagatballabpur, Sankrail, and Shyampur. They carry on cocoon-rearing and silk-spinning on a very small scale, and they also follow other agricultural pursuits. The mulberry is grown chiefly on both sides of the Damudar and the Kana nadi, and it is only in the jurisdiction of the thana Jagatballabpur that cocoon-rearing and spinning are carried on on any considerable scale.

10. In Birbhum, the cocoon-rearing and spinning industries prevail in the Rampurhat thana, the silk factory of Ganuaia belonging to the Bengal Silk Company being the centre of these industries; while the principal villages where mulberry silk-weaving is carried on are Baswa, Bishnupur and Margram, also within the jurisdiction of the Rampurhat thana. The silk-weaving industry of Birbhum is of less magnitude and importance than the silk-spinning industry, but the “Biswa-Bishnupur silks” enjoy more than a mere local repute. If the Census figures for 1901 can be depended upon, the silk industry of Birbhum is declining very fast.

11. The silk-weaving industry of Bankura is of greater importance than the cocoon-rearing and spinning industries, and the Census figures show that the industry has made considerable progress in this district during the last decade. Only a portion of the raw material used in the looms of the Vishnupur subdivision is produced locally, the balance being imported from Midnapore. Silk-worms are reared and silk spun in the following villages: Dhanda, Punishole, Kesavpur, Chingnun, Tilagthagri, Simlapal, Pahurdaba, Pathadoba, and Barakhulia. The Government sericultural experiments conducted in the villages near Garhbeta attracted the attention of the cocoon-rearers of Bankura, who are eager to profit by the introduction of Pasteur's system in their midst. They come to fetch seed from those cocoon-rearers of Garhbeta who are following this system with profit, and they hope by-and-by to have a seed-rearing establishment at Punishole. The silk-worm epidemics have been the principal cause of the great contraction of the silk industry within a very few years both in Midnapore and in Bankura, and as both districts still contain large numbers of people who depended at one time on sericulture but who have now taken to other pursuits, the resuscitation of the silk industry in these two districts, if taken in hand within a few years, is not such a difficult matter to accomplish.

12. In Rajshahi, mulberry cultivation, cocoon-rearing, silk-spinning, and silk-weaving, are still regarded as industries of very considerable importance. To feed the European and foreign factories cocoons are now imported from the neighbouring district of Maldah, as the local produce is found insufficient for local demands. The various sericultural industries in this district are carried on chiefly within the jurisdiction of Charghat, Puthiya, Bagmara, Panchipur, and Farar thanas. Within the jurisdiction of Godagari, Boalai, Lajpur, and Nattor thanas, the industries are of less importance. In the remaining five thanas of the district, sericulture is not carried on. The system of taking cocoons and yarns to hâts prevails in the district of Rajshahi, Maldah, and Bogra. In Bagmara thana there are fifteen of these hâts, of which the principal are those of Taherpur, Ekdala, and Mohanganj. In Panchipur thana there is Suktabigha hât and in Tanore thana the hâts are at Keur, Jahanabad, Raighati, and Dhorda. In Boalai thana there are five hâts: Talaimari, Binodpur, Parila, Godagari, and Khurkhari. The hât system of buying and selling cocoons and yarns does not appear to exist in Charghat, Lajpur, and Puthiya. European factories do not make use of the hâts in obtaining supplies of cocoons but depend in this matter on their agents or patikas, the cocoons not bought by the filature patikas going to hâts for sale to native filatures. Weavers sometimes go in quest of yarns to the spinning centres or villages instead of to the hâts. The chief centre of spinning and weaving in this district is Mirganj in thana Charghat. The principal village of this centre, where the best matkâ silks are woven, is Dákâ. Mirganj malikâs or Dákâ malikâs are well known even in the Calcutta market. The principal trade centre for yarns and fabrics produced in this district is a portion of the sadar station (Rampur Boalai), known as Resampati.
13. In Bogra, mulberry is grown only in the western portion of the district in a few villages surrounding the sadar station. The mulberry bush is considered unsuitable for the portion of the district east of the Karotoya, known as Pali, while the western tract, called Barind, is considered suitable. Barind is a part of the ancient province of Barendra, which included the district of Rajshahi. This tract is distinguished by the reddish and sticky appearance and the hardness of the soil. The tract known as Pali is alluvial, consisting of loose, sandy soil, which is considered specially adapted for the castor oil plant. Hence the rearing of Eadi or Eri silk-worms (the Attacus Ricinellus) is carried on chiefly in the Pali tract, while mulberry silk-rearing is confined to a portion of the Barind. Mulberry silk-rearing was in a flourishing condition when there were some European factories in this district. The last of these, viz., the one at Nowdapara, about 3 miles away from Bogra town on the western bank of the Karotoya, ceased working about 30 years ago. It is said, there had been a European factory at Kharna and another at Sajapur long before this time. At present the decayed industry of Bogra depends entirely on the neighbouring district of Rajshahi, where cocoons and yarns produced in Bogra are sold, mostly at the bazaar of Thanipura.

14. In Maldah, cocoon-rearing and silk-spinning are carried on more or less extensively throughout the district; while silk-weaving is carried on at Shibganj, 24 miles from the sadar station, at Shahpur near Bhola, where there is a silk factory belonging to the French Company, at Sajapur near the ruins of Gour, and at old Maldah, which is 4 miles from the sadar station. The silkworm industry of Maldah has slowly but steadily improved during the last decade, and the Census figures show 43,498 persons as being dependent on this industry in 1901 against 42,896 in 1891, but the development, as in the case of Murshidabad, Rajshahi and Birbhum has been mainly in the department of weaving.

15. Mulberry silk-rearing is a very important industry in the districts of Murshidabad, Rajshahi and Maldah. In the districts of Midnapore and Birbhum, it is also an industry of some consequence. In Bankura the silk-weaving industry still holds its own, though cocoon-rearing has dwindled down into insignificance. In the districts of Nadia, Hooghly and Bogra, cocoon-rearing is carried on only in a few villages, while in the districts of Hooghly, Bardwan and 24-Parganas only a vestige of the industry is left.

16. Rangpur, Dinajpur, Purnea and Bhagalpur were recognised in the eighteenth century among the mulberry silk-producing districts of Bengal. Patna produced better silks than Murshidabad in the middle of the seventeenth century.* In those days Santipore also ranked with Maldah and Cossimbazar as silk-weaving centres.†

CHAPTER II.

MULBERRY AND MULBERRY-GROWERS.

No reliance can be placed on the figures furnished by the different districts as to the acreage under mulberry in Bengal. The Agricultural Statistics of the Lower Provinces of Bengal and the Season and Crop Reports of Bengal published by the Department of Land Records and Agriculture do not take separate cognizance of this crop. The most recent figures that I could lay my hands on are those furnished by a Note on the Outturn of the Rabi Crops in Bengal for 1895-96, prepared by the Department of Land Records and Agriculture. These put side by side with the figures obtained from the Census Report

* Vide Mr. C. R. Wilson's brochure, entitled "Reports and Letters concerning the Company's Affairs in Bengal, 1661 to 1685." "There are better Taffetas made at Patna than Cossimbazar, which are sold from 9 to 10 at the long yard, but no great quantities, but if followed a good quantity might be procured."

† Vide George's "Silk in India." "The trade of the East India Company in Indian silk was, however, inconsiderable till about the middle of the last century. At that time the cultivation of the domesticated kinds of silk-worms seems to have prevailed in very much the same regions of Bengal proper as at the present day. It was to be found in the districts of Rangpur, Dinajpur, Purnea (these two including what is now Maldah), Rajshahi, Murshidabad, Birbhum, and parts of Hooghly, Midnapore and Howrah" (page 2, para. 8).

"At the Cossimbazar, Maldah and Santipore factories, silk goods were manufactured." (page 14, para. 29).
of 1891 relating to the number of mulberry-growers and cocoon-rearers give the results tabulated here:

<table>
<thead>
<tr>
<th>District</th>
<th>Area under mulberry (Acres.)</th>
<th>Number of mulberry and cocoon growers (Acres.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhirbhum</td>
<td>2,000</td>
<td>8,249</td>
</tr>
<tr>
<td>Bankura</td>
<td>400</td>
<td>978</td>
</tr>
<tr>
<td>Midnapore</td>
<td>18,500</td>
<td>3,500</td>
</tr>
<tr>
<td>Hooghly</td>
<td>200</td>
<td>83</td>
</tr>
<tr>
<td>Murshidabad</td>
<td>63,900</td>
<td>31,698</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>820</td>
<td>5,793</td>
</tr>
<tr>
<td>Maldah</td>
<td>60,000</td>
<td>20,500</td>
</tr>
<tr>
<td>Total</td>
<td>184,600</td>
<td>91,650</td>
</tr>
</tbody>
</table>

18. Allowing four individuals per family the above table gives 6 acres of mulberry as the average possession of each family of mulberry-grower and cocoon-rearer. This is far too excessive an estimate. To the above table must be added a few hundred acres of mulberry for the districts of Bogra, Nadia, Howrah, Burdwan and 24-Parganas. The census figures for 1891 and also for 1901 for silk-worm-rearers and cocoon-gatherers for these and probably other districts are too low, and the actual number of mulberry-growers and cocoon-rearers must be over 100,000 (vide Tables A and B in Part III). Some of these are accustomed to call themselves cultivators and many of them are mainly cultivators, though they grow mulberry or rear cocoons also. This would account for there being more mulberry land than the census figures for mulberry-growers and cocoon-rearers would warrant one to expect. The estimates given in the above table of mulberry land in Maldah, Midnapore and Murshidabad are, however, far too high, 50,000 acres of land shown against Maldah would produce 15,000,000 maunds of mulberry leaf per annum, raising 750,000 maunds of cocoons. The district report or monograph on silk fabrics, dated the 1st May 1899, estimates the annual produce of cocoons in Maldah at 70,000 maunds only—a quantity which would go to produce about 4,000 maunds of silk. This is a good approximation, and it agrees with my own estimate. The production of native spinning establishments is about 2,000 maunds per annum (vide page 215 of Hand-book of Sericulture), and of the European filatures about 1,600 maunds. The figures of export of raw silk from Maldah in Table P (Part III) afford no reliable guide as to the production of silk in the European filatures of Maldah, as most of it is sent through the Sardah factory (Rajshahi) to Calcutta. A few thousand maunds of Maldah cocoons also find their way to Rajshahi and Birbhum, which would make perhaps another 400 maunds of silk. This total of 4,000 maunds of raw silk could be produced out of 5,000 acres of mulberry. But, as a matter of fact, the silk-worm epidemics and the fly-parasite make only a third of the cocoon crops successful, and the crop of cocoons actually obtained is probably derived from three times as much mulberry land as would be required if there were no failures. Fifteen thousand to twenty thousand acres of mulberry is perhaps a closer approximation than 50,000 acres for Maldah. This also gives \( \frac{1}{4} \) an acre per individual or 2 acres per family as the average possession of mulberry land, which is a fairer estimate than 6 acres per family. For Murshidabad, the district monograph considers 50,000 bighas (about 16,000 acres) as too high an estimate, and I have no hesitation in discarding the figures given in the above table (82,900 acres) and adopting 16,000 acres as a closer approximation for this district. Ten thousand acres for Midnapore also is nearer the mark than eighteen thousand acres. So, while some addition would have to be made to the above tables on account of those silk districts for which no returns for the mulberry crop have been furnished and also on account of some mulberry-growers and cocoon-rearers being regarded as cultivators or persons belonging to other professions or trades, a considerable deduction must be made on account of exaggerated estimates for Maldah,
Mushaidabad and Midnapore. Instead of 134,600 acres, I would estimate the
total quantity of mulberry land in Bengal at the present time at only 60,000
acres. Monsieur Natalis Kundot, the greatest authority on sericultural statistics,
estimates the annual production of raw silk in India at 623,000 kilogrammes.
This quantity of raw silk would be produced from about 12,000,000 kilogrammes
of green cocoons. Now, assuming there were no epidemics and no loss, this
quantity of cocoons could be raised with 6,000,000 manads of mulberry leaf
(one manad producing 2 seers of green cocoons). Six million manads of mul-
berry is the normal produce of 20,000 acres of land. I have already said that
silk-worm epidemics and the fly-parasite make only about a third of the cocoon
crops successful. The actual acreage of mulberry that produces the outturn
alluded to, therefore, about 60,000 instead of 20,000, even on the assump-
tion of the whole of the estimated production of raw silk being from Bengal, which
is not quite the case.

19. In the Census Report for 1891 the number of mulberry-growers in
Bengal has been put down at 12,004. The small figures shown against some of
the districts, e.g., 5 males and 5 females for Murshidabad, evidence conclu-
sively that the number is meant to include only those who subsist entirely on
mulberry-growing. The Census Tables for 1901 ignore mulberry-growers as a
special class.

20. Many high-caste men and men holding other occupations in the silk
districts of Bengal have plots of mulberry which cocoon-rearers resort to when
their own supply fails short. Every cocoon-rearer has his own mulberry field
which he uses for rearing silk-worms, and only when his own supply happens
to fall short at the very last, that he runs to non-cocoon-growers who have
mulberry land. His own mulberry costs him about 4 annas a manad, but he has
to pay as much as Rs. 4 or Rs. 5 a manad sometimes for what he buys from
mulberry-growers. As his needs at the last are very pressing, he willingly pays
the high price for it, or pledges, by handing over a token (usually a blade of
grass), to the mulberry-grower, to pay the price demanded as soon as his crop is
ripe. Sometimes the cocoon-rearer cannot redeem his pledge and, as a rule, the
mulberry-grower gets unusually high prices for his crops, and a bigha of mulberry in a silk
district is considered a little fortune. If the number of mulberry cocoon-rearers
is estimated at 80,000 (vide Table A) in Bengal, the total number of mulberry-
growers, including cocoon-rearers and others, must be over 100,000, represent-
ing about 25,000 families. The census figures for 1901 work up to a lower
figure, viz., 55,256 inclusive of dependents. The census figures for silk-worm
rearers and cocoon-gatherers are evidently too low (vide page 68), and the number of
cocoon-rearers and mulberry-growers in Bengal must be about 100,000.
Many of these would call themselves only cultivators, and they would
thus be excluded from the tables referring to the silk industry. The social
position of mulberry-growers who carry on no other profession is higher than
that of cocoon-rearers, spinners or weavers. The social position of mulberry-
growers, who follow other professions and only add mulberry-growing to their
ordinary vocations, is determined by their principal profession. A zamindar
or a silk factor may derive part of his income by sale of mulberry, but he
would not be recognized as a mulberry-grower. A cocoon-rearer with 2 or 3
bighas of mulberry is not necessarily a more substantial man than one who
owns only 2 or 3 bighas of mulberry but does no cocoon-rearing. Cocoon-
rearing may or may not be remunerative, as the silk-worm epidemics make the
industry a most precarious one; but mulberry-growing is scarcely attended
with any risk. For miles and miles it is known, so and so have mulberry land,
and even if one among a hundred cocoon-rearers within this tract makes a
miscalculation and finds at the end that his home leaf will not suffice, the few
mulberry-growers would have every time a crowd of persons offering to buy
his mulberry, one man one load, another two, another four, and so on. It is
only when silk-worm epidemics do very great havoc that the loss of cocoon-
rearers is generally shared by the comparatively few mulberry-growers also.
But as the latter can better afford to lose occasionally, mulberry-growing is
regarded as a safe and profitable industry. The average rental of mulberry
land is about Rs. 10 per acre per annum. There are some mulberry land;
even in the district of Maldah (where the highest rents are paid), which are rented at 6 annas to 8 annas per bigha, i.e., Rs. 1-2 to Rs. 1-10 per acre per annum. But in the principal jhars or cocoon-rearing centres, the rent is sometimes as high as Rs. 12 or Rs. 15 per bigha or about Rs. 40 per acre per annum. The average purchase value of mulberry land is about Rs. 100 per acre; but I have known an acre of mulberry fetching as much as Rs. 300. Each acre produces about 300 maunds of mulberry leaf per annum, inclusive of stalks, which are cut with the leaves and given to silk-worms. If the mulberry-grower realizes an average price of Rs. 1 per maund for his crop, and spends as much as Rs. 150 per acre in cultivation, &c., even then he can secure a clear profit of Rs. 150 per acre per annum. This is considered a fair estimate of profit in the silk districts for mulberry-growing as distinguished from cocoon-rearing.

21. As a rule, mulberry is cut four times a year. In Bogra and in parts of Rajshahi, leaves are stripped from the stalks twice and the stalks with leaves cut twice. In Midnapore the bushes are allowed to grow in size for two or three years and leaves only are stripped.

22. Two kinds of mulberry are recognized in the silk districts, the kajli or bora tunt, and pheti or chola tunt. Botanically there is no difference between the two and they all come under Morus alba, variety Indica. The former has whole (ovate-lanceolate) leaves and the latter split (palmate) leaves. The leaves of the former are also thicker and slightly rougher. The difference is entirely due to the difference of soil. Stony soils, such as occur in parts of Birbhum and Midnapore, produce the whole-leaved variety. Stiff clay has also a tendency to make a palmate-leaved stock to be converted into the lanceolate type. Sandy soils produce palmate and lighter coloured leaves. The pheti variety is better suited for rearing the chhotapalu variety of silk-worms, and the kajli variety for the barapalu variety. The nautari variety is reared indifferently on both varieties.

23. A detailed description of the Bengal system of mulberry cultivation is given in Part I, Chapter II, of the Hand-book of Sericulture, and the subject of the present Monograph does not admit of the reproduction of that chapter here.

24. Before concluding this chapter, however, it should be noted that various kinds of mulberry are found wild throughout the Himalayas at an altitude of between 500 to 4,000 feet above the level of the sea, and that there are references in old Sanskrit literature to sericulture having been carried on in ancient times by certain mountain tribes, among whom Paundrakas are specially mentioned in the Institutes of Manu. The recognized silk-worm-rearing castes of Bengal still call themselves Pandas, and they probably came originally from the hilly regions of the Himalayas, where the mulberry grows wild. The Western portion of the Himalayas, from Kashmir to Kumayun, the climate of which is less damp than that of the eastern portion, is still to be regarded as more naturally suited for sericulture than any other part of India. In a paper published by Government some years ago on "The Genesis of the Silk-worm," I endeavoured to show that the sericultural industry of India is traceable not to China but to the Himalayan country; that it travelled not from north-east to south-west, but from north-west to south-east. Perhaps one more fact, culled from ecclesiastical history, will vividly bring into prominence the importance attached to the silk-weaving industry in the north-western corner of India in the first century of our era. The first Indian Bishop (Agaeus) from whom "all Persia, Assyria, Armenia and Media, the regions about Babylon, Huz and Gala, to the borders of India, and as far as Gog and Magog (the country north of the Caucasus), received the priesthood" was "a weaver of silk clothing."—(The Syrian Churches and Gospels by Etheridge, p. 18.)

CHAPTER III.

COCCOON-REARING AND COCCOON-REARERS.

The varieties of mulberry silk-worms reared in Bengal are: (1) the Nautari or Madost (Bombyx cristata), which is suitable for the warm and rainy seasons, (2) the Chhotapalu or deshi (Bombyx mori), suitable for the cold season, (3) the Barapalu (Bombyx mori), which is an annual variety, of which the egg-stage continues for 10 months instead of 8 to 16 days as in the case of the
Chhota-palu and the Nistari, and (4) the Cheena-palu (Bombyx sinensis), which is reared chiefly in the Tamulk subdivision of Midnapore. The Bara-palu is reared in the spring (February and March) in parts of Murshidabad (near Jangipur and Kandi), in Birbhum, and in Midnapore. The Midnapore Bara-palu produces indifferently white, greenish, salmon-coloured and bright yellow cocoons. The Bara-palu cocoons of Murshidabad and Birbhum are a select class of beautiful white cocoons, which yield the yarn which is in high demand among the best weavers. What is called dhali (white) silk is made out of thread spun from white Bara-palu cocoons. There is another class of polyvalent dhali cocoons in Midnapore, called bulu (evidently corruption of blue), the colour of which is somewhat greenish and not silvery white as is the colour of Bara-palu silk. These bulu cocoons were originally selected out of Nistari and Cheena varieties, light-coloured cocoons often occurring among these species. The Bara-palu silk goes almost entirely to feed the native looms, and there is neither supply nor demand for this in the European factories at the present time. It is curious how this superior staple has come to be neglected by European traders, while it was this that chiefly attracted the early traders from Europe. The three kinds of Native reeled silk mentioned in Mr. C. R. Wilson's little brochure, entitled Reports and Letters concerning the Company's Affairs in Bengal, 1661-1683, are putia, pullany, and doltiara. Putia is evidently derived from Sanskrit patta (silk), and yellow cocoons and silks are still called pat or some parts of Bengal and Assam. A common saying among cocoon-rearers is "Late pata challish din," i.e., it takes forty days for yellow cocoons to form from the time of the moth's piercing the seed cocoons to the time of the new cocoons being formed. Pullany as explained in Mr. Wilson's brochure, was a term applied to fine reeled silk. Doltiara must be what is now called Dhali silk or Bara-palu silk. The very first reference protected for us of transactions in silk by the East India Company refers also to Dhali silk. Geoghegan alludes to this in the following lines:

"Thus under date 18th and 19th November 1679, he (the Chief of the factory at Fort St. George) writes:--'White silk bought at Serpore and tamtee (than? silk examined; to be packed with coarse silk ropes, which may be sold in England at good profit'" (page 2, para. 3).

25. Later on the Bara-palu silk was largely exported by the East India Company from the Cossimbazar circle. "The first kind," says Geoghegan, "was the large or annual worm (B. textor), yielding its yearly supply in March, its silk being of a high quality. This worm predominated in the Cossimbazar circle, where it yielded the greater part of the March crop of silk, but was found also in Haripur, Jungypore, Radnagore, and Sonamukhi. The Jungypore Resident in 1819 complains of the cultivation of this worm having become extremely precarious and uncertain, and attributes this to degeneracy in the stock." (Page 15, para. 31).

26. For quantity or proportion of silk, the Chhota-palu (B. fortunei) ranks next to the Bara-palu, though the fibre of Nistari is softer and finer. The Nistari (B. crasi) is often reared than the other varieties, but the cocoons yield a smaller proportion of silk. The respective qualities of the three principal kinds of Bengal cocoons for textile purposes may be best ascertained from the following figures:

<table>
<thead>
<tr>
<th></th>
<th>Bara-palu</th>
<th>Chhota-palu</th>
<th>Nistari</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average length of fibre in a cocoon in metres</td>
<td>270</td>
<td>215</td>
<td>210</td>
</tr>
<tr>
<td>Weight of unreelable portion in each cocoon in milligrams</td>
<td>20</td>
<td>16</td>
<td>14½</td>
</tr>
<tr>
<td>Weight of reealable silk in each cocoon in milligrams</td>
<td>60</td>
<td>45</td>
<td>36</td>
</tr>
<tr>
<td>Proportion of reeelable silk in the fresh cocoon per cent.</td>
<td>8</td>
<td>7½</td>
<td>6</td>
</tr>
<tr>
<td>Diameter of fibre (in millimetres)</td>
<td>16½</td>
<td>20½</td>
<td>20</td>
</tr>
<tr>
<td>Average weight of test skeins of fibre (bare) 476 metres long, in deniers</td>
<td>24</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Tenacity of fibre (bare in grammes)</td>
<td>6½</td>
<td>6½</td>
<td>4</td>
</tr>
<tr>
<td>Percentage of elasticity of base</td>
<td>16</td>
<td>12½</td>
<td>12</td>
</tr>
<tr>
<td>Percentage of loss in weight due to &quot;boiling off&quot;</td>
<td>24</td>
<td>30</td>
<td>25</td>
</tr>
</tbody>
</table>

27. The above figures are most convincing with regard to the high intrinsic merit of the Bara-palu cocoon and silk as compared with the other two ordinary

* See also paragraph 36 of Geoghegan's "Silk in India." The chase or rearers of the silk-worms wind off the cocoons with bare hands (with the aid of cow-dung as fuel instead of wood) upon the common Bengal nattah or reeal made of bamboo, the thread so reeled being called putia.
varieties. Picked Bara-palu cocoons may yield as much as 14 per cent. of silk; but the average actually obtained specially in Midnapore, where the annual worms are more largely reared than anywhere else, is much smaller, about 7 per cent. In Midnapore, the Chhota-palu or deshi, Nistari or Madras and Cheena, cocoons are small, and they yield much smaller proportions of silk than they do in the northern districts. The yield of silk obtained from the other three varieties of cocoons in Midnapore are—

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield (per cent.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chhota-palu</td>
<td>54 to 64</td>
</tr>
<tr>
<td>Nistari</td>
<td>5 to 64</td>
</tr>
<tr>
<td>Cheena</td>
<td>54 to 64</td>
</tr>
</tbody>
</table>

28. Usually three or four crops of cocoons are reared during the year out of eight that are possible, viz., three of Nistari and one of Chhota-palu. There are exceptions to this rule, e.g., in Bogra the Chhota-palu is the principal crop and in Midnapore the Nistari. It is not ordinarily feasible to take all the eight crops though the polyvolute silk-worms, Nistari, Chhota-palu and Cheena, breed eight times in the year. The parasitic fly (Trycorypha Bombycis) would make silk-rearing impossible if all the crops were taken in the same locality. The practice therefore prevails of silk-worms being reared during one bund and mulberry being attended to during the next, when in some distant joars (silk-rearing centres) silk-worms would be reared. The seed is thus perpetually kept up one bund in one joar and another bund in another, and cocoon-rearers of one joar go to a distant joar for seed, and they walk sometimes 60 or 80 miles before they light upon good seed. There are, however, some recognised seed-rearing joars, where, at particular seasons, cocoon-rearers resort to, in preference to others. Thus, there are the Bachra and Bhattachari joars in Murshidabad, the Baralpar joar in Rajshahi, the Khanna joar in Bogra, Dhatata Ganipur joar in Malda, and Rarh joar in Birbhum, where thousands of cocoon-rearers can be seen going to in quest of good seed. Exchange of seed is also recognised as beneficial to the health of silk-worms. In Malda, Rajshahi and Bogra, the practice prevails of going to khet for seed. But it is considered safer to go to the proper joar and buy seed, after seeing the worms ripening in a faultless manner. In Murshidabad, the principal cocoon-rearing bunds, or seasons, are Aghani (November), Chaitra (March), and Srabani (July); while the three principal bunds in Malda are Kartika (October), Baishakhri (May), and Bhadurkia (August). In parts of Rajshahi, the Maghi (January) bund is of the first importance, as at the end of this bund cocoon-rearers from Murshidabad, &c., come to Rajshahi for Nistari sunch (seed-cocoons); while the Ashwinë (September) bund, for Chhota-palu, is of considerable importance for parts of Birbhum and for Bogra, whence Chhoto-palu seed for the early November bund is taken to other districts. From June to September two crops are usually taken in succession: one of which is more important than the other. The parasitic fly does the second crop a great deal of harm, but the growth of mulberry at this time of the year being very vigorous it pays taking a second crop.

29. The following estimate of production of cocoons in the different districts is somewhat conjectural, but is based on the suppositions (1) that an average of eight maunds of cocoons are raised per family of cocoon-rearers, or two maunds per individual per annum; and (2) that the census figures for cocoon-rearers are somewhat low, persons belonging to other professions, but doing cocoon-rearing also, not being generally included in the census figures for cocoon-rearers:

<table>
<thead>
<tr>
<th>District</th>
<th>Produce of green cocoons (Maunds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burdwan</td>
<td>20</td>
</tr>
<tr>
<td>Birbhum</td>
<td></td>
</tr>
<tr>
<td>Bankura</td>
<td>2,000</td>
</tr>
<tr>
<td>Midnapore</td>
<td>37,000</td>
</tr>
<tr>
<td>Hooghly</td>
<td>200</td>
</tr>
<tr>
<td>Howrah</td>
<td>100</td>
</tr>
<tr>
<td>24-Parganas</td>
<td></td>
</tr>
<tr>
<td>Nadia</td>
<td>200</td>
</tr>
<tr>
<td>Murshidabad</td>
<td>72,000</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>18,000</td>
</tr>
<tr>
<td>Bogra</td>
<td></td>
</tr>
<tr>
<td>Malda</td>
<td>70,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>215,940</td>
</tr>
</tbody>
</table>

Or, roughly speaking: 220,000.
30. The above quantity would produce about 12,000 maunds of raw-silk (silature-reeled and Khamru), of which about 5,000 to 6,000 maunds are used in the country looms. Besides raw-silk, however, inferior silks (Tasar, and Endi) and a great deal of waste,—altogether not less than 12,000 maunds of Bengal silk, are used in India for weaving purposes. The averages during the last decade have been somewhat higher, and the estimate is rather too cautious than liberal.

31. Cocoon rearing is done in almost the same way all over Bengal, the variations in methods and appliances being insignificant. Mud-walled houses are the best for rearing worms, but those who cannot afford such houses do the rearing in mat-walled houses. The seed cocoons are placed, thinly spread out, on dalas, or flat bamboo trays, which in some districts are circular and in others square or oblong. In eight or nine days in the hot weather, and in 15 or 16 days in the cold weather, the moths come out, and they remain paired for the greater part of the day: that is, until they are separated in the afternoon. Unless they are separated the males do not allow the females to lay eggs uninterrupted. The males are known from their smaller size and their constant fluttering of wings. After being separated, the males are thrown away and the females left to lay eggs on the dala. In the case of the Bara-palu, the female moths are transferred to a piece of rag, and they deposit their eggs there. Pieces of rag with eggs adhering to them by means of a natural gum are folded up and kept inside a handi, or earthen vessel, the mouth of which is closed by means of an earthen cover and sealed with mud. If the moths cut out of the Bara-palu cocoons for three or four days successively, three or four pieces of rag with eggs are obtained. The vessel in which they are kept is of sufficient size to prevent asphyxiation of the eggs. It is kept suspended from the roof in a cool part of the house. The moths finish depositing the eggs in about 24 hours, and on the 3rd or 4th day the female moths are thrown away. In the case of the polyvoltine silk-worms (Nistori, Obheto-palu, and Cheena-palu), the eggs are left on the dalas on which they are laid, and allowed to hatch there, the hatching taking place in eight to nine days in the hottest weather, and in 16 or 18 days in the coldest. The Bara-palu eggs do not hatch till next spring, the eggs remaining in the handi from the end of March to the end of January, i.e., when the weather begins to get warm. The fixed day for opening the handi is the Sripanchami, or Saraswati Puja day. The hatching of Bara palu eggs does not take place so evenly and completely as that of the polyvoltine silk-worm eggs. It goes on for 8, 10, or 12 days, and the cocoons afterwards go on forming for a similar period. This is a great disadvantage, and when there is any epidemic among the worms ripening first, the late worms fall a complete victim to it. After the worms have hatched out, the same system of rearing is followed in the case of every kind of mulberry silk-worm. Tender leaves of mulberry are cut up very fine and sprinkled over the newly-hatched worms. Three or four hours afterwards the worms are removed to another dala with the help of a little brush made with grass or feathers. The worms with the refuse leaves are then made into a neat flat circle or chäki (disc) of uniform depth of about \( \frac{1}{10} \)th of an inch, and fresh leaf, finely cut up, is sprinkled over this chäki. Feeding is done at 5 or 6 A.M., 10 A.M., 3 P.M. and 8 or 9 P.M. Sometimes, specially in the wet season, only three feeds are given. In the dry season five feeds are sometimes given in the early stages of the worms. Regularity of feeding is regarded as very essential. The refuse leaf is cleaned once in four or five days, i.e., a day before and a day after each moulting period. The moulting period lasts each time from 20 hours in the hot weather to 48 hours in the coldest weather, when the worms are left without food and untouched. Feeding is recommenced when the worms are well out of the moulting. The special art in rearing silk-worms consists in stopping feeding at the right time and recommencing feeding at the right time. One often sees an old and experienced woman being called in at these critical periods to judge whether feeding should be stopped or whether feeding should be recommenced. Women do most of the work in connection with the rearing-house, while men look after the mulberry, cut and bring it home for the silk-worms, and assist the women at feeding and cleaning. After the fourth moulting the worms become very voracious, but the regular three or four feeds are adhered to, and it is not considered right to give extra feeds at this last stage. Three to nine days intervene between moulting to moulting.
according as the season is warm or cold, and the last stage before the worms make their cocoons lasts from five to twelve days according to the season. *Bara-palus* eat for four or five days more and *Chhota-palus* two days more than the *Nistar*is, and the *Nistar*is two days more than the *Cheena-palus*, before they commence making cocoons. So, altogether from the time the worms hatch out of the eggs to the time they begin making cocoons, the *Nistar*i silk-worms have constant care bestowed on them for 20 days in the hottest weather and 55 days in the coldest weather; the *Chhota-palus* 22 days in the hottest weather and 57 days in the coldest weather; and the *Cheena-palus* for 18 days in the hottest weather and 53 days in the coldest weather, and the *Bara-palus* (which are reared only once a year in the spring) for 30 days. When ready for spinning the silk-worms cease eating, look about restlessly, spit out silk-fibre and appear translucent. They are then picked and placed on *chandrakies*,—called also *taurus, chânehes or fugds* (Fig. 1).

Fig. 1—Chandraki or spinning mat

32. The spinning of cocoons on these bamboo screens is finished in two days in the hot weather and four days in the cold. The screens are put out in the morning sun, and in the cold weather fire is kept in the room at night to hasten spinning. The most insidious and general of all the silk-worm epidemics, viz., *Pebine*, requires to develop for 30 days before it proves fatal to the silk-worm. So when the seed is badly diseased the worms die off simultaneously in the cold weather, sometime after all the care has been bestowed on the worms. In the case of the *Bara-palus* the death from *Pebine* (when diseased seed is used) taking place invariably on the very day of ripening, the event appears most weird and ghastly; and hence there is a strong objection on superstitious ground against rearing the *Bara-palus*. Even in the case of
the other silk-worms the phenomena connected with the epidemics are at times so unexpected and inexplicable to the cultivator that he attributes them to supernatural agencies. The silk-worm reaper feels he is surrounded at all times by devils and hobbgoblins, and he is a most superstitious and usually a most unreasonable person to deal with. At one time, I remember, in connection with the experiments with which I was entrusted, a belief spread among a number of villagers in Malda that the microscope caused cholera. I traced the origin of this belief to a Malda boy who had been learning to use the microscope having died of cholera. Another cocoon-rearer whom I trained in connection with these experiments lost two wives in succession, and he was shunned for a long time as a man who was under a curse for using sulphur for fumigating his rearing-house and appliances. Burning of sulphur is considered an act of desecration by the Pandas of Malda, who believe this substance to be some kind of uterine discharge of the goddess Bhagabati. Cocoon-rearers have been fast giving up their superstitions since they have come to recognise the benefit of these experiments. They see that all those trained men who ignore the old superstitious rules, get nevertheless very good crops. These old rules, which are observed during rearing, consist in, not shaving, not giving clothes to the washerman, not eating curries in which oil, turmeric and chillies have been used, not anointing the body with oil, not wearing shoes, keeping strangers out, preventing owls from flying over the rearing-house, abstaining from conjugal association, giving wrong information about the progress of the worms, &c.

33. The hereditary silk-worm-rearing caste of Bengal is known as the Panda caste, who live mainly in Malda, but who are also found in parts of Murshidabad and Rajshahi. They are the best, the most intelligent, and the most prosperous of all cocoon-rearers. Other castes have also taken to cocoon-rearing, and Muhammadans, though very slovenly in their work, form the largest proportion of cocoon-rearers in almost all the districts, especially in Rajshahi, Bogra and Midnapore. Cocoon-rearers are sometimes called tuntas, kuntia, kuntia-kai, kuntia-chashas, kuntia being the Bengali word for mulberry, and kai-baras and chashas being a generic name for cultivators. The total number of cocoon-rearers in Bengal (including those who add cocoon-rearing to other professions) is about 90,000. All the lower castes among Hindus rear silk-worms, and it is only the highest castes, viz., Brahmins and Kayasthas that consider it derogatory to rear cocoons. Cocoon-rearers are considered higher up in the social ladder than cultivators, and, as a rule, they employ labourers of other professions for ploughing, digging and other works, which are recognised as menial. They are not, however, at the present time more prosperous than other cultivators, and their somewhat superior status implies past prosperity rather than present affluence. They are perhaps heavier in debt than other cultivators, and their struggle for life is made more poignant on account of their being still recognised as belonging to the middle rather than the lower classes of society. A cocoon-rearer, burdened as he is with debts, usually wears shoes or slippers, and when he goes out takes a chaddar to cover his body. The cocoon-rearer, in spite of the silk-worm epidemics, actually handles more cash at times than the ordinary cultivator ever gets the opportunity of doing. The average quantity of silk-worms reared by a family of cocoon-rearers is three gharas, or 48 trays, each tray being about 5 feet in diameter. If two of his four cocoon crops are a decided success, he may succeed in selling them both for seed. Every cocoon-rearer has this chance, and many get the chance a dozen times during their life. Three gharas of silk-worms turning out successful, yield an average quantity of from 100 to 160 kahans of cocoons according to the season, the larger quantity in the cold weather when worms are kept thicker on dalas. Each kahan (=1,280) of good cocoons selling for seed may fetch Rs. 2, and the two successful crops in the year may bring to the cocoon-rearer as much ready money as Rs. 400 to Rs. 600, the produce of only 2 acres of mulberry. If he and the members of his family work in the mulberry field and in the rearing-house, as they nearly always do, his outgoings are very little. But, as a rule, the cocoon-rearer sells his 100 kahans

* The following wrong information contained in the District Monograph from Bankura was probably supplied by a cocoon-rearer; when he had cocoons in his house.—The Tahsildar of this district generally purchase cocoons for reproduction from men of eastern districts such as Dacca and Pabna. Advances are given to those men for supplying the cocoons at the proper season of the year. No cocoon-rearing is done in Dacca or Pabna. The superstition that lying is beneficial for a trade occurs also among those castes of Calcutta who deal in dyes and paints.
for Rs. 50, and he gets altogether about 100 kahns out of his four crops, expecting each time to get as much, and probably buying two or three loads of extra mulberry each time and spending Rs. 10 or Rs. 15 on mulberry alone, and the rest in paying rent and keeping himself and his family in that state of semi-respectability to which he is born. He finds it impossible to get on without incurring debt or taking to some other calling considered less respectable. The cocoon-rearer, all over Bengal, is in this struggling condition and he has been so for twenty or thirty years past. A ray of light has dawned on him in recent years, and there is a general feeling among his fellow caste men that better days are again in store for them.

34. It is needless to enter here into a description of the various silk-worm diseases and pests, as they have been fully described in the Handbook of Sericulture recently published by Government.

CHAPTER IV.

DECLINE OF THE COCOON-REARING INDUSTRY AND EFFORTS AT IMPROVEMENT.

There have been ups and downs in the cocoon-rearing industry of Bengal from the days of the East India Company, that is, the earliest days from which we have a continuous record of this industry. Epidemics among silk-worms are not a new thing in Bengal, nor are efforts at improvement in the direction of avoiding epidemics of recent growth. Mr. Atkinson, Resident of Jungypore, writing in 1766, mentions about the degeneracy of the Bara-palu silk-worm (see Geoghegan's 'Some Account of Silk in India,' page 2). In 1819 the Jungypore Resident again complains of the cultivation of this worm having become extremely precarious and uncertain and attributes this to degeneracy in the stock (page 15). "According to Mr. Atkinson the 'dead' worm had also degenerated" (page 16). In 1830, in the evidence taken before the Select Committee of the House of Lords, the degeneracy of the silk-worms was distinctly asserted.

"The preponderance of authority," sums up Mr. Geoghegan, "is certainly in favour of the view that the Bengal species have degenerated; but the subject does not seem to have been very carefully investigated, and Mr. Turnbull of Ghatal maintains that the fact of degeneracy has yet to be proved. Most of those engaged in silk manufacture assume this point and confine themselves to discussing the remedies. These are various. It seems generally admitted that the attempts to introduce exotic breeds have not of late years succeeded. It would also appear that though there has sometimes been a large mortality among silk-worms, no epizooz, such as the Miserardine and the Pétrine, which have devastated France and Italy, has as yet appeared in India. Mr. Galois, of Midnapore, appears to think the cause of degeneracy may be in the mulberry being too long cultivated in one spot. Mr. Perrin, of Berhampore, on the other hand, extols the native mulberry cultivation as careful and judicious. Mr. Marshall urges an attempt to improve the stock by offering prizes for the best method of selection. Most authorities agree that the natives stint the worms, and Mr. Atkinson long ago saw the difficulty of dealing with this tendency on their part. Mr. Malcolm, of Rammagor, in the Kandi subdivision of Murshidabad, maintains that the worm has been injured by being forced into too rapid reproduction of itself; that whereas 20 or 25 years ago there were but four breeds or 'bunds' in the year, there are now from six to eight. It may be the worm has been forced in this direction, but I do not find that the bunds are anywhere given as less than five, even so long as 30 years ago." (Geoghegan, page 34.)

36. From the very earliest days, therefore, of European dealings in Bengal silk, the chief difficulty has been the 'degeneracy' of the silk-worms, that is, their proneness to die off from diseases. If the cocoons crop had been as certain as the jute, or the sugar-cane, or the rice crop, trade in Bengal silk would not have had those ups and downs and that continuous depression in the foreign trade during recent years. Cocoon-rearing is much more profitable than any other agricultural industry, provided the crop can be assured. The remedies suggested according to Mr. Geoghegan's summary just quoted are:

(1) Introduction of the superior European or Chinese cocoons (Bombyx mori).
(2) Arresting the silkworm epidemics.
(3) Improvement in the system of mulberry cultivation.
(4) Better and more liberal treatment of the worms.
(5) Taking fewer "bunds" or crops.

37. All these important questions have been fully discussed in the Handbook of Sericulture, and it is unnecessary dealing with them here. An historical
sketch of all the efforts at improvement, may, however, prove interesting. Experiments have been conducted to solve all the above and other questions from the earliest days of British enterprise in Bengal, and the only improvement successfully introduced at a very early period was an improvement in reeling. The Noht pattern of reeling (the main principle of which was the crossing of threads on the same reel) was successfully introduced in 1770 by Messrs. Wiss and Robinson, assisted by a staff of reevers and mechanics chosen from Italy and France, and provided with tools, implements and models” (Geoghegan's Report, page 3). The efforts of the Bengal Government to introduce the B. mori of China in 1771 and the subsequent attempts of Messrs. Frushard and Captain Kyd in the same direction, were unsuccessful. The efforts of Government in 1771 to introduce the China mulberry and a more rational system of mulberry cultivation also failed. The Hon'ble A. Ramsay, in his evidence given in 1830, speaks of the obstructiveness of the people's habits. “The Court of Directors wished the natives to use the old leaves in preference to young leaves, but the natives were averse to it, and it could never be carried into effect” (Geoghegan, page 4).

33. In 1796 Mr. Atkinson again advocated the introduction of a superior race of silk-worm and a better system of management.

39. In 1812, with the help of Dr. Roxburgh, Government initiated a plan of improvement in the method of mulberry cultivation and of rearing of silk-worms. But no important results were achieved. In 1828, the Resident of Santipore was allowed to incur an expenditure of Rs. 25,000 (sicca) in a trial of ‘nece’ cultivation, that is, cultivation of mulberry and rearing of worms in large nurseries with hired labour, under the direct personal supervision of the Resident.

“The experiment which was carried on till 1839 unfortunately failed entirely in producing a supply of silk, and not only so, but entailed considerable pecuniary loss, outstanding balances of a dubious recoverable sort having been allowed to accumulate to a large extent. The plan was, therefore, abandoned” (Geoghegan, page 19).

40. In 1832 the Italian “silk-worm bred at St. Helena” was imported by Government and distributed to the Residents of Boalia, Sonamukhi, Haripal, and Kumarkhal and to the Agri-Horticultural Society who had an experimental station at Akra. Two varieties of mulberry were also imported from St. Helena at the same time. Nothing came of these experiments. The transfer of the silk trade from the hands of Government to those of private companies was completed between the years 1834-37. The result of all attempts at improvement during a whole century that the silk trade was under the direct control of the Hon'ble East India Company is thus summed up by Geoghegan:

“The only direction in which any effective improvements had been introduced was that of reeling and drying. The method of cultivating the mulberry and the kinds cultivated were in 1835 just what they were a century before. Attempts had been made to introduce new stocks of worms; but the worms introduced from China had not thriven, and in respect to their breeds, the attempts do not seem to have been made with energy enough to have warranted any expectation of success.” (Geoghegan, page 37.)

41. Since Government gave up the direct control over the silk trade of the Province, experiments at improvement were conducted mainly through the Agri-Horticultural Society of India. There was an attempt to introduce the Morus Multicaulis variety of mulberry; there were also experiments, at crossing the indigenous varieties of silk-worms with foreign varieties and also at the introduction of the Japanese bivoltine silk-worm, conducted by Mr. Bashford, Captain Hutton and M. de Cristoferis. Mr. Bashford succeeded in producing fine cross-bred cocoons, but when he distributed his stock to native breeders, it degenerated rapidly and produced very flimsy cocoons. Captain Hutton subsequently expressed his opinion that crossing would be of no use. Captain Hutton's own conclusions from his experiments were, that the climate of Bengal was not suitable for sericulture, and that the western parts of the Himalayas were marked out by Nature herself as the best tract for carrying on sericulture to perfection. M. de Cristoferis' experiments showed that the Japanese bivoltine silk-worm soon degenerated into the polyvoltine in the climate of Bengal and produced cocoons inferior to those indigenous to Bengal, though the worms continued free from disease. An attempt to introduce sericulture in Behar, conducted in 1867 and subsequent year also proved futile. The difficulty they had to contend with were the difficulty of getting good seed and the occurrence of sudden mortality among their worms, sweeping off apparently the
whole stock and compelling them to indent on Bengal for a fresh supply. (vide Geoghghan, p. 31). "In Cuttack, sericulture has been carried out on an experiment since 1877 at Government expense, under the supervision of the Executive Engineer of the Mahenadi Division.” (Liotard’s Memorandum on "Silk in India, 1888,” p. 21). The reference here is no doubt to the experiments of Mr. J. Cleghorn of the Public Works Department. Mr. Cleghorn’s experiments were not altogether fruitless. He published his studies of the life-history of the parasitic fly, and brought to light the great destruction caused by it. He produced some valuable races of beautifully white cocoons, both annual and polyvoltine. He also claimed to have discovered a simple means of avoiding or destroying the fly-pest. But as he could not be induced to part with his secret for less than a lakh of rupees, nothing is known with regard to his method of coping with one of the chief enemies of sericulture in Bengal. The fine races of cocoons he was rearing in conjunction with the Secretary of the Agri-Horticultural Society were not given out to the world either, and Mr. Cleghorn’s researches and experiments have, therefore, left little of practical value behind.

42. Next may be mentioned the experiments of Messrs. Keighley, Blechynam and Anderson, at Ghatal and at Alipore. These were based on the supposition that M. Pasteur’s system of selection of healthy ‘seed,’ which involved the use of very high power microscopes, was not practicable in Bengal where the peasantry, who had the management of silk-worms, was much less intelligent than the Italian or the French peasantry.

43. Side by side with these experiments conducted by Messrs. Cleghorn, Keighley and others between 1886 to 1887, Government initiated experiments with the object of introducing M. Pasteur’s system among the Bengal cocoon rearers. These experiments were initiated by Sir Edward Buck, Revenue Secretary to the Government of India, at the instance of Sir Thomas Wardle, President of the Silk Association of Great Britain and Ireland. A preliminary study of the conditions prevailing in Bengal from December 1886 to March 1888, conducted by Mr. J. Wood-Mason, Superintendent of the Indian Museum, and the writer of this Monograph, left no doubt that it was the European epidemics, *Muscardine* and *Pébrine* (which were being successfully dealt with in France and Italy), that had been doing their work of destruction among the Bengal silk worms also. The writer of this Monograph was thereupon deputed to study the practical methods by which these silk-worm epidemics were being dealt with in Europe. The experiments were renewed by Government in August 1890 on a more solid foundation than had hitherto been possible, owing to the uncertainty that had prevailed on many points. It was demonstrated that the peasantry of Bengal were able to carry out M. Pasteur’s system successfully and profitably. Not only were the principal silk-worm epidemics, *Pébrine* and *Muscardine*, dealt with in connection with these experiments, but all the diseases and pests of the silk-worm and the mulberry plant were studied and remedies capable of easy adaptation by the Bengal peasantry, devised. It may be specially mentioned that methods of avoiding *Grассerι* (which occurs in an epidemic form among Bengal silk-worms, but not among the silk-worms in Europe), and also the fly-pest, were discovered by the writer of this Monograph in connection with these experiments. The cocoon-rearers who were taught these methods no longer consider the cocoon crop uncertain and precarious, and year after year they are now getting full crops which they had never done before. As early as 24th August 1892, Mr. C. W. Marshall, Manager of the Bengal Silk Company, communicated to Government, through Messrs. Lyall, Marshall and Company, his appreciation of the results of these experiments. He wrote: "I believe Mr. Mukerji has succeeded in his work, and now rears seed which can be depended on." In his letter No. 1448A., dated the 10th September 1896, Mr. P. C. Lyon, Director of the Agricultural Department of Bengal, reporting on the conduct of these experiments to Government, gives pretty fully, not only his own views, but also the views of the principal European silk factors regarding the value of these experiments. The following extract from this report may be found interesting:—

"While Government interference does not seem to be called for to assist the trade in supplying the manufacturers of silk with the particular silk referred to by Mr. Wardle, or to maintain its quality, there appears to be no room for doubt that the operations, hitherto under the superintendence of Mr. Mukerji, have had considerable effect in eradicating disease
among silk-worms, in diffusing healthy seed over the silk districts, and in thus improving the output and consequently the profits of silk-worm rearers. That such results will tend to popularize the silk industry among cultivators, and to revive it to a great extent in the districts in which it has fallen into disrepute, is more than probable.

On this subject I have consulted Mr. R. A. Lyall, of Lyall, Marshall and Company, the most important firm in the silk-trade in Calcutta, and he has been kind enough to obtain for me the opinions of his agents and correspondents in the silk districts, to the value of the work done by Mr. Mukerji and his assistants. The question has been very frequently discussed before, and Government has already on the files correspondence showing that Mr. Mukerji's opinions have often been severely criticised by experts in India, and that his work has not always been approved by them. On the other hand, Government is also aware that much of the criticism has been directed to minor details, and that in main principles there has been much difference between Mr. Mukerji and those who have opposed him.

As the result of my present enquiries I may quote the following views, which have been expressed on the above subject.

"Mr. H. C. Fraser, Manager of a Silk Concern in Berhampur, writes:

"I believe that there is a future for the sea-rearing nurseries, such as that established at Kagachira in Malda by Dandadhar Das.

"The advisability of Government aid in this direction is doubtful, and I am not prepared to speak authoritatively, but my private opinion is that, with a little encouragement, many others might be induced to follow Dandadhar's example, when it is proved to them that there is money in it, as there undoubtedly is.

"The seed cocoons (not eggs) supplied by this man, have a good reputation, and if only a few more men were induced to go in for the same thing, trained properly and assisted at the first go-off with microscopes, &c., I feel sure that the cocoon-rearers would take to it gradually, as they said clearly that profit accrues."

"Mr. T. G. Rice, Manager of the Bengal Silk Company's flaxure at Gonales, writes:

"I am of opinion that the nurseries Mr. Mukerji has established in the different districts will eventually prove of great benefit.

"The Kagachira nursery in Malda has now pretty firmly established its reputation, and the rearers in Malda are eager to get this seed, and, in fact, are beginning to take it from nurseries in other districts as well, in preference to the ordinary seed. This is a very hopeful sign, it will be a great point gained, and may gradually lead to the rearers adopting the scientific methods of rearing.

"I think these nurseries should be increased and encouraged as much as possible. The danger is that, before the rearers come to have confidence in the seed — this will be a matter of time — the men in charge of the nurseries may get disheartened, and may get careless with the rearing, and one or two failures of seed taken from them would ruin all that has been gained."

"Mr. J. Fraser-Forbes, Manager for the same Company at Sarda, Rajahshahi, writes:

"Mr. Mukerji seems to be more successful in Malda than anywhere else, the rearers round about here are very conservative, and won't be convinced that there can be any good in anything new. I think if his methods were carefully carried out on a large scale, some good might result, but anything that involves extra care, or expense, is not likely to quickly find favour with Bengalis."

"Mr. Lyall himself, after pointing out to me that the Above gentlemen are practical men on the spot who thoroughly understand their business, writes:

"From what I saw, when working the Rearing-house at Alipore with Messrs. J. A. Anderson and J. C. Hodgson, I am strongly of opinion that it will not be possible to get the silk-worm rearers as a class to adopt the methods of the Silk Committee, as described in the pamphlet I gave you. They are too wedded to their ancient ways, and will not give them up.

"All that is needed is carefully-selected seed, good mulberry, careful and frequent feeding, plenty of ventilation, and extreme care as to cleanliness — all very simple, but involving a lot of care, attention and time.

"If it is admitted that we cannot get the rearers to adopt our method, the next question is what else can be done?

"Like Mr. Fraser and Mr. Rice, I think a system of nurseries, scattered over the silk districts, would gradually effect improvement in the seed. One man, you will observe, has established a nursery in Malda, and I am told he is making it pay. Once this is known and recognised, others will follow his example. I believe this man is one of Mr. Mukerji's pupils. In Europe, silk-worm rearing is a large and profitable industry of itself, and there is no reason why it should not become so here, if the people would take it up in the right way.

"I do not refer to the rearers as stated above. I do not think they ever will, but men such as the man Dandadhar Das, referred to in Mr. Fraser's letter, might. How men are to be got to take it up is a matter for careful consideration."

"I also enclose copy of a communication received, by Mr. Mukerji from Mr. Fraser-Forbes, and enclose, on the subject of the work done in the Nosadapa nursery (Rajahshahi)."

"I am bound to add that none of gentlemen consulted think that it would be worthwhile to place Mr. Mukerji on special duty again to carry out these operations."

"We have, therefore, to consider whether it is worthwhile for Government to persevere in its efforts to stamp out silk-worm diseases, by inducing the people to rear healthy-seed, and whether the lines on which are at present proceeding are the right ones."
"The conservatism of the silk-worm rearers is, of course, no new thing. The same spirit is encountered throughout India by all who promote agricultural improvements of any kind. And the practical lesson, which is taught by it everywhere, is the same as that indicated by Mr. Lyall. It is useless to ask them to join us in experimenting. However certain the results may be, they will only appreciate the work when the solid results appear. We must not appeal to their intellects, but direct to their pockets.

"And it is on this ground that I would now propose to Government to maintain the work which is in progress, and to sanction a small yearly expenditure for the extension of nurseries and the practical instruction of silk-worm rearers in the various joars. However, opinions may differ as to the value of Mr. Mukerji's personal work; he may, at least, claim to have established three facts fairly clearly:

"(1) that the seed produced under his instruction is a great improvement on the ordinary native seed;

"(2) that the cultivators are beginning to appreciate this and are buying increasing qualities of this seed; and

"(3) that his pupils in independent charge of private nurseries, originally started by him, are making the business pay.

"And as a deduction from these facts, I think we may reasonably hope that, if we proceed quietly and perseveringly to open out nurseries in each of the more important joars (or silk-worm seed centres) to train men in each, and then leave these men in charge, we shall probably do a great deal to revictual an industry which was once a source of considerable profit to Bengal, but has nearly died out in recent years.

"It seems clear that our operations are to be confined to a mere demonstration and pioneer movement in two or three isolated places, we shall never have a real chance of success. It is only by plodding steadily on, and by gradually persuading the people, in each silk centre of the practical value of the knowledge we have acquired, that we can do any good. If we stop now, the spread of knowledge will cease abruptly as the men whom we have trained will do their best to keep the monopoly of seed-rearing in their own hands, and will have no inducement to instruct others.

"The cost of the operations that I would propose will not exceed Rs. 3,000 per annum, and they can be supervised by one of the Assistant Directors of Land Records. They will take their place, in future, among the ordinary experimental operations of this Department, and their special character will disappear.

"In making these recommendations I have not been unmindful of the lengthy correspondence that has passed on the subject of these operations during the past two years, but hope that the determination that was then expressed to put an end to the heavy expenditure we were annually incurring on silk experiments, will not apply to the comparatively modest proposals which are now made."

44. As appendix to this report of the Director of Agriculture is published a letter, dated the 14th August 1896, from Mr. F. A. M. Dixon, silk factor of Mathi, addressed to Mr. J. Fraser-Forbes, General Manager of the Bengal Silk Company. This letter may be fully quoted here:

"In reply to your's of 23rd ultimo, I have to state that I went out to the Nogapara nursery on the 26th July last, and again yesterday. On the first visit, I saw the worms before they had spun, and was very much taken with all I saw, and the clean way in which everything was kept. On making inquiries from the man in whose house the worms are being reared, he told me that since he had taken to Babu N. G. Mukerji's system of rearing he had not lost a single bunde, and that although one lot had a very bad attack of mucedo, the Babu in charge had cured all the worms attacked, in a short time, by the use of sulphur. He spoke very highly of this new way of getting rid of this disease, and said that, had it not been for the sulphur, he would have had to throw all his worms away. He also said that great benefit had been derived from the use of sulphate of copper for disinfecting the house in which the worms were reared. Yesterday I saw the cocoons, and they were a very nice lot of deshi ones. He told me that he had sold more than half of the 14 maunds he had reared for seed, and was sure he would get rid of the remainder, as men were coming from long distances, now that they were beginning to know about the seed, one man having taken as much as Rs. 10 worth. He is selling the seed at 12 paise for the rupee. As I have said above, I was greatly taken with all I saw, and the only drawback is that a more central place was not chosen. This place is quite out of the way, and nowhere near any of the big centres where cocoons are reared. For instance, it is over 25 miles away from Tahapore, and more from the people living north of that place. It is too far for people to come and see what is being done, and return home the same day. The Babu in charge told me that the Tahapore Raja had promised to erect a place for seed-rearing at Tahapore this coming October, and I strongly advise the offer be taken up, and a place started there as soon as possible. Another might with advantage be built at Doorgpore, and one also a little to the north of Madarigunge. I am sure that great benefit would be derived from the rearing sheds, and specially to the north, where, as you know, the rearers are a very ignorant set, and take very little pains with their worms. I feel sure that had Mr. Mukerji commenced operations to the north of this at first, instead of going to the Berhampore side (where they know more or less what they are about), rearers would not have thrown up rearing cocoons to the north in the way they have done."
"In conclusion, I would strongly recommend these rearing sheds being started to the north as soon as possible, so that the ignorant raiyats can see how things should be done. I am sure they would take to the new system at once, and be sure of good crops of better cocoons."

45. On the transfer of the writer of this Monograph to Sibpur as Agricultural Lecturer, the silk merchants of Bengal formed themselves into a Committee in 1898 to carry out the system thus initiated by Government with the help of the men trained by him, and the expenditure of the departmental grant of Rs. 3,000 has been since entrusted to this Committee. The system is slow, but it is the only sure and satisfactory way of introducing scientific methods of sericulture in Bengal, and the Committee must be prepared to work away with perseverance and confidence, starting seed-nurseries in one joar after another, helping trained cocoon-rearers (but not outsiders) to establish these nurseries, until all the joars have been supplied with centres of instruction and of supply of healthy seed. There is danger in helping non-professional or non-caste men to establish these grainages, as this has the effect of exciting the jealous opposition of professional cocoon-rearers, who, instead of deriving benefit from such establishments, do their best to boycott them and bring discredit on the seed issued from them. Everything should be done with a view to grafting the new methods on to the existing system and never to excite the jealousy or the opposition of the cocoon-rearing cultivators, who are only too ready to believe that the ultimate object of a Committee of silk factors is to take away from their hands the lucrative trade of seed-rearing, and to make them (the rearers) dependent on the grainages owned by the Committee for good seed. The operations of the Silk Committiee are at present confined to the districts of Murshidabad, Birbhum, Malda and Bogra. In the district of Rajshahi a distinct movement among Native zamindars, initiated by the late Mr. N. K. Bose, Collector of the district, resulted in a sericultural school being established. About Rs. 30,000 were contributed by the zamindars, and the District Board of Rajshahi and the Agricultural Department of Bengal have liberally subsidised the institution. The whole of the Hand-book of Sericulture in Bengali is taught in this school, and students do all the work with their own hands, from the planting of mulberry to the weaving of silk cloths. The school has now worked for two years, and it shows continued progress. Thirty-six pupils, most of whom are actually connected with one or other branch of the sericultural profession, were in training in this school in 1899; the number in the previous year having been 15. The following extract from the report of the Secretary of the school, forwarded with the District Monograph from Rajshahi, will be found interesting:—

"The proposed school, at the suggestion of Mr. Bose, who took an abiding interest in its welfare, was made over to the District Board of Rajshahi, and a Committee, consisting of its Chairman and Vice-Chairman, the Chairman of the Rampur Boalia Municipality, the Principal of the Rajshahi College, and some of the leading donors and supporters, with an Honorary Secretary, was formed to start and manage the school, according to the scheme prepared at their request by Professor N. G. Mukerji, M.A., who then held the office of the Assistant Director of Land Records and Agriculture to the Government of Bengal.

"The foundation-stone was laid by Mr. Bose on Jubilee day, amidst great public rejoicing, on a piece of land measuring about 3 bighas, 2 cottahs, 15 chutaks, the proprietary right of which was made over to the school by Raja Promoda Nath Roy of Dighapatia, and the Government of Bengal, in its Department of Land Record and Agriculture, having placed the services of Babu Sitanath Guha, a trained sericultural overseer, at the disposal of the school, on condition of paying only Rs. 15 a month towards his salary, the institution was started from January 1898, with the help of the District Board promising to pay Rs. 1,200 a year, and the leading zamindars of the district came forward to support the movement with donations amounting to Rs. 32,000, part of which was paid down in cash.

"With a view to introduce the scientific knowledge and encourage the students who would be likely to profit by it, the Committee resolved to charge no tuition-fees, but to support the students with scholarships and help them with prizes to start seed nurseries in the district. The Rajshahi sanctioned eight scholarships of Rs. 8 each a month, the Berhampore Silk Committee sanctioned three scholarships of Rs. 6 each a month, and Babu Rabindra Nath Tagore granted four scholarships of Rs. 5 each a month. At the suggestion of Mr. P. C. Lyon, Director of Land Records and Agriculture to the Government of Bengal—who has evinced a great interest in the welfare of this school—the Honorary Secretary started a Prize Fund to which Mr. Lyon contributed Rs. 25, Mr. Fraser-Forbes, Manager of the Bengal Silk Company at Sardah, Rs. 50, and the Rampur Boalia Municipality, Rs. 75, with the object of enabling two of the best students of the school to start seed nurseries in the district. As the Prize Fund fell short of the requirements, the District Board of Rajshahi
and the Department of Land Records and Agriculture were pleased to make a grant of
Rs. 169 and Rs. 50, respectively, at the suggestion of the Honorary Secretary.

"The training under the scheme, prepared by Professor Mukerji, consisted, in the first
year, in theoretical and practical lessons in the cultivation of mulberry-rearing and reeling of
the Bengali and Assam silk-cocoon, and manufacture of coarse silk pieces from the thread of
pierced cocoon locally known as muka. As this scheme required two complete years to finish
the sericultural training, the attention of the Committee was drawn to it, and a modified
scheme was adopted to divide the school into two independent departments—(1) Sericultural,
and (2) Weaving. and, to complete the training in either, in the course of one year only,
leaving it optional with the students at the end of the year to leave the school or join the
other department. The Sericultural Department under this modified scheme imparts in one
year sound theoretical and practical training in the cultivation of mulberry-rearing, of
Indian and foreign silk-cocoon and in the reeling of silk threads; while the Weaving Depart-
ment, during the same period, imparts practical lessons in bleaching, dyeing, and weaving of
various silk stuffs.

"Altogether 15 students (Hindus and Muhammadans) joined the school as regular
students during the first year of its existence. They were examined twice during the year, and
at the final examination held in January last by Professor Mukerji and the Honorary Secre-
tary, 13 students passed the test: 11 being placed in the first, and two in the second division.
The first two students—Ekramuddin and Ebadulla—have been awarded a prize of Rs. 175
each for starting seed nurseries in the interior of the district. Four students have obtained
employment under the Sericultural Silk Committee on Rs. 15 a month each; and two students
have been employed on Rs. 8 a month each by Babu Rabindra Nath Tagore for intro-
ducing the rearing of the Assam silk-cocoon in his zamindari in the district of Nadia. Besides
these regular students, several casual students and visitors interested in the industry, both
literate and illiterate, received instruction at the school as well as through correspondence.
A few associates in different parts of India also received casual help from the school for
introducing the industry in their localities.

"Pandit Sisal Prasad Upadhyaya, in the employ of the Hon’ble Raja Rampal Singh,
after a course of training at this school for three months, returned home and started a
nursery at Port Kalakamuket, in the district of Purba Bank in Oudh, where he is successfully
rearing the Assam silk-cocoon. Mr. O. Lloyd, Superintendent of the Oxford Mission
Industrial School at Calcutta, who came to this school with a Native Christian pupil
for a short time, is doing useful work, and rearing Assam silk-cocoon in Calcutta.
Mr. Lawrence, in the employ of Babu Rabindra Nath Tagore, is rearing successfully,
Assam silk-cocoon in Nadia, and the Honorary Secretary—being invited to visit his
nursery and advise generally upon starting a rearing establishment on a large
scale—testified to his success and skill. Mr. R. S. Joshi, Superintendent of the Govern-
ment Experimental Farm at Nagpur, in the Central Provinces, Mr. Pink of Debra Dun,
and Mr. Essafi of Hamirpur, North-Western Provinces, received written instructions,
and are rearing the Assam silk-cocoon at their respective stations. Seed was supplied
to these places from the school in the beginning, and arrangements have been made to
encourage an exchange of seed between them and the school."

46. One point of somewhat general interest I may notice here in connection
with the progress of this school during these two years, viz., the prominent
place occupied by Muhammadan pupils in this school. In going through the
annual examination papers of the pupils, I was struck with the capability of the
Muhammadan pupils in taking in every detail of the work. The Hindu pupils
wrote neater hands, their composition and style of writing were better, but
the Muhammadan pupils showed greater familiarity with the subject, though
their composition and spelling were abominable. With the march of technical
education, the Muhammadans of Bengal are likely to show a keener apprecia-
tion of the benefits of education than they have done in the past. In connection
with the working of this school, it may be also mentioned, there is some
danger in admitting non-professional or non-caste men as pupils, and helping
these with microscopes, &c., to start grainings in the midst of professional
cocoon-rearers. In reviving an existing industry, it is a bad policy creating
a new guild or craft, and putting it virtually in a position of antagonism to the
existing caste or craft. Educational qualifications should not be given promi-
ence to in the admission of pupils into this school, but rather caste or pro-
fessional qualifications.

47. As the net result of the sericultural experiments conducted for ten
years by the writer of this Monograph may be mentioned, besides the estab-
lishment of a Silk Committee and of the Sericultural School of Rajshahi, the
successful working of fifteen seed-rearing stations by professional cocoon-rearers
themselves, without any subsidy or help from Government, except at the outset,
when they were taught the new methods and given microscopes and a few other
appliances free of charge. These nurseries are scattered all over Bengal, seven
of them being in Malda, two in Birbhum, three in Murshidabad, two in Rajshahi,
and one in Midnapore. The owners of the nurseries are carrying on the work with profit to themselves and benefit to their fellow-cocoon-rearers, and their methods of work are being extensively imitated by their relations and fellow-caste men. These trained cocoon-rearers have a sixteen-anna crop every time now, and some of them take as many as eight crops in the year. Five or six years ago they were poor and struggling cultivators, but now they are men of considerable substance, who are looked upon with jealous eyes by money-lenders and zamindari officials.

48. As a further result of these experiments may be pointed out the revival or initiation of the silk industry in Baroda, Kashmir, Mysore, Gurdaspur (in the Punjab), and Kalakankar (in Oudh), where men instructed by the writer of this Monograph have been employed in carrying on sericultural enterprise on the most approved principles. I will conclude this chapter by quoting an extract from a letter, dated 4th April 1901, addressed to me by Mr. J. Partridge of Yeelauka (Bangalore), who has been having successful crops of cocoons every time since he has adopted the method of work recommended by me:—

"I am meeting with success each crop. I have now on their fourth moult 60 trays and cannot see a faulty worm. I have to thank you and only you for the good luck attending my endeavours. I follow your instructions fully, and so far as disinfections are concerned, I freely use the sulphate of copper after each crop . . . . . . . . . . . There is therefore no possibility of things going wrong, when once you have seed free from disease. Sericulture is a splendid opening, and I am glad I started it."
PART II.

SILK YARNS.

CHAPTER V.

MATKÁ AND KHAMRU-SPINNING.

The cocoons, after they are finished spinning, are taken down from the chandrákies and either (1) taken to the nearest hát for sale, or (2) killed by exposure in thin layers to the sun and reserved for sale until paikars or agents of European filatures come round, or (3) steamed in a basket covered-up with cloth under which a pot of water is kept boiling, and reeled off into silk, or (4) if they were formed in a very healthy manner, they are bought up for seed by travelling rearers going about in quest of seed, from village to village and sometimes from joar to joar. In some districts, e.g., Malda, Bogra, Birbhum and parts of Rajshahi, spinning of silk is done by cocoon-rearers themselves, and they are more or less independent of the local cocoon-market for the time. If they get a good price they sell off their cocoons, or else they convert them into silk.

50. Matká-spinning.—Then there are the pierced cocoons, which accumulate in every cocoon-rearer's house after his seeding is done, that is, after the moths have cut out of the cocoons and laid eggs. These empty cocoons cannot be reeled off into silk in the same manner as whole cocoons with dead chrysalids inside them can be reeled off. Whether a rearing succeeds or fails, there are always the few seed-cocoons. Each cocoon-rearer makes, on an average, four attempts every year to rear cocoons, and each time he uses an average quantity of one kahan (1,280) of seed-cocoons. Many Malda and Murshidabad rearers use as much as five or six kahans of seed each time, but the majority use only half a kahan of seed for a crop; and I take the average to be one kahan per crop or four kahans per annum. If there are 100,000 cocoon-rearers in Bengal, or 25,000 families rearing cocoons, 100,000 kahans of empty cocoons accumulate each year. These weigh about 10,000 seers, the greater portion of which is spun into a coarse thread and utilized for weaving matká cloth. Matká-spinning and matká-weaving give occupation to the poorest of women and the least artistic among the weavers. The matká cloths, however, that are made in Rajshahi are not so coarse as Murshidabad or Malda matkás, and a better class of weavers are employed in that district in matká-weaving. The empty cocoons are kneaded with a little clay, or with a paste made by pounding peas with water. They are left soaked in this thin paste for a little while, and then they are taken up one by one with the left hand, while a strand of fibres is drawn out of it with the thumb and index finger of the right hand and attached to a spindle variously called telo, tékia, takur, jámia, or játákur. The fibres are kept twisting with the revolution of the spindle. When the portion drawn out has been thus twisted into a single and firm thread, it is collected at the base of the spindle, and another strand of fibres drawn out of the cocoon and twisted as before. When one cocoon is finished, another is taken up, and the fibres from this are joined on to the fibres of the previous cocoon, and the operation is continued until about 400 cocoons are spun in one day. Women doing the work during their leisure time at home, do the spinning of about 400 cocoons per day, not at one sitting but as they get time. It takes six or seven hours' continuous work spinning 400 cocoons in this manner. When the day's spinning is done, the thread is taken out of the spindle and gathered on to a látái or nátái which is
represented in the figure (Fig. 2) as lying beside the woman engaged in spinning.

Fig. 2.—Matka-spinning.

A woman spins only about an ounce of thread every day, and, when four or five ounces accumulate in the lāṭāi, the thread is taken out, a band put on it to prevent the mass getting tangled, and it forms what is called a bandī or bundle. When several of these bundles or short skeins accumulate, they are taken to a local hātī for sale. A seer of matkā-thread sells for Rs. 2 to Rs. 6, according to the rate prevailing at the time. The profits of matkā-spinning industry are extremely low; and it is only old and feeble women, as a rule, who carry on the industry. The only thing to recommend it to them is its ease and inexpensiveness. The woman can do the work at her leisure, in the midst of her ordinary domestic duties, and the appliances required are only a tikur and a lāṭāi and a mud vessel to hold the cocoons. The former consists of a thin bamboo stick, about 10 inches long, of which the upper end is cut to form a hook, and to the lower end of which is attached a stone or earthenware disc which acts as a fly-wheel. The other implement, the lāṭāi, is a skeleton bobbin made of bamboo lāṭa, about six inches in diameter, conical at one end and having a long shaft or handle going lengthwise through the middle, which helps in the easy turning of the lāṭāi when the thread is taken on to it from the tikur. Both these implements can be made at home by a poor woman, or a lāṭāi can be bought for a pice or two. The earthen vessel may cost another pice, and it is only the cocoons that have to be reckoned in the calculation. If the woman belongs to a family where cocoon-rearing is done, as she usually does, she does not need to buy even the cocoons. The cocoons, the continity of the thread of which has been broken by moths cutting out of them, cannot be reeled in filatures, and there is no very great demand for them. They are collected in some villages and sold in some hāts at about 4 anna per kahan, or Rs. 2.8 per seer. When a woman has to buy a seer of pierced cocoons, she has to pay about Rs. 2.8 for it. She spins about an ounce of thread per diem, using 1 1/4 ounces of cocoons. It thus takes her about a month spinning a seer of pierced cocoons. Thus, after a month’s toil, she may make a rupee or two by an outlay of Rs. 2.8 and another two or three pice worth of dāl (pulse).

51. Matkā-spinners are amongst the poorest of the poor, and they are usually Muhammadan women who attempt to keep up their purdah respectability by means of this sedentary toil which brings such poor return. There is no means of judging how many matkā-spinners there are in Bengal. The census figures (Tables A and B of Part III) include khamsru and filature spinners and winders, and it is therefore not possible to say how many of the 19,904 persons returned as silk-carders and spinners are matkā-spinners. Further the census figures do not give an adequate idea of the number of persons who actually do spinning or carding. Cross-division in sericultural industry is unavoidable. Mulberry-growers are generally also cocoon-rearers, and cocoon-rearers are generally silk-spinners, at least in some districts, and silk-spinners are usually cocoon-rearers in every district. In census operations, a person is regarded as depending on agriculture, or mulberry cultivation, or
cocoon-rearing, or silk-spinning, according as the principal occupation of the
person is agriculture, or mulberry-growing, or cocoon-rearing, or silk-spinning.
The same may be said of silk-weavers. They may be principally cultivators,
or they may depend entirely on weaving, or they may return themselves as
cotton-weavers, though they use the same looms for weaving silk and cotton
fabrics. We can get some idea, however, of the number of individuals who can
entirely depend on matkà-spinning if we go back to the consideration of the
amount of seed-cocoon used in the country. One hundred thousand individuals
depending upon cocoon-rearing, means about 25,000 families. Each family
using, on the average, 4 kahans of seed-cocoon per annum, gives us 100,000
kahans as the total quantity of pierced mulberry cocoons available in Bengal.
One spinner, if wholly occupied in spinning every day in the month, would spin
about 10 kahans per month, or about 120 kahans per annum. This gives us a
smaller number than 1,000 as the total number of individuals who may depend
upon matkà-spinning. As a matter of fact, however, there are 800 to 1,000
matkà-spinners in the district of Murshidabad alone; as I ascertained after an
elaborate enquiry during the last famine, when these poorest class of people
suffered most. All the other silk districts put together would probably have
another 2,000 matkà-spinners, and I estimate the total number of matkà-spinning
women in Bengal as 3,000. There are more matkà-spinners in Murshidabad and
Rajshahi than in the other districts. It is only for a few days in every bund
that matkà-spinning is done, and women are never employed all the year round
in this industry. This is how 3,000 women do the work that could employ
only about 800 of them fully.
52. *Khamru-spinning.*—A little more than half the quantity of mulberry
cocoons raised in Bengal is spun into thread by the country method of reeling.
This is called khamru, khamru or bânk silk. Bânk is a name of the machine by
which *khangru* silk is made. The machine is more commonly known as *ghâdi,*
which properly means simply the pan in which cocoons spin in hot water.
*Ghâdis* are chiefly worked by Muhammadans, but in Malda and Birbhum silk-
spinning on the native method is largely done by Hindus. The processes
employed are mainly the same in every district. In Malda there are regular
native flatures consisting of 40 or 50 *ghâdis.* 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 flatures. In some places single *ghâdis* are the rule (Fig. 3).
In Rajshahi the *ghâdi* is usually double (Fig. 4.)

Fig. 3.—The single-*ghâdi* of Murshidabad.
(1) The double ghāi.

(2) The Khelna on ara.

(3) The Tahbil.

(4) The Banti-ʒal.

Fig. 4.—Native reeling machine of Rajshahi shown part by part.
53. In some places, as in Murshidabad and Rajshahi, there is more masonry, wood and iron used in the construction; in others, as in Bogra and Midnapore, mud and bamboos are used wherever possible (Fig. 5).

![Diagram of a reeling machine]

**Fig 5.—Native reeling machine of Malda.**

A.—Tephil or tehabil.
B.—Jánta or wheel.
C.—Khelaña.
D.—Kali.
E.—Kala.
F.—Tub or string.
G.—Iron hooks for conducting thread to reel.

X.—Small crank (khelándr tár) on wheel (B).
This crank imparts a reciprocatory motion to the khelán in order that the thread may be evenly distributed on the reel (A).

F.—Flue.

54. In Figs. 3 and 5, a well-constructed and a more rudely constructed single ghái are respectively represented in position. In Fig. 4, the separate parts of a double ghái are represented. Fig. 4(1) shows the fire-place and the two ghái, karáu or basins (A1 and A2) warmed by it. At the places marked B1 and B2 two bantikats, are placed [Fig 4(4)]. This consists of a block of wood to which an iron portion as represented in the figure is fixed. The arc-shaped portion has two, four or six holes according as two, four or six skeins of silk are reeled off at a time. Through these holes the fibres from a number of cocoons in the basin are passed and carried on as a single thread to the tobbil, tobbil or reel, which is separately shown in Fig. 4(3). At C1 and C2, i.e., beyond each set of basin and kál, stand árs or upright posts on which in gearing with wheels (called jánta) play the khelandra or ghargharis.

55. Fig. 4(2) shows one árd with its khelând on the top of it. Beyond C1 and C3, &c., that is, beyond the two árs of a double ghái at (D1 and D2) stand two tobbils, one of which is separately represented in Fig. 4(3). Each ghái has a spinner or reelor (katali) sitting with his face towards the fire and the basin looking after the boiling of the cocoons and the reeling of them; and on the far side a pátkar or workman standing and turning the handle of the tobbil as shown in figure 3. The connection between the árd and the tobbil is established either by toothed wheels as shown in figure 3, or by means of a string passing through the groove of the wheel (jánta) on the árd, and another on the offside of the axis of the reel as represented in figure 5.
56. The owner of a native ghādi begins by steaming the cocoons. Cocoons are killed by exposing them to the sun for a few days, or, when no sunlight is available, they are killed in the process of steaming. Whether the chrysalids are alive or dead, the cocoons are placed in a basket, and the basket is placed on the basin in which water is kept boiling. The whole is covered with a blanket or a thick cloth. After about half-an-hour the steamed cocoons are ready for reeling. The steaming makes the cocoons easier to reel. Steamed cocoons are not exposed to the sun nor allowed to get too dry, but they can be kept ready for reeling for a week, if necessary, spread out in a cool room. The steamed cocoons are reeled by first putting them in the basin in boiling water, and working them with a brush or bundle of sticks (represented in figure 3), so that each cocoon gets dipped in the boiling water and its end attached to the brush. When nearly all the ends have got attached to this brush they are taken up with the left hand, and with the right hand the cocoons are lightly shaken, so that a greater length of the fibres works off. A few, ten, or twelve, according to the size of silk wanted, that work off very easily, are then separated out of the whole lot of cocoons in the basin, and these are divided into two equal lots of 5, or 6, or 10 cocoons, the end of which is passed through the two eyes or holes of the kal. Where there are four eyes (as in Fig. 4), 20, 30, or 40 cocoons are divided into four equal lots, and the ends of these are taken out separately from the whole lot on the left hand of the spinner, and passed through the holes of kal. There are usually two upright wires on the kal to keep the two lots of fibres separate during the reeling. These also serve to give two croiseurs to the fibres, one between the holes of the kal and the upright wires, and the other between these wires and the reel. The friction caused by these croiseurs agglutinates the fibres together, and make them pass on to the reel as two firm and single threads. It should be noted, however, that crossing the threads before they pass on to the reel is a European innovation introduced into Bengal in 1770, and it is still rather the exception than the rule in the reeling of khāmrū silk (vide Fig. 5). As the reel is turned by the pākhār, the cocoons in front of the kalāni get worked off. The kalāni sees that any cocoons that get entangled, or that jump up, are instantly separated out, and new cocoons thrown along with the fibres which are being reeled, as the old cocoons work off, and thus he goes on feeding cocoon after cocoon while the reeling is going on. When there is any interruption or break, the pākhār assists him in re-establishing order and union, and the work is continued as before. When one lot of cocoons is finished, another lot is subjected as before to boiling, heating with the brush, and reeling, until the day's work is done. There are little twisted wires or guides (khēnharātār) on the khelānd, or piece of bamboo or wood, which moves in an eccentric manner on the jāndi. The thread passing through these wires on to the reel do not pass straight to the reel and get laid on the reel exactly on the same spot. The movements to and fro of the khelānd causes each thread to be laid over a width of 3 or 4 inches of the reel. Getting laid on the reel in this wide manner, the thread gets dry more easily, and when there is a break the end is also found out more easily. In Khāmrū-reeling, however, they do not take the trouble of finding out the end when there is a break and putting a knot, as is done in European filature, but the union is effected anyhow. It is, therefore, more troublesome unwinding a skein of Khāmrū silk than a skein of filature-reeled silk. Khāmrū silk is also much coarser and uneven than European filature-reeled silk. In filatures 4 to 6 cocoons are usually reeled off together to form a single thread, while in Native ghādis 8 to 20 cocoons are used. The cocoons used in European filatures are also more select; cheaper cocoons, and the rainy season cocoons (which do not work off easily) being chiefly used for the ghādis.

The ordinary price of Khāmrū silk is Rs. 10 to 12 a seer. In Bankura Rs. 13 to Rs. 14 a seer, and in Burdwan Rs. 14 to Rs. 16 per seer, is the usual price. The Khāmrū silk of Malda is highly prized by Native weavers, especially for the weft, the weft (bhārānd) silk of Malda usually selling a rupee per seer higher than the tkād or warp-silk. Mirzapore weavers of Murshidabad prefer Malda Khāmrū to that reeled in their own district. At Bāshā Bishnupur, and other villages of Birbhum, where silk-weaving is done, they use the Khāmrū of their own district. At Vishnupur in Bankura, and Chandrakona in Midnapore, a good deal of Khāmrū silk is employed in Native looms.
half the total quantity of Khāmru silk produced in Bengal is bought up by dealers from Benares, Nagpur, Karachi, Mysore, Sholapure, and other parts of India where there is silk-weaving. Only an insignificant quantity of filature-reeled silk is used in Native looms. Weavers of Murshidabad call filature-reeled silk “Latin silk,” owing probably to the fact of its being produced on the improved ‘Novi’ pattern introduced by Italian artisans in the filatures of the Hon’ble East India Company. It is for some exceptionally fine fabrics such as silk muslins, that the weavers use ‘Latin silk,’ for which they pay Rs. 17 to Rs. 20 per seer, instead of Rs. 10 or Rs. 12.

57. The Khāmru silk-spinning industry of Bengal is at present in a very flourishing condition. The Bombay plague has, no doubt, put some check on this industry, but it is likely to be only a temporary check. The silk-weaving industry of other parts of India is also in a flourishing condition. The quantities of raw-silk imported from foreign countries (Table K) into India has practically remained the same during the last 30 years, while the demand for Khāmru silk, in the silk districts of Bengal, specially Malda, Birbhum, and Rajshahi, has gone on increasing. Of the two million pounds of foreign raw-silk from China, etc. that are used in India, Bengal uses only about five thousand pounds (vide Table M), while she exports by coasting steamers only to the other Indian ports about 250,000 lbs. of raw-silk per annum (vide Table G); and nearly as much goes by rail to the other Provinces (vide Table Q). Malda produces about 2,000 maunds of Khāmru silk; Murshidabad, about 800 maunds; Rajshahi, about 1,500 maunds; Birbhum, about 500 maunds; and Midnapore and the other districts put together, about 1,000 maunds,—the total quantity being five to six thousand maunds per annum and the tendency has been upwards during the last 8 or 10 years though, as I have already said, the plague has somewhat impeded the progress of this branch of the silk Industry. In Malda, Khāmru-reeling prevails in all the jōra, chiefly in the villages close to English-bazar, and in English-bazar itself. In Murshidabad, Khāmru-reeling prevails chiefly in the Jangipur and Kandi subdivisions, and in Birbhum, in all the villages where cocoon-rearing is done. With regard to the localities where Khāmru-reeling is done in Rajshahi, the following extracts from the District Monograph will be found interesting:

“Ghais are found in the same villages as looms and also where there is weaving, but those who work them are Musalmans. Out of 41 reevers, 21 bear the name of Paramanik, and the remaining 20 one of the following: Sarkar, Mandel, Mullah, Sirdar Saha, Sheikh, or Chaukidar. In Dacca itself there are 14 ghais to 12 looms. In Dacca and ten neighbouring villages, which together constitute the greatest reeling centre, there are 104 ghais. All these villages are in thana Chaghat. There are others too for which figures are not available in this thana, such as Belgaria; in Boalia, such as Kadirpur, and in Lalpur, such as Kaldakshali, Kamaldear, and Gargari. In the latter village there are four or five filatures, and in one house there are as many as six ghais.

“From Lalpur and Chaghat a great deal of khangru is exported across the river into the Murshidabad district, where it is sold at Islampur and Berhampur. Some goes direct to Calcutta, and a large proportion comes to the silk merchants of Rampur Boalia.

“There is a quarter of the town called Resampati, where most of these dealers live in large brick buildings, and form a small but wealthy community of both Hindus and Musalmans. There is one bopari, known as Manjan Dalal, who buys khangru from most of the silk merchants, as it is brought in from the mufassil villages. The chief business of these silk merchants is to act as commission agents for up-country weavers. Hence we find that the places to which they consign their khangru are chiefly Benares, Amritsar, Lucknow, Delhi, Agra, and also Bombay and Calcutta. To these places principally and to a few other towns, the quantity of silk thence reeled in native filatures and exported from Rampur Boalia alone by steamer for the year 1898-99 exceeded 1,500 maunds. No figures are available to show how much khangru finds its way out of the district through other channels of export, but from a comparison of the number of villages whose produce comes to Boalia with the remaining villages, containing native silk filatures (not under European control), it is probable that 1,500 maunds represent about two-thirds of the total produce of the district.”

58. What is said here about the export of khangru or khāmru silk to other parts of India applies equally to Murshidabad and Birbhum.

59. In Bogra “there are only about a dozen skilful labourers who can reel silk. Most of them belong to the village Barbkapur, also called Barapur, near Nowdopara, where there was once a silk factory. These reevers are all Muhammadans. Reeling of silk is not their only occupation. They live by cultivation and field-work, and silk-reeling takes only a part of their time.”
60. In Bankura all the silk reeled "is sent to Vishnupur for sale. The principal traders dealing in silk thread at Vishnupur are Chandra Sekhar Banerji, Nafor Tanti, Sundar Rakbit, Kartik Chand, and Behari Tanti. They also import silk from Midnapore district. Silk thread is sold at Rs. 14 per seer, generally on credit of one month."

61. In Midnapore this, as other branches of the silk industry, is in a declining condition.

62. This chapter may be brought to a close by the following extract from the Handbook of Sericulture (pages 216 to 218):—

"For the last few years the native silk-reeling industry has been steadily improving. At times the price of this inferior silk goes up higher than that of the superior raw silk turned out from European factories. This absurdity can be explained only by the ignorance of native silk merchants regarding the state of the European silk market. The silk-reeling industry of Bengal suffers considerably by the absurd procedure of native silk merchants. At one season when the market price in Europe for the superior flature silk of Bengal was Rs. 14 per seer, these native silk merchants were buying the inferior khamru silk for Rs. 15-8 per seer. Under such circumstances native silk-reelers began buying cocoons at a higher price than European silk factors. The latter sewed that they could not make any profit buying cocoons at Rs. 40 or Rs. 41 per maund. Coccoon-reelers in Maida also made up their minds not to sell their crops for less than Rs. 40 or Rs. 41 per maund. The factories were closed for some time. The native silk-reeling went on briskly for a few days, while most of the cocoons remained locked up in the houses of silkworm-reelers. In a month most of the cocoons were sold off at Rs. 15-8 to Rs. 12-8, and only these few silkworm-reelers who had succeeded in selling their crop for Rs. 40 or Rs. 41 per maund made a profit. Most of the cocoons-reelers who had kept their crop locked up for two months got more heavily involved in debt to the money-lenders, and finally sold their April and May crops of cocoons at the low price prevailing during the rainy season. Native silk merchants and silk-reelers should accept as just the prices at which European factors buy cocoons or sell their silk if such disappointments are to be avoided. European silk factors make exact calculations as to the price of cocoons they ought to pay after consulting the state of the European market at the time. Native silk merchants and silk-reelers should simply follow them in this matter. If they do not, they may make an accidental profit, but they are more likely to lose. Buying cocoons at the same price at which European factors buy them, native silk-reelers can make sure of their profit, as, for various reasons, khamru silk is worked cheaper than the flature-reeled silk: (1) The yield of khamru silk is larger. (2) A spinner can turn out three times as much khamru silk as flature silk. (3) As six skeins of khamru silk are turned out at a time in some parts of Maida and instead of two, the number of winders required is also less in the case of the khamru silk. (4) The establishment charges of a European factory are considerably larger."

63. For the above reasons, the manufacture of khamru silk proves more profitable to the native reeler than that of the flature silk, notwithstanding the higher price which is or ought to be obtained for the latter. From a maund of green cocoons 2½ to 3½ seers of khamru silk is obtained, the outturn of flature-reeled silk being about half-a-seer less in either case. The cost in reeling a maund of green cocoons into khamru silk is Rs. 3-8 to Rs. 4. The cost of reeling a maund of poor cocoons is the same as that of reeling a maund of good cocoons, though the produce in the two cases differs greatly in value. To the European factor a seer of silk costs about Rs. 2 in reeling. A maund of green cocoons yields two or three seers of 'waste silk' as a bye-product to the native reeler. These two or three seers of 'waste' sell for Rs. 3 to Rs. 3-8. The cost of reeling native silk is therefore sometimes defrayed by the sale of the bye-product, and any excess in the sale-price of the silk turned out above the purchase-price of cocoons yields a net profit. If a maund of green cocoons has to be bought for Rs. 40, that is, if the cocoons are very superior, three seers at least of khamru silk can be expected as the produce. But the average price of superior cocoons should be taken as Rs. 30 per maund. The three seers of khamru silk can be sold at Rs. 30 to Rs. 46, according to the fluctuations of the market. The weft silk, again, can be sold for Rs. 1 to Rs. 1-8 more per seer. Native silk-reelers usually pay higher wages to their spinners and winders than European silk factors. In Maida the spinner in a native reeling establishment gets Rs. 6 Rs. 10, and the winder from Rs. 4 to Rs. 8 per month. European factors, however, have to advance money in engaging spinners and winders. It is for this reason they are able to secure spinners for Rs. 5 to Rs. 8 a month, and winders for Rs. 3 to Rs. 4. The spinner and winder in a native silk-reeling establishment work much harder than in a European filature. In the hot season they begin work at 4 in the morning, and go on until 1 P.M. In the cold season they work from 6 A.M. to midday, and again
from 1-30 P.M. till 4 P.M. In European factories regular work goes on only for eight hours in the day. The weft khamru silk is reeled out of 8 seris of green cocoons (about three seris of dry cocoons) by each spinner per diem. If he has to make warp silk, he has to reel off 10 seris of green cocoons (about 2½ seers of dry cocoons) before he gets leave for the day. Khamru silk is sold by 82½ tola weight. Filature silk is sold by 72½ tola weight. With one maund of khamru silk are obtained 25 to 30 seers of 'waste.' This waste is not clean like the filature waste, but full of chrysalides. In filature the quality of cocoons is fairly judged from the 'waste' they produce. If on reeling 11 kahas of cocoons 1 seer of silk is obtained in a filature, i.e., if the cocoons are tip-top in quality, 11 seers of waste are expected with a maund of this silk. If the cocoons are poor, and they go 20 kahas to the seer, 20 seers of waste are expected with a maund of this silk. The filature 'waste' which is clean sells for Rs. 80 to Rs. 100 a maund in the Calcutta market, while the khamru 'waste' sells from Rs. 38 to Rs. 60 per maund. In filatures each spinner makes 4 skeins of silk per day, which weigh from 3 to 4 chitaks. In khamru-reeling establishments each spinner turns out 12 skeins per day. If these are of weft silk, they weigh 8 to 9 chitaks: if they are of warp silk, they weigh 10 to 14 chitaks. The comparison here instituted will show that, on the whole, it is more profitable for the native reeler to reel coarse khamru silk. Bengal khamru silk is not exported to Europe, but coarse silk is exported to Europe from China and Japan, and it is advisable to export khamru silk also to Europe. But it will scarcely find a market unless it is re-wound before export. In the manufacture of the khamru silk thread, the winders turn the reel very fast. When a thread happens to break, he makes the re-attachment anyhow without putting a knot, and the winding of the reel goes on as before a moment's interruption. Such being the case, it costs a great deal unwinding the khamru silk from the skeins into bobbins. The cost of labour in Europe is so great that khamru silk will fetch very little price unless it is exported in a re-wound state. A great deal more of khamru silk is produced in Bengal than filature silk. The competition between European factors and native reevers is therefore very keen. The best way for the European factors to avoid the evil resulting from this competition is to recognise the khamru silk as an article of export, to buy up large quantities of it, to re-wind it, and then send it to the European market. The effect of such a procedure will be two-fold—(1) to give the native silk-reeling industry a still greater impetus, and (2) to combine it with European enterprise. That a very wide field is likely to be opened out in Europe for the coarse khamru silk is the opinion of some of the best manufacturers of England, France, and Italy.

65. No time should be lost in taking advantage of an enterprise that is likely to develop export trade in a new direction, while giving an impetus to an already-flourishing native industry. For such manufacturing purposes (e.g., for manufacturing shoe-maker's twine), where coarse sizes are preferable to fine sizes, the native-reeled silk, if exported re-wound and twisted, if possible, would be preferred to the more expensive filature-reeled silk.

CHAPTER VI.

SILK SPINNING—FILATURE SYSTEM.

65. The raw silk of superior quality—superior, that is, to khamru silk—is nearly all exported to Europe. This silk is spun in filatures, the largest of which are owned by the Bengal Silk Company and Messrs. Louis, Payen and Company. Many small filatures producing silk of nearly as good quality as that produced in European filatures are owned by native merchants, such as the Dabunda filature, owned by Haji Naku Mondal. The principal filatures of the Bengal Silk Company are those of Sardah and Matihar in Rajshahi, Baraghar in Maida, Ghatul in Birbhum, Babulona and Rangamati in Murshidabad, and Ghatal and Chatterganj in Midnapore. The principal filatures owned by the French Company are those of Kajia and Talaimari in Rajshahi; Bhobhat in Maida; Gadi, Bajarpura, Gouripur, Sajapur, and Narayanpur in Murshidabad, and Gorela in Midnapore. Mr. Ferguson of Berhampore owns a factory at Beldanga and another at Jangipur, in the district of Murshidabad, and also the
factory of Sirool in Rajshahi. The produce of the filatures owned by native merchants are bought up by the European silk factors on a system of contract. The tendency of late years, when prices of Bengal silk have gone down very much in the European market without any fall in the price of cocoons, has been to reduce establishment charges by concentrating the work in a few factories, while at the same time keeping up the quantity as in former years. This has resulted in the majority of silk factories in Bengal being closed. The following account of the present state of the filature industry in Murshidabad, furnished in the district monograph, may be read with interest:—

"After the rearing comes the preparation of the silk from the cocoon. Last year's district administration report records that there were 48 filatures in the district, which turned out some 484,597 lbs., valued at Rs. 23,80,955. Of these, some 26 are the property of European firms, the rest belong to natives. Generally speaking, the output of the Europeans is greater than that of the native filatures.

"According to the annual statement of important industries of the district for 1897, the average daily number of persons permanently employed throughout the year in these factories reaches a total of 3,151. At certain seasons of the year, generally speaking from January to March, April to September, and during December, the average daily number of persons temporarily employed is more than three times as great.

"Large cocoons and centres.—The Bengal Silk Company and Messrs. Louis, Payen and Company are the largest filature owners in the district. Mr. Rice, the Manager of the former, and Mr. Gourji of the latter have their headquarters at Berhampore. Haji Nakibuddin and Haji Moniruddin are owners of large native filatures in the towns of Burwa. Again, turning to the annual statement of important industries, I find that amongst the largest European filatures are those of—Onoa, with an output in 1897 of 19,333 lbs; Gadi, with an output of 34,864 lbs; and Faridpur, with an output of 21,334 lbs. All these are in the Sadar division. In Kandi subdivision that of Bajarpore produced 33,463 lbs. In Jangipur the filatures of Chila and Balughata produced 15,502 and 22,813 lbs. respectively. Among native filatures, those of Beldanga and Debdunda, in the Sadar division, produced 9,734 and 8,926 lbs. respectively, while in the Kandi subdivision the output of the Shomshapara filature was 3,083 lbs."

66. For Rajshahi the following account has been furnished:—

"To show the extent of the silk industry as a whole, native and European, in this district, a brief statement of the numbers of the factories in each concern and their output for the year 1898 is appended:

<table>
<thead>
<tr>
<th>Number of filatures</th>
<th>Outturn. lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengal Silk Company</td>
<td>Sardah, Matihar, and eight subordinate filatures</td>
</tr>
<tr>
<td>Louis, Payen and Company</td>
<td>Kajla, Khojapur, and Sabhganj</td>
</tr>
<tr>
<td>Watson and Company</td>
<td>Sirool</td>
</tr>
<tr>
<td><strong>Total—Three</strong></td>
<td><strong>Fourteen</strong></td>
</tr>
</tbody>
</table>

"In other words, three companies owning fourteen factories produced 69 tons 7 cwt. 3 qr. 14 lbs. in the year 1898."

67. Two-thirds of the cocoons produced in this district find their way to these filatures.

68. The district monograph from Midnapore contains the following very short notice on this subject:—

"Some factories have been established here, among which are those at Guruli—Nintala and Moheshpore in Daspore thana, and Gurgartapore, Ramchandrapore, and Moherajpore in Ghatil thana. In them raw-silk is reeled off cocoons and woven into cloths. One seer of cocoon yields from two to three tolas of yarn, which sells at about Rs. 15 per seer of 80 tolas. The yarn is either exported or sold to weavers for weaving into cloths. Each spinning wheel turns out about two to three cattaks of yarn."

69. The quantities of raw silk exported in the palmy days of the East India Company, i.e., from 1812 to 1835, and in subsequent years up to 1876, have not been approached of late years; but otherwise there is nothing much to complain of regarding the quantity of silk produced in filatures and exported to Europe. The competition with China, Japan, France, and Italy is now keener than ever; the improvements effected in all branches of sericulture in France, Italy, and Japan within the last 20 years are enormous; and the struggle the European silk factors have had during these 20 years in keeping up the quantity is very great. But so far the struggle has been well
maintained, and some improvement even is noticeable. The regular export of raw silk from Bengal may be said to have commenced in the year 1772. The annual average of export for the 20 years from 1773 to 1792 was about 400,000 lbs. During the next 20 years 1793—1812 the average annual export was 438,554 lbs. The next period of 22 years (1813 to 1834), at the end of which Government gave up all direct control over the silk trade, saw the average annual export of raw silk attain to 982,761 lbs. The next period of 20 years, from 1836 to 1855, saw the average rising to a still higher figure, viz., 1,435,225 lbs. The next period of 20 years, from 1856 to 1875, saw a still higher average, viz., 1,609,838 lbs, which was the maximum reached. To study the march of export in raw silk from this time onwards it is best to take into account much shorter periods—

<table>
<thead>
<tr>
<th>Period</th>
<th>Annual Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>1876 to 1880</td>
<td>1,074,837</td>
</tr>
<tr>
<td>1881 to 1885</td>
<td>1,074,837</td>
</tr>
<tr>
<td>1886 to 1890</td>
<td>1,074,837</td>
</tr>
<tr>
<td>1891 to 1895</td>
<td>1,074,837</td>
</tr>
<tr>
<td>1896 to 1900</td>
<td>1,074,837</td>
</tr>
<tr>
<td>1901 and 1902</td>
<td>1,074,837</td>
</tr>
</tbody>
</table>

70. The upward tendency since 1889 has been very distinct (vide table C of Part III); and if the methods of amelioration are persevered in, I have no doubt, the improvement can be maintained. Every department of the silk industry depends for its health and vigour on the state of the cocoons rearing industry. Cocoons will necessarily become cheaper if crops become certain and plentiful; and it is cheaper cocoons that are needed to make cheaper silk, both raw and manufactured. Bengal silk is always acceptable, specially in England, if it can be supplied cheap. The Imperial sentiment is operating here, as in every-thing else in the British Empire, and England is interesting herself more and more in the raw-silk from Bengal. France is no longer the principal patron of Bengal silk, and England is striving to assume the same unrivalled position with reference to Bengal silk which she held 30 or 40 years ago. The nature of the present competition between England, France, and Italy in this respect can be judged from the following figures:—

<table>
<thead>
<tr>
<th>Year</th>
<th>To England</th>
<th>To France</th>
<th>To Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1891</td>
<td>1,362</td>
<td>1,242</td>
<td>194</td>
</tr>
<tr>
<td>1892</td>
<td>1,258</td>
<td>1,256</td>
<td>723</td>
</tr>
<tr>
<td>1893</td>
<td>1,297</td>
<td>1,266</td>
<td>666</td>
</tr>
<tr>
<td>1894</td>
<td>1,196</td>
<td>932</td>
<td>834</td>
</tr>
<tr>
<td>1895</td>
<td>1,380</td>
<td>2,062</td>
<td>478</td>
</tr>
</tbody>
</table>

71. The figures compiled from the Bengal Administration Reports for 1896-97 to 1900-1901 are given in Table E. In 1896-97 the amount of raw silk and waste exported to England was 5,064 maims or 416,713 lbs., while in 1897-98 it rose to 6,432 maims (753,080 lbs.). The quantity exported to all other countries taken together in 1896-97 was 9,159 maims, while in 1897-98 it fell to 6,871 maims. From 1875-76 down to 1896-97 France invariably imported larger quantities of raw silk and ‘waste’ from Bengal than England, and even Italy occupied for some years a higher place than England. For the first time during the last 30 years, therefore, England assumed the first place once more in 1897-98. This is as it should be, and if the tendency continues, there is no reason why Bengal silk should not continue to flourish, though it may never regain the position it occupied from 1813 to 1875, when Bengal silk stood unrivalled in the competition even with Chinese and Italian silks. Table E, however, is not altogether hopeful on this point. Mr. Liotard writing in 1883 made the following cogent remarks regarding the fall of Bengal silk being due to England’s failure to patronise it:—

“It will have been seen from this series of tables that of Indian raw silk, the United Kingdom was by far the largest consumer 13 years ago (viz., 99 lakhs of rupees in
1870-71, but that the exports thither declined rapidly till they came down to Rs. 11 lakhs in 1875-76, to Rs. 44 lakhs in 1880-81, and to about Rs. 3 lakhs in 1882-83. It is chiefly this decline, this abandonment of the Indian supplies by the United Kingdom, that has brought about the fall in the Indian raw silk trade.

72. England's behaviour in this respect is all the more regrettable, since other European countries did not see any reason for abandoning Bengal silk in the same manner as England did. The cocoon crops of France and Italy began steadily to improve from 1876, and yet France went on importing almost as much silk from India, and Italy imported more and more of it.

73. The raw-silk of export is made in large factories, and more carefully, though, on the main, the principle of reeling resembles more the old native method than the present methods which have come into vogue in Italy and France. The principal differences between the khamru and the filature methods are—

1. 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 ghats.

2. The discipline under which the spinners and winders are kept by constant check of their work by means of special testing machinery and a special supervising staff renders the silk turned out of evener size than khamru silk.

3. When there is a break a knot is put, which is not done in khamru silk.

4. Crossing of two adjacent threads to give them roundness and firmness is invariably done in filature-reeling, though it is only rarely done in khamru-reeling.

5. Filature silk is finer than khamru silk.

74. The following extracts from the "Handbook of Sericulture" will give an idea of the system of filature-reeling in vogue in Bengal:

"The Oven.---In Part II of this book it has been said that cocoons require to be killed by heat or with carbon-bisulphide before they are reeled. Even when they have been killed, they require to be steamed, except in the rainy weather, when cocoons killed in the sun are exposed to the action of heat and moisture simultaneously, which does away with the need of subsequent steaming. The combination of heat and moisture makes the fibres on the cocoons to swell up and become loose and easily reealable. Even in the rainy weather it may be necessary to bake the cocoons in a steaming oven, simply to kill them, when the rays of the sun or carbon-bisulphide is not available for this purpose. At other seasons the object of putting cocoons into an oven is simply to kill them. They are, therefore, steamed in the oven even when they have been killed in the sun before they can be properly reeled. Where large quantities of cocoons require to be killed, steaming ovens must be provided. When small quantities of cocoons only have to be reeled, the steaming can be done by introducing the cocoons in a basket or in an earthen vessel having holes at the bottom, and putting the basket or the earthen vessel on the reeling basin, where water is boiling, the basket or the earthen vessel being covered up with a blanket, to keep the steam in as much as possible. A poorly constructed oven has this advantage, that the temperature inside it can be made to exceed 105°C, while the temperature of the steam got from the boiling basin is ordinarily 105°C. Exposure of cocoons to a temperature of 105°C for 5 minutes kills them effectually. A short exposure of living cocoons to 100°C leaves these inside a heap alive. Moths coming out of such cocoons afterwards make them 'waste.' Killing cocoons in the sun in the rainy season does not do any harm to the silk fibre, but in those seasons, when the air is naturally dry, killing the cocoons by exposure to the sun lessens the elasticity of their fibre. Cocoons should, therefore, be killed in these seasons either in a steaming oven or with carbon bisulphide. The kind of ovens constructed in this country in connection with filatures is not altogether suitable for the baking of cocoons. These are hemispherical in shape, constructed with bricks, and have a small removable door in front of each. They are first heated with fuel burnt inside. The fire is then extinguished by sprinkling water from outside, the charcoal and ashes being removed immediately afterwards, and cocoons arranged in baskets put in. The little movable door is then fastened and the cocoons kept inside the hot and steamy atmosphere of the oven for 10 or 12 hours. They are afterwards taken out and spread in thin layers on mats, and distributed as required to the reealers. In Europe there is a long cavity under the oven. In this cavity is put fuel (wood or coal) and a boiler in contact with it. A tube from this boiler opens into the oven above. The cavity underneath the oven leads into a flue, which goes up the further end of the oven, then along the top, until it terminates in front in the form of a chimney. The cavity or flue going round three sides of the oven, heat is radiated into the oven from the three sides. This makes the temperature of the oven stand at over 100°C. Putting fuel inside the oven, bringing charcoal and ashes out, and sprinkling water are not required for an oven of this kind. The killing of the chrysalidés is also effected in about three minutes in such an oven.
At the entrance to the oven just described, a couple of rails are fixed in the ground. A truck laden with cocoons is rolled along these rails, shot in for three minutes in the oven, and then rolled back. Another truck laden with baskets of cocoons is in the meantime got ready and rolled in as before. If the oven is made 12 cubits long 3 cubits wide and 6 cubits high, 5000 of cocoons can be smothered at a time, or 50000 (10 truckfuls) per hour. An oven like this worked for eight hours a day can kill and steam 400000 of green cocoons per diem. Sometimes the accumulation of cocoons in a stifler is so great that it seems desirable to introduce the European system of baking in this country. If a much larger quantity of cocoons arrives in a factory in one day than what has been spoken of as being easily capable of being smothered during the day, these must be baked first that are not safe to keep over for a day or two. A hand of cocoons out of each lot coming into a factory should be held close to the ear and shaken. If the shaking gives one the idea that the sound has a dry character, or when a rustling sound is heard from inside the cocoons, when they are simply held close to the ear, those cocoons should be killed that night, or else moths are likely to emerge next morning and spoil some of the cocoons. If there is any doubt in the matter, a few cocoons may be cut open, and it may be seen whether the chrysalids have got their eyes quite distinct, and also whether the contour of the wings are quite plainly seen. When these signs appear, the cocoons should be killed the same day. Steamed unsmokey cocoons should not be kept in the same room, as this may lead to occasional mistakes in steaming cocoons.

"A more detailed description of the methods actually followed in the large stiflers for killing, drying, and ovening cocoons may be of interest."

"Killing and drying.—A special method is adopted for killing the cocoons of the rainy bands and the November bund. When sunny days are available, the cocoons with live chrysalids inside them are exposed to sun for a day or two immediately after they are brought to the stifler. If it is wet at the time, they are spread out in the cocoons godown; and before the moths cut out, they are killed in a stove-room called atoughar. This room is kept hot with a big stove, the fire-pace of which is at a low level and in one corner of the room, so that coal is fed from outside the room. Two pipes or flues from this stove go in a curved manner along the length of the room and up to the roof, where they end in chimneys, whence the smoke goes out. On the opposite wall to where the door of the stove is placed is a huge door through which an iron truck laden with flat trays of cocoons goes inside the stove-room or comes out of it along iron rails. The trays are made of wood or iron, and each time the truck is charged with about 600 kahams of cocoons in 60 or 60 trays. The cocoons are kept in the stove-room at a temperature of 156° to 160°F. for four or five hours, after which they lose nearly the whole of the moisture. There is a small trap-door at one end of the room to which a thermometer is attached, and which is opened every now and again for measurement. Out of this opening a few cocoons are also brought out with the help of a stick and cut open. Excessive heat or too long heating spoils the cocoons. In the hot weather, when two or three days' exposure to the sun is sufficient, the cocoons are not put in the stove-room. After sunning or stoving the cocoons, as the case may be, they are spread out on bamboo shelves (madaia) and stirred every now and again, and after seven or eight days they are put out once more in the sun for a short time."

"Ovening.—Three or four days before the cocoons are reeled, a week's supply of cocoons (about 2000 kahams) is ovened at once. The oven or twald is a hemispherical masonry structure with a masonry floor and a half trapezoid. When it is burnt inside this oven, and when a blazing fire has been made and the oven has become very hot, the fire and embers are brought out and water is sprinkled thoroughly all over the inside without loss of time. In December 12 or 14 kalías of water are thus used, and in April 24 or 25 kalías. In the rainy bands cocoons do not need ovening, as the fibre in these bunds is naturally soft and open. The cocoons arranged in baskets are put inside the oven as soon as sufficient water has been sprinkled inside the oven, and immediately the trap-door is made firm. The ovening continues for 10 or 12 hours. No sunning is required after ovening, as the object of ovening is to give the cocoons a mellowness, which is lost by sunning or drying. In December the ovened cocoons are spread out on bamboo shelves, but in April they are spread out on the floor that they may not lose the mellowness through excess of drought. The ovened cocoons are distributed among the reeilers."

"Method of reeling.—It is impossible to learn reeling of thread from cocoons simply by reading books. It is altogether a matter of practice. One should learn to reel silk at an early age. In youth it is easier to bring muscles and nerves under control, and apply them to special kinds of work. In silk-reeling factories, therefore, small boys and girls are usually employed for winding the reeels. They begin by learning to wind with and put knots on to the reeled thread when it happens to break, and then gradually get to do the unravelling of the ends of the cocoons with bundles of sticks, and to throw them off their fingers for the purpose of reeling. In Bengal it is usual to employ one reel and one winder for reeling four skins of thread per diem. This is waste of labour. Two winders can be employed for winding a whole series of reeels, while an extra man can be employed to walk up and down, putting knots on to threads that happen to break. This system has come into operation in some of the Bengal stiflers. There are three main arrangements in a reeling machine:—(1) A basin, where hot water is kept, where the cocoons spin, and where the fibres are carried off. (2) Two perforated porcelain or discs attached to the end of two wires just above the basin. These are fixed to a block of wood, into which are also fixed vertically two brass wires or rods. The ends of these number
of cocoons are then passed through the other eye or disc and attached to the other side of the reel. When this is done the two lots of fibres will be found stretched in a parallel way from the basin to the reel. If the reel is turned under such circumstances the fibres from the cocoons will work off and be laid on the reel in two loose bundles. The fibres going to form the two threads reeled off from the two sets of cocoons are agglomerated together by the two sets being crossed with each other a number of times, the vertical brass rods serving to keep the two 'croisures' or crossings intact by keeping the threads separated between them. The first croisure lies between the two porcelain discs and the second croisure between these vertical rods and the reel. The two sets of fibres from the cocoons form into two single threads by means of these croisures, and they are gathered on to the reel as single threads. (3) The reel. When this is turned with a handle, the fibres from the two sets of cocoons are worked off from the basin into two threads. When a cocoon has been worked off in this way, another is made to supply its place out of a lot of ready-boiled cocoons. To avoid the two adjacent threads from a basin being laid on the reel exactly on the same spot, a rod or latch is made to work laterally with the help of an eccentric arrangement connected with the reel by means of toothed wheels. On these laths are fixed two glass or brass guides, through which the two threads are made to pass. The top end of these guides being twisted in the shape of corkscrews, the thread reeled off pass in contact with them without getting detached, so that the two threads are laid on a width of 3 or 4 inches of the reel, when the latch moves right and left at each turn of the reel. The thread reeled off being laid in this wide manner, results in two advantages—

(1) When the thread happens to break the end is more easily found out on the reel. (2) The threads get dry in the skews while the reeling is going on (Fig. 3).

"We may conclude this chapter by giving an estimate of cost and outturn of a filature of 100 basins conducted on the Bengal (European) system:--"

<table>
<thead>
<tr>
<th>Description</th>
<th>Rs.</th>
<th>A.</th>
<th>P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Purchase of cocoons, at 3½ kahans per basin per day, for 250 working days (100 x ½ x 250 = 87,500 kahans), at 11 annas a kahan</td>
<td>66,156</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>(2) One hundred reellers, employed for 250 days, on Rs. 6 per month</td>
<td>5,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(3) One hundred winders, employed for 250 days, on Rs. 4 per month</td>
<td>3,333</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>(4) Two cooks for pumping water, for 250 days, at Rs. 5 per month</td>
<td>83</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>(5) Coal, 35 maunds for each maund of silk turned out and 2½ maunds for the stove-room for each maund of silk turned out (say, 136) maunds out of 87,500 kahans of cocoons), i.e., 5,120½ maunds, at Rs. 40 per 100 maunds</td>
<td>2,050</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>(6) Fuel for evening, &amp;c., 500 maunds, at Rs. 25 per 100 maunds</td>
<td>125</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(7) Repair of filature</td>
<td>300</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(8) Establishment charges—European Assistant, including commission</td>
<td>4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gomastah</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerk</td>
<td>240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Godown-keeper (also clerk)</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazirnabah (roll-caller)</td>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaukidar</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two barkandazes or peons</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three filature sardars or foremen</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oven sardar</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer lascar</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpenter</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweeper</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Contingent expenses</td>
<td>5,692</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total expenditure</td>
<td>77,941</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

"Outturn---

136½ maunds of 10—12 denier silk, at Rs. 800 per maund | 1,09,200 | 0 | 0 |
45½ maunds of 'chauam or tape-waste, at Rs. 100 per maund | 4,550 | 0 | 0 |
Nine maunds of 'gudur or coarse chasam, at Rs. 40 per maund | 360 | 0 | 0 |
34 maunds of tops or unreelable portions of cocoons, at Rs. 7 per maund | 238 | 0 | 0 |

Total outturn | 1,14,348 | 0 | 0 |
Deduct expenses | 77,941 | 0 | 0 |
Net profit | 36,407 | 0 | 0"
"According to the above calculation of expenditure, each seer of silk (and a filature seer is only 72½ tolas) costs over Rs. 14; and if the price realised is only Rs. 12 or Rs. 13 per seer, as sometimes happens, instead of a net profit a net loss would be the result."

75. The number of silk-carders and spinners in Bengal inclusive of dependents is over 19,000 (vide Table A). It includes matka and Khamru spinners, but not cocoon-rearers, who are also spinners. So the figure gives no clue for finding out how many filature-spinners are at present employed in Bengal. The amount of raw-silk exported to foreign countries, which is all filature-reeled silk (very little of which is used in the country), offers, however, a clue for ascertaining the number of spinners and winders employed in filatures. Assuming 600,000 lbs. as the amount of filature-reeled silk turned out per annum of 200 working days, and ½ lbs. as the amount turned out per diem by two men, i.e., one spinner and one winder, we get the total number of employed hands in filatures as 16,000, that is, 8,000 spinners and 8,000 winders. But as in some filatures, where better mechanical arrangements have been introduced, one winder is employed for several spinners, the number of winders is perhaps 6,000 instead of 8,000, and the total number of hands employed about 14,000. The filature-spinners and winders come from the lowest grades of Hindu and Muhammadan (chiefly Muhammadan) societies. They work on a system of advances, and they get very small wages—Rs. 4 to Rs. 6 per month—for those days when they actually work.

CHAPTER VII.

UNWINDING AND THROWETING.

76. Phirán, or unwinding.—Native weavers, as a rule, employ khamru silk in their looms. It is only rarely that they employ European filature silk, or 'Latim' silk, for turning out some very superior fabric. In weaving 'pakwan' silks (i.e., silks made out of twisted thread), the weaver first unwinds the skeins to a number of latais (fig. 6), and then gets this unwound raw-silk twisted, and

Fig. 6.—Unwinding of skeins.
finally gets it warped before he commences weaving. In weaving khdam silk (i.e., those made out of raw or untwisted silk), the weaver gets the thread unwound and gathered on to latais, and then warped before commencing weaving. If the thread is bleached, dyeing is done after warping. The thread for the weft is gathered on to latais from the skeins, two or three fibres from the skeins of a raw silk going to form a weft-thread. The weft-thread is taken out of latais and bleached and dyed, if necessary. In other words, whether the raw silk is used in a twisted or untwisted condition, whether it is bleached or not, whether it is dyed or not, it must be unwound before it is used. The unwinding is done with two objects—(1) to gather the thread of the same thickness or 'size' in the same latais, and (2) to get one uninterrupted thread in each latais. The skeins of raw silk are loosened out and put round a frail bamboo wheel called 'poli' or 'chorki' (fig. 6 A). The end of the skein is attached to a latais, and the thread transferred to this latais (fig. 6 B) by keeping it turning with the right hand, while the thread is made to pass between the thumb and the index finger of the left hand. The stick passing through the axle of the 'poli' being loosely planted in a hole in the ground or in the hollow of a thick piece of bamboo, the turning of the latais with the right hand makes the thread come out unwound from the skein. The thread passing through the fingers of the operator, he can judge of its thickness. Thread of the same thickness is wound on to one latais, so that three or four latais are sometimes employed for unwinding one skein of native-reeled silk. In unwinding the thread, the clue is lost from time to time. To get back the clue or end, some waste takes place. European filature-reeled silk is easily unwound, as it is fairly even in thickness throughout, and a whole skein can be gathered on to one latais. One tola or half a tola of silk per seer is wasted in unwinding filature silk, and half a chitak to one chitak is wasted per seer in unwinding the khammu silk. It costs about 8 annas per seer to get raw silk unwound. Women are usually employed in this work.

77. Throwing or twisting.—The raw-silk gathered on to latais may be used for warping in untwisted condition for manufacturing khdam silks, or silks of poor quality. For manufacturing superior silks, twisted thread is employed. Superior silks are therefore styled paatwain (i.e., twisted). The native process of twisting is extremely simple and inexpensive. In other words, the total cost of the tools and appliances used in twisting silk thread is less than one rupee. But to get a seer of silk thread twisted by this process costs about two rupees. In Europe, labourers are paid nearly ten times as much as in this country, and yet getting a seer of raw silk twisted in Europe costs only about eight annas. The machinery used in Europe for twisting silk thread is not so complicated that it cannot be constructed even in country places in India. The chief obstacle to the employment of the Bengal raw silk in Europe is the greater cost it entails in unwinding. The Bengal raw-silk should be re-wound and twisted in this country before export. Re-wound raw-silk has indeed begun to be exported by the French firm. If the export takes place in the form of thrown-silk, the difference of Rs. 6 or Rs. 7 per seer between European and Bengal silk is likely to disappear. Indeed, one of the principal ways of ameliorating the export trade in Indian raw silk would be the recognition of Organzine and Trame as the staples of export, instead of raw-silk. Doubt may be reasonably entertained with regard to the advisability of introducing the complicated power-looms of Europe into this country under existing conditions, but there is no doubt it is high time that the comparatively simple machinery required for throwing or twisting silk should be introduced. European methods, indeed, should be introduced into this country, as a rule. China and Japan have been able to develop their silk industry considerably by the adoption of European improvements. That the old methods are the best for India alone can never be accepted as a sound theory. With regard to the Japanese enterprise, one fact only may be pointed out as quite conclusive: we are now buying Japan-made handkerchiefs and other silk articles even at Borhampore. These are quite European in style and finish. Japan silks are finding their way into the English market also, to the great detriment of the silk-weaving industry of England.
78. The native process of twisting.—In twisting silk by the native process, the lādus are planted loosely in holes in the floor (fig. 7). The threads are passed through an iron guide (L), called Loôngri khanti, firmly planted in the floor; they are then carried up in front of the operator through a bamboo and cane erection (E), called Đol (fig. 8), and then through the first space of the upper-most series of a number of thhāks or bamboo erections (D), back through the first spaces of the lower series of spaces of the same thhāks and the second space of the đol, when the threads are snapped at the iron guide, and a takur tied at each end, as at a, a, the two ends being then made to hang vertically at
equal heights from the floor. Another length of thread is then taken exactly in the same way from the lātāis, passed through the guide, the third space of the dōḍ, the second spaces of the upper and lower rows of the hhākṣa and the fourth space of the dōḍ, two tākura being again tied at the two ends in front of the operator, as at b, b. In this way seven lengths of threads with 14 tākura attached to their ends remain hanging in front of the operator. One of these tākura is separately shown in the figure 7c. From the dōḍ to the last hhākṣa being 27 yards, 378 yards of thread are twisted at the same time by each operator. The distance between the dōḍ and the last hhākṣa is sometimes more and sometimes less, and sometimes 16 tākura are used instead of 14. There are usually 9 hhākṣa when the distance between the dōḍ and the last hhākṣa is 27 yards. The tākura are simply slender pins of bamboo with mud weights attached to their bottom, which help to keep the threads straight while the twisting is going on. The operator keeps rubbing the pins of the tākura successively between the palms of his hand, so as to make them spin fast and uninterruptedly, which serves to twist the threads. When the tākura are only 6 inches from the dōḍ, by the shortening of the threads by 9 inches, as the result of twisting, the operator considers the twisting done. The seven pieces of twisted thread are then gathered on to a lātāi (B) as one continuous piece by knotting them together. More thread is then twisted exactly in the same way. Two to three lengths of raw silk are usually twisted together. In other words, the pieces of thread passing through the same spaces of dōḍ and hhākṣa are taken from two to three lātāis at the same time, and not, as a rule, from one lātāi. In the native system of weaving the weft is never made of twisted thread.

79. The illustration here given represents the system actually carried on by Kusi Mandol of Sibganj, one of the principal chambuliās or silk-twisters of Maldah. In principle, the method of twisting adopted at Baluchur and Khāgrā (two other principal silk-twisting centres) in Murshidabad, is also the same. In Murshidabad the dōḍ from which the loose ends of the silk threads suspend consists of two bamboo upright posts and a bamboo cross-piece (as shown in the figure) to which a number of U-shaped pieces of cane are attached. From sixteen U-shaped canes 8 single, double, or treble pieces of raw silk hang down, the two ends of each piece of thread being attached to tākura a, a, b, b (as in the figure). In another detail also the Murshidabad arrangement slightly differs from the Maldah arrangement. The upper and lower spaces of the hhākṣa have chāris or common glass bangles tied to them, so that the silk threads pass through in contact with the smooth surface of U-shaped canes and the glass bangles instead of with bamboo tubes and laths. Silk fibre gradually cuts through bamboo, but it does not cut through cane or glass. The chāmti or piece of leather (G) shown strapped at the operator's thigh helps to make the rotary motion of the lātāi to which the twisted thread is gathered, easier. The chāmti is sometimes dispensed with. There is always a boy assisting the operator in carrying on each end of one piece of thread from hhākṣa to hhākṣa, and also when the twisting is finished and when the piece of twisted thread has to be gathered into the lātāi (B). As only one hhākṣa (instead of nine) is shown in the figure, and that even not in situ, the work of the boy has not been represented here.

80. Silk-twisters are called chambuliās, and there is a Chambuliā-pārā, or silk-twisters' quarter at Berhampore. They are either Hindus or Muhammadans—usually the latter. There are chambuliās also at Baluchur, Jangipur, and Shibganj. Their total number is perhaps less than 1,000. In social position they occupy a place intermediate between weavers and spinners, that is, they are considered better off than spinners, but not so well off as weavers.

81. In Bogra and other districts, where the number of weavers is comparatively small, a separate Chambuliā class does not exist, and the twisting is done by each weaver on his own account. The processes of unwinding and throwing are thus described in the Bogra Monograph:

"After purchasing the thread the weaver puts the skein on to a big cīrkhā, mounted on two upright posts fixed on a block of wood, so that it may turn on the reel, which is now horizontal, without anybody holding it.

"The weaver then rolls off the thread on to lātāi. If the cloth to be woven be very fine, the threads are not joined: otherwise two or three such reels are suspended from the ceiling of the house according to the thickness of the thread required. The operator sitting below takes down the ends of the threads, and joins them so as to form one thread. This joint thread is then twisted with the right hand on the left forearm. As the process goes on
the operator keeps the prepared thread on a thing called *Khatia* (fig. 9), which consists merely of two small upright posts fixed on a block of wood. The thread is arranged on this in the shape of an elongated 8.
PART III.
THE SILK-WEAVING INDUSTRY.

CHAPTER VIII.

SILK-WEAVERS.

82. It is best to deal with this subject district by district after discussing the common features of the industry in the different districts of Bengal.

83. Weavers are more wholly dependent on weaving than spinners on spinning, or cocoon-rearers on cocoon-rearing. About half the cocoon-rearers of Bengal are also cultivators in the ordinary sense. It is only the old caste of Pundari, who more or less depend exclusively on cocoon-rearing. Carders and spinners are usually too poor to own land, and when they are not spinning mačkā or working in fluteries, they are usually employed as servants or labourers. But there are scarcely an eighth part of weavers owning land, and they belong to a grade of Hindu society (when they are Hindus) in which working as servants or labourers is considered degrading. Muhammadan weavers, called jugis or jolas, are more independent in this matter, but even they cannot help imitating Hindus in this as in many other social customs. Weavers are considered superiors to cultivators in social position, and a family of weavers will suffer a great deal of privation and incur a good deal of debt before it chooses the lower position in society. Families of weavers struggling away for two or three generations and yet pursuing their calling is an ordinary affair in the silk districts. But silk-weavers as a class are far more prosperous than cotton-weavers, though in the districts where silk-weaving is not a speciality silk-weaving and cotton-weaving are pursued indifferently by the same families, as occasion arises, the same looms being used for both purposes. Silk-weaving proper is done in all the districts by adult males, but women and children assist them in preparing the thread and fixing the warp.

84. Weavers are usually their own dealers, that is, when a number of pieces accumulate on their hands they take them to the nearest towns for sale, and what they cannot dispose of in this way, they take to their mahajans or money-lenders by way of part-payment of their debts. The mahajans are well acquainted with the prices of yarn, the cost of bleaching, dyeing and weaving, and they acquire the pieces at cost price after a most detailed calculation. Besides getting silks cheap, they charge the weavers heavy rates of interest—12 to 36 per cent. per annum. The progress of the silk-weaving industry, as of many other industries in Bengal, is greatly impeded by the grabbing policy of rich money-lenders, who get all the good out of an industry, leaving the actual workers poor. But in silk-weaving there is fortunately another class to be reckoned with, viz., the silk merchants, European and native. Mahajans are indifferent whether they are paid back in money or in kind, and they are no more interested in silks than in jewellery, or in grain, or in land. They are utterly indifferent if their grabbing policy only results in the decay of a particular industry. There will be people always ready to borrow money, whatever they may pledge against the loan, and nothing comes amiss to the mahajans. The silk merchants, on the other hand, are interested in the welfare of the silk industry, and they pursue a more liberal policy. They make advances of money, buy articles at more reasonable prices, and they compete one against another to the benefit of weavers. At Berhampore, Rampur Boalia, and English Bazar, there are many rich silk merchants who keep up regular places of business, and make purchases for various parts of India and also for foreign countries.

85. There is one well-known family of actual silk-weavers at Berhampore—the family of Tanti Ram Babu, who are now zamindars and also exporters of silk. Babu Shoshi Bhushan Chowdhury is the present representative of this family. Rai Mukunda Lal Barman Bahadur, who died lately, was also a rich silk merchant of Berhampore. His firm deals principally with the
Mahratta country. The French firm of Messrs. Louis, Payen & Co. also deals in silk piece-goods. I have known one very talented weaver (Mrityunjoy Sarkar of Gankar-Mirzapur) rising from the ranks within the last 13 years and aspiring to the position of a silk merchant until death removed him also from the field of competition. In 1887, when I first knew him, he was a servant of Joykisto Mandal, getting Rs. 6 a month, but when he died the other day he left a brick-built two-storied house behind him. Other Mirzapur weavers recognised him as their master, as he was the means of introducing many improvements in the silk-weaving industry of the Jangipur centre. The caste system viewed in the light of trade-guild is a great lever for industrial improvements in this country, and any system of technical education that may be introduced in the country should fully utilize the existing system.

86. In Murshidabad about 15,000 persons depend on silk-weaving, and there are over 2,500 looms at work. Most of the Murshidabad weavers are Hindus, and the majority belong to the Tanti caste. There are also some Kaubartas, Vaishnavas, Mala, Bagdits, Chandals, and Muhammadan jugs engaged in this industry. Dubraj, the most famous weaver of this district, who also died within the last four years, belonged to the Chamar caste, and he actually began life as a maker of tom-toms or native drums and other articles in which leather or skin is employed. He then changed his profession entirely and became the leader of a gang of impromptu singers (kabie). Though he could neither read nor write, he was able to compose verses impromptu. Later in life he became apprenticed with a famous Muhammadan weaver of Baluchar, who knew the art of constructing looms for bringing out figured patterns; and Dubraj was the only master-weaver in this department of the industry until death removed his most interesting figure from the recent agricultural history of this district. But Dubraj’s case is an exception rather than the rule. Families of weavers adhere to their ancestral occupation in Murshidabad as elsewhere. If Dubraj had belonged to the weaver caste, there would have been no occasion for any anxiety that his art should not die with him. The majority of weavers in this district belong to what may be termed “the intermediate class,” a large number to the lowest, but none to the highest, with the sole exception of Tanti Ram Babu’s family. In their house also the family traditions are kept up, and here a number of looms may be always seen at work. The other native silk merchants of Berhampore are not weavers, but only exporters. These are S. S. Bagchi, Durga Sankar Bhattacharjya, Kalidas Premji, Dharmraj Kanji, and Gopakdas Makundalal (to which firm the late Rai Makundalal Barman Bahadur belonged). Though some of these call themselves silk manufacturers, they are really silk-dealers or brokers. S. S. Bagchi, the winner of the Gold Medal, at the International Exhibition of Paris, does some amount of directing, which has resulted in the improvements which have characterised the recent years, the silk weaving industry of Jangipur.

87. There are many weavers in the district who employ their fellow-caste-men on a system of contract. They each keep 40 or 50 families of weavers employed, and they exercise a kind of supervision over the actual work of these families, with the object of keeping up their own reputation for the quality of their goods. Joykisto Mandal of Gankar-Mirzapur and Batakrisna Ram of Islampur-chak are weavers of this class. These also in time are likely to be reckoned as silk merchants, like Babu Shoshi Bhushan Chowdhury of Berhampore. Besides Berhampore, Mirzapur, and Islampur, there is another recognised silk-weaving circle in Murshidabad, viz., Baluchar. There is no substantial weaver in this circle, though Dubraj, the most ingenious weaver of the district (but a poor man), belonged to it. The persons who are recognised as the silk merchants of this circle are Bisen Chand Babu and Khetu Babu. They are not silk merchants properly so called, but they add ordinary mahajan business, which all rich Jains more or less delight in, to their function as silk-exporters. This is one cause of the low condition of the Baluchar silk industry. Another reason for the Baluchar weavers not getting on as well now as they did in times gone by, is the change in public taste. The figured saris, etc., of Baluchar were at one time very fashionable, but now they are rather despised as being ugly and unsuitable for personal wear; and as they are far more expensive than phulkari of the Punjab, they cannot be used for mere decorative purposes. The silks known as ‘Baluchar silks’ are not actually woven
at Baluchur, and there are no weavers at Baluchur. The weavers live in the
neighbouring villages of Bahadurpur (where Dubraj had his looms), Amnī-para,
Ranmā-para, Ram-dahar, Baligrām, Bag-dahar, Belia-pokhar, Am-dahar, and
Ram-sagar. As the Mīrzapur (Jangipur) silk-weaving industry is in a
comparatively flourishing condition, weavers of the Baluchur circle are gradually
giving up weaving of figured fabrics and taking to weaving plain and check
fabrics in imitation of Jangipur weavers. This is a good policy under existing
circumstances, however much the death of the artistic weaving of Murshidabad
with the master-weaver, Dubraj, may be deplored. The weavers of the
Gankar-Mīrzapur (Jangipur) circle are better off than the weavers of any other
part of Murshidabad. Next to them come the weavers of the Islampur-chak
circle. Next come the weavers of the Berham pore circle, and last of all the
weavers of the Baluchur circle. But the matkā weavers of the Berhampore
circle are the poorest of all. They live in two villages—Goaljan and Neya-
līshpārā—across the river, opposite Berhampore. The average earnings of an
adult male weaver are from Rs. 8 to Rs. 15 per month, and of a woman or child
about Rs. 4, these last getting food in addition. In the Baluchur system of
weaving figured silks, children are largely employed to assist weavers; a man
and a boy being required to weave a piece of figured silk, while other kinds of
fabrics are woven by a single person. Mr. A. R. Edwards, Assistant
Collector of Murshidabad, who wrote the district monograph of Murshidabad, says:

“A weaver, whose cottage I visited, told me that he can earn about 6 annas a day,
and his boy about 4 annas, but there are times at which he can get no work. Another said
he professed to have a piece of work which took him one and-a-half days to finish amounted to 6 annas.
There is no doubt that as a class their condition is not prosperous, and that they are deeply
involved in debt. They do not, as a rule, work for themselves, but for dealers who advance
them material and pay them so much for their labour. Some of these dealers employ a very
large number of weavers. I am told in Kandi subdivision some weavers found the industry
so unprofitable that they have entirely given it up and in many cases taken to agriculture.
Others in the same subdivision have abandoned the weaving of silk for that of cotton. At
present the price of cotton yarn is low and the demand for goods fairly great, so that industry
is found to be more paying.”

88. These remarks, though probably applicable to the matkā weavers of Goaljan and Neyalīshpārā, and weavers of figured fabrics of Baluchur,
or to the few silk-weavers who are found in the Kandi subdivision, do not apply to the
great body of Murshidabad weavers, who are on the whole,
prosperous, many living in brick-built houses. The matkā weavers also
have constant occupation; and though the profits of their rude industry are
very small, and though very few own lands, they are an independent class of men.
In famine times, however, matkā weavers (who being landless buy food-grains)
suffer very much owing to the smallness of their income, and being weavers
they are ashamed to dig or to work as field-labourers, or to earn famine-wages
by twisting jute-string. The average income of Rs. 8 to Rs. 15 per month,
specially when women and children can earn separate wages is considered a
good income in this country, and as a class, therefore, silk-weavers cannot be
regarded as indigent.

Hooghly.

89. The following extracts from the Hooghly report give an idea of the existing status of the
silk-weavers of that district:

“In the Census of 1891 the workers and dealers in silk fabrics were returned at 505 for
the district. As no silk and tanār fabrics are manufactured in any part of the district outside
the Jahanabad subdivision, the figure represents the manufacturers of that subdivision.”

“The decline in the silk trade has been to some extent compensated by the gradual
extension of the tanār industry to the western part of the subdivision, which borders on the
subdivision of Ghatal (Midnapore) and Bishnupore (Bankura), which are noted for tanār
manufacturers.”

“About 210 people of the Tanti caste are engaged in the silk industry proper, the rest
in the tanār industry.”

“The silk industry in this subdivision has its centre at Bali. There are at present only
seven firms (tutuśa) or individual dealers, five of the tutuśa or wholesale shops being owned
by bunnias of Agra and the Punjab.”

“The only kind of silk fabric manufactured is ranj-in-kapar, or coloured silk, which is
made for export to the Punjab.

“These wholesale dealers are only agents of, or order-suppliers to, up-country firms, and
receive a commission at the rate of two per cent., payment being made on arrival of goods
at destination. It is said that camels were formerly sent by the Punjab merchants for this traffic."

"It is estimated roughly that goods to the value of Rs. 40,000 are annually sold by
the agents or middlemen to the up-country merchants."

"The fabrics made at Bail are now used only on marriage and ceremonial occasions.
It is said that only three years ago, when there was an unusually long akal or prohibited
season for marriages in the Punjab, there was a serious depression of the industry here."

"The Tantis depend almost entirely on the product of the loom, and very few of them
possess agricultural lands. Several families have emigrated to and have settled in Calcutta."

90. In Burdwan, the average wages of a weaver are said to be Rs. 8 to Rs. 12 per month, and it goes up sometimes to Rs. 15. The silk-weavers of Burdwan may also therefore be said to be in fairly easy circumstances. The following extract from the Burdwan report will be found interesting in connection with the question of the income and social position of silk-weavers:

"The yarn costs about Rs. 15 to Rs. 18 a seer. This is manufactured into articles which
sell at the rate of Rs. 8 or Rs. 9 a piece of 10 cubits, of which 24 to 31 pieces can be manufact-
ured in a month. Thus Rs. 20 to Rs. 27 would be the gross income per month to make 24
to 31 pieces; Rs. 12 or Rs. 13 worth of yarn would be used, and thus the average net income,
would be Rs. 8 to Rs. 12 a month. Garad silk requires more skill and care than tanur silk
but the wages obtained are quite as high. The cocoon cost Rs. 12, and Rs. 2 go to the
women for making the yarn, and there are incidental expenses for dyeing, etc., which make
the cost about Rs. 15 a seer, which is about the same as for garad silk. The same quantity is
woven, and pieces 7 cubits long are turned out to the number of three to four per month.
Thus the wages vary between much the same limits. It is said that a thoroughly energetic
and skilful man could make Rs. 15 a month, but, on the other hand, the ordinary weaver's
wages are nearer the lower limit than the higher.

"The caste rank of the weavers is, as has already been said, fairly high, being inferior
only to Brahmins, Baidys, and Kayasths. Financtally their position is not very high, and
is sinking along with their industry. Some families, e.g., the Bani Shana families of
Memari are wealthy, but their position is not due to the silk trade, but to outside
causes."

91. In the silk districts proper (Mushidabad, Rajshahi, Maldah, Birbhum,
and Midnapore), the yarn does not cost Rs. 15 to Rs. 16 a seer, but only Rs. 10
to Rs. 12, and the sari and other 10-cubit pieces turned out by the best
weavers of Mushidabad sell not for Rs. 8 or Rs. 9 per piece, but for Rs. 13
to Rs. 15. The profits of the best Mushidabad weavers are therefore larger.

92. The condition of Midnapore silk-weavers is, however, deplorable. Mid-
napore silk fabrics have not the same reputation as Jangipur silks, and fabrics almost of the same
quality can be had very much cheaper at Chandrakona (Ghatal) than at Mirzapore (Jangipore). The profits of the Midnapore silk-industry are therefore less, though there being a fairly large number of weavers concentrated in two
villages, the competition is great. The monograph from this district has the following
remarks on the condition of silk-weavers:

"In Ghatal thana men of the Kaitara caste, numbering about 200, and in Deopore
than those of the weaving (Tanti), Suari, Vaishnava, and other castes, numbering about
700 in all, work in silk. They are not in prosperous circumstances, as the industry is
decreasing."

93. The Birbhum report has the following
remarks on this subject:

"About 300 or 400 families in this district have taken up this industry for their livelihood.
Most of them come from Beswa (Bishnupur), Magram, and some petty villages
round Gomhatia Silk Factory and other petty villages scattered over many parts of the
district. The manufacturers generally come from the following classes:—(1) Tanti, (2) Fugi,
(3) Jolib, and some Dhopas in villages Rajpur and Mirzapore in Bolpur thana.
The caste employed in this business are regarded as coming between the artisan caste
and the labouring castes. Their social position is, therefore, an inferior one. Their
industrial position is gradually falling, as the business seems to have been in a declining
condition."

Birbhum-made silks being of an inferior quality to Mushidabad and
Midnapore-made silks, the profits of the Birbhum silk-weavers are less.

94. In Bankura, however, silk-weavers are better off. There is more local
demand for Vishnupore (Bankura) and Memari
(Burdwan) silks than for Birbhum silks, as the
quality of the former is superior. "At Vishnupur," says the district monograph, "there are about 60 families engaged in the manufacture of silk fabrics. Of these, 6 belong to the Rajak (washerman) caste; the rest are all Tantis."

95. In Bogra there are only about a dozen silk-weavers properly so-called. The Bogra silk has only a local demand, not sufficient to keep even these few weavers fully occupied. They are, however, considered of good social position. They take pride in their work, and they do not let their women go out to work, which is a sign of respectability.

96. 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 famous Mirungle or Dakra matkās. Some of these are made so fine that they look like fabrics made out of reeled silk. Khamru silk is occasionally mixed with matkā thread for turning out matkās of superior quality. The weavers are mostly Tantis. Mr. H. L. Salkeld, Assistant Collector of Rajshahi, writes in the monograph furnished by him:—

"There are very few Musalman silk-weavers in this district. I have only heard of one at Paikpara, police-station Lalpur, in the course of my enquiries; but in cotton-weaving many are engaged. Silk-weaving on a small scale, by one person, seems to be combined with other occupations."

97. The Maldah monograph has the following remarks on this subject:—

"In Maldah there are over 2,500 silk-weavers. The weavers are all Tantis by caste. They are not badly off. Muhammadans have lately taken to silk-weaving in this district."

CHAPTER IX.

SILK FABRICS.

98. It will be best to treat this subject also district by district. The largest variety of silks is woven in the district of Murshidabad, which is the heart of the silk-weaving industry of Bengal. The fabrics woven in the other districts of Bengal have their counterpart in Murshidabad, except a class of fabrics woven in Maldah, but now almost defunct. No specimens of these Maldah fabrics have been supplied with the district monograph, and I have not any of these in my own collection. A fuller description of Murshidabad silk fabrics may precede the mere enumeration of the fabrics in the other districts. The only district monograph accompanied with samples of fabrics is the one from Manbhur. With the exception of the seven samples of Tussar from Manbhur, shown in the sample sheets, all the samples shown at the end of this chapter are from my private collection obtained principally from the district of Murshidabad. The Murshidabad silk fabrics have been thus fairly well illustrated, which is another reason for dealing with them first.

99. Murshidabad. — The principal types of Murshidabad silk fabrics are—

Class A. — Fabrics made with ordinary looms, such as may be used for weaving cotton cloths also. Under this class come—

1st. — Plain fabrics, either bleached, unbleached or dyed.
2nd. — Striped fabrics.
3rd. — Checks.
4th. — Bordered fabrics.
5th. — Printed fabrics.
6th. — Banous.

Class B. — Fabrics made with nakaha loom for weaving figured silks.

Class C. — Embroidered and other hand-worked fabrics.

Class A (1st) — Plain fabrics are usually made with khamru silk and rarely with filature-made silk. Matka silk is also made use of for special purposes. Mirzapore (Jangipur) weavers usually obtain Maldah khamru, and sometimes very high-class native filature-reeled Dhali or Barapalu silk. The best
fabrics are made of this latter kind of silk. The following silk fabrics fall under this class:

(1) **Gown-pieces.**—The raw-silk used for gown-pieces is twisted and bleached and sometimes dyed before weaving. White gown-pieces are woven in four different styles—(a) plain, (b) twill or drilled (terchi or dt-palti), (c) striped, and (d) checked. Coloured gown-pieces are usually made either plain or drill. The dimensions are usually 10 yards x 42 inches. Sometimes the width is made 44 inches, 45 inches, or even 54 inches. The price of gown-pieces varies from Rs. 12 to Rs. 40 per piece. An extra thick gown-piece, 10 yards x 42 inches, made out of filature-reeled Barapalu silk, is valued at Rs. 45 or even Rs. 50. The cheaper kinds are made of untwisted thread, and should be styled coraha rather than gown-pieces. The only difference between a coraha and a gown-piece made of untwisted thread is, that for the latter bleached thread is used, while for the former unbleached thread, i.e., raw silk as it comes from the ghai, is used.

The specimens of gown-pieces illustrated in the specimen sheets at the end of this chapter are—

1. An extra thick twill gown-piece, 12 yards x 54 inches (Rs. 50).
2. Thinner gown-piece, 10 yards x 40 inches (Rs. 23).
3. An extra thick plain gown-piece, 10 yards x 42 inches (Rs. 45).
4. Ordinary gown-piece of superior quality, made of dhali silk, 10 yards x 40 inches (Rs. 25).
5. Dhali gown-piece, somewhat inferior, 10 yards x 40 inches (Rs. 20).
6. Lali gown-piece, 10 yards x 40 inches, superior quality (Rs. 26).
7. Ditto, inferior quality, heavily starched (Rs. 14).
8. Plain striped gown-piece, 10 yards x 40 inches (Rs. 23).
9. Twilled and striped gown-piece, 10 yards x 40 inches (Rs. 34).
10. Twill gown-piece, maurnamthi colour, 10 yards x 40 inches (Rs. 35).
11. Plain gown-piece, red colour, 10 yards x 40 inches (Rs. 25).
12. Twill gown-piece, cheap quality, grey colour, 10 yards x 40 inches (Rs. 22).
13. Twill gown-piece, slightly superior quality (Rs. 28).
14. Plain grey gown-piece, 10 yards x 40 inches (Rs. 22).
15. Plain gown-piece, black, i.e., deep indigo colour, 10 yards x 40 inches (Rs. 26).

Gown-pieces are in use among European ladies for making dresses and by Bengali gentlemen for making coats, chapkans, and chogas.

(2) **Corahs.**—These are the cheapest silk fabrics which form the staples of export to Europe, where they are used mainly for lining purposes. Corahs are generally woven 7 yards x 1 yard, and sold at a rupee per square yard. They are made out of unbleached and untwisted thread, and are bleached in the piece after they are woven. Corahs are also woven 10 yards x 42 inches like ordinary gown-pieces, and worn as sares by widows. Like gown-pieces corahs are valued by the number of warp threads (called shand), 2,400 warp threads per yard making the best gown-pieces and corahs, while 1,200 or 1,000 warp threads per yard makes the poorest gown-pieces and corahs. The price of corahs varies from 8 annas to Re. 1.8 per square yard. A sample of corah shown in the sample sheet (No. 16) which is cut out of a piece of 1,700 shand corah, 7 yards x 1 yard, is valued at only Rs. 5.8 per piece. High-class corahs are used for making ladies' blouse-jackets and other garments usually after dyeing.

(3) **Silk muslins or handi pieces are very fine fabrics made with filature-reeled dhali silk. Handi chadars, handi dure (No. 18 of illustration sheets) pieces, as well as plain handi pieces or malhads, are illustrated here (No. 17 of the illustration sheets). This last
was originally cut out of a 10 yards × 40 inches piece, valued at only Rs. 10. It is excellently adapted for trimming ladies' hats and for other similar purposes. Silk muslins are locally used by rich men for making shirts, coats, or chapkans which they wear in the hot weather, kalmuri saris being similarly used in the season. It is only highly skilled silk weavers who can turn out superior silk muslins. The best silk muslin weaver at present is not a Murshidabad, but a Mymensingh man. The weaver of Murshidabad who was able to weave as good silk muslin as this Mymensingh weaver, died about 10 years ago, and no one has been able as yet to exactly fill his place in this district.

(4) Handkerchiefs.—These are made either with twisted yarn or with raw-silk. Handkerchiefs are sometimes made with dark blue or red borders. A high-class Mirzapur handkerchief 2 feet × 2 feet costs a rupee. Poor khām handkerchiefs 15 inches square may be had for 4 annas each.

(5) Atwals or thick chaddars are usually worn double by Bengali gentlemen of means. Each chadder is 3 yards long and 1½ or 1¼ yards wide. They are as a rule twilled, and sometimes they are coloured. The price varies from Rs. 25 to Rs. 35 per pair. An ornamental bordered atwal first woven for Maharaja Sir Jotendra Mohan Tagore by Mrityunjay Sarkar of Mirzapur now sells for Rs. 50 a pair.

(6) Plain white dhutis and jōrs (i.e., dhutis and chaddars woven in the same piece, alternately) have a considerable sale throughout Bengal, as they are required for ceremonial purposes. The father of a bride or bridegroom wears a jōr at the marriage ceremony of his child. High-class priests also wear jōrs. Jōrs are worn at the smrta (funeral feast) ceremony also. Plain white dhutis are worn by rich widows when they go to see their friends. A jōr usually costs Rs. 16, and a dhuri Rs. 8 to Rs. 10. The length of a dhuri is 10 cubits and of a jōr 15 cubits, and the width 45 inches.

(7) Mekhdas.—These are a special kind of corah which are exported to Assam. They are converted into women's skirts, sometimes after being embroidered with gold thread.

(8) Mārkhas.—Mārkha dhutis and saris made in Murshidabad are much coarser than those made in Rajshahi. They are largely exported to the Mahratta country, but locally they are also worn by elderly men, by widows, and by the poor women of the villages where they are woven. They are made 4 to 6 yards long and 40 to 45 inches wide, and they can be had for Rs. 3 to Rs. 5 per piece. They are also woven into the chadder size (6 yards × 1½ yard), and in this state exported to Assam. Locally these chaddars are worn dyed to a very limited extent.

(9) Māthā and khammu yarns are sometimes used mixed, i.e., twisted khammu silk going to make the warp and the māthā silk going to make the weft, for weaving thick pieces suitable for making men's suits. These are sold for about Rs. 2 a yard. The samples (Nos. 19 and 20) illustrate two styles of these mixed fabrics—one plain and the other twilled and striped (i.e., of khorā-chhāri pattern).

(10) Imitation Assam silks.—These were introduced in this district by the writer of this Monograph, in connection with the famine operations of 1897. About 150 families of poor māthā-weavers came for relief, and the only kind of work they were capable of was coarse weaving. About Rs. 11,000 were spent for their relief, including cost of materials, and the fabrics they were made to weave realised by sale about Rs. 10,000. Messrs. Whiteway, Laidlaw & Co. patronised these silks largely, and they have since become very popular. About Rs. 50,000 worth of these silks are now exported annually from Berhampore, and the importance which this new industry has already achieved is locally a well-recognised fact, and it has given rise to a hope
that under a fostering care the silk-weaving industry of Bengal may be developed in other directions also. These imitation Assam silks, or Murshidabad Endies, as they are now called, are sold specially by one Berhampore firm (S. S. Bagchi & Co.), and the samples shown (No. 21 to No. 31) are taken from their pattern-book. The pieces are usually made 7 yards x 27 inches, as originally advised by Messrs. Whiteway, Laidlaw & Co., and they are sold for Rs. 6 or Rs. 7 per piece. They are just sufficient for making one ordinary suit of clothes. They are also woven double the width. Sample No. 26 (valued at Rs. 9) and sample No. 31 (valued at Rs. 14) are exceedingly pretty, and they show what Murshidabad weavers can do out of waste silk.

Class A (2nd) — Striped Fabrics. — Gown-pieces with coloured stripes are made in two styles, called respectively rekhis and dharis. Rekhis are plain white or coloured gown-pieces (usually 10 yards x 40 inches) with some dark-coloured lines or double lines as per illustrations (Nos. 63 to 66). The ground of rekhis may be either plain (Nos. 63 to 65) or twill (No. 66, a to e). Dharis have broader stripes, usually of more than one colour. According to the colour of the widest stripe a dhar may be either (a) red, (b) yellow, (c) green, (d) purple, or (e) handmade (chocolate coloured). These five standard kinds of dhari are woven for the Arabian market, one of which is represented by specimen No. 93. The kind of dhar appreciated locally is not so highly coloured (see specimen No. 61). Like rekhis, dharis are woven in 10 yards x 40 inches, and are sold for Rs. 16 to Rs. 18 or Rs. 23 to Rs. 25 per piece; the heavily-starched, high-coloured pieces being sold cheaper, while the thick-woven, lighter-coloured pieces made for the local market are sold for the higher price.

Class A (3rd) — Checks are divided into five kinds of fabrics:

1. Charkhândas or checks where the squares or oblongs are all of diverse colour. These, like rekhis and dharis, are made in two styles — one suited to Arab taste, and the other suited to local taste. The former (called chautkârdas) are more highly coloured and heavily starched, and are cheaper fabrics, sold for Rs. 18 to Rs. 19 per piece, while the latter are closer woven superior fabrics, sold for about Rs. 25 a piece. Two samples (Nos. 57 and 58) of the kind of chautkârdas made for the Arabian market, and twelve of those charkhândas (Nos. 51 to 66) made for the local market are shown in the sample sheets for illustration. Fine flimsy checks of the latter style (No. 55) are woven in the Baluchari circle for the use of Jain ladies and Jain children of Baluchari and Azimgunge, who are habitually to be seen in kurtas and pajâms made of such cheap silk. They are made 40 inches wide and are sold for Rs. 1-8 per yard. These fine and flimsy checks used to be made at Chandrakona and other villages in the Jahanabad subdivision of Hooghly, and the Baluchari weavers have simply taken over the Jahanabad industry.

2. Charkhândas or checks, which consist of white ground and coloured square outlines, the squares being of various sizes as in the previous case. The lines are either double, triple, or single, and the ground is either plain or twill (see samples Nos. 37 to 32). The dimensions and prices are the same as in the previous case, i.e., they are usually made 10 yards x 40 inches, and priced Rs. 20 to Rs. 40 per piece.

3. Matrâs. — These are of a standard Arabic pattern, like dharis, rekhis, and chautkârdas. They are striped like dharis, but all along the edges of the stripes are studded rows of little squares or oblongs. The dimensions are the same as in dharis, rekhis and chautkârdas. Matrâs exported to Arabia cost a rupee more than the other styles also made for the Arabian market.
(4) Phulikhát checks—illustrated by sample No. 68, are woven for the Rangoon market. The lines are white and the ground is either red, or yellow, or green, or purple, or brownish (chocolate), which are the five standard colours for the goods that are exported. Phulikhát checks are considered suitable only for handkerchiefs. They are made a yard square, and 15 are woven together, which cost about Rs. 19.

(5) Check matkás (No. 67) are a very coarse class of fabrics woven for the Maharatta country. A check matká sari 8½ yards long and 45 inches wide may be had for Rs. 5 or Rs. 6. The trade with the Maharatta country in plain and check matkás is pretty extensive.

Class A (4th).—Bordered fabrics.—The demand for Murshidabad bordered saris, dhoris, jōrs, chelis, and matkás, is very considerable. The upper middle classes of Bengal patronise these fabrics very largely, and chelis and matkás are in demand among the lower middle classes also. The price of a sari of two or three borders, varies from Rs. 10 to Rs. 18. White silk saris made out of dhani silk, with dhākkā tāj pār or border, of kantea-orange colour, are considered very fashionable by Bengali ladies. A sari with spotted ground (No. 91a) has been recently produced by Mrityunjoy, which is sold at Rs. 30 a piece. This is the very best fabric produced in Murshidabad. But tāj pār, kālāpār, pādmanāpār, and bhoomapār saris with plain white ground are the common styles in use. Dhāni kālāpār, phitāpār, ghanāpār, and charāpār are the common styles of border adopted for men's dhutis. The sari represented by sample No. 91 is a three-bordered kālāpār sari. Number 90 illustrates what is called "Dhakka" border. The borders of dhutis are made narrower, and there are never three but always two borders at the two edges. Number 64 illustrates a kānspār dhuti. Silk saris and dhutis when they have coloured grounds are called chelis. Chelis of very dimny texture have a large sale. They are used for making ceremonial presents at various religious festivals. Bhāris also use cheap chelis for making ceremonial presents in celebrating funeral rites. A yard-square piece of cheli of this sort may be had for Rs. 1-10 to Rs. 2, and when it is considered that the material used is pure silk, the worthlessness of the stuff can be very well imagined. A cheli jōr (i.e., dhuti and chadder) of superior quality, such as is worn by a Bengali bridegroom of good family, may cost as much as Rs. 25.

Regias have also coloured borders. They are sent to Assam, where they are worn by Assamese women to cover the upper part of their bodies, somewhat in the same way as chadders are worn. They are woven in the Baluchar centre. They are 4½ yards long and 22 inches wide, the two ends (anchāla) being ornamented with coloured borders. The gold embroidery of regias is done after their arrival in Assam.

Handkerchiefs are sometimes woven with coloured borders. Matká dhutis and saris are also made with black or red borders, the borders of saris being wider than those of dhutis.

Class A (5th).—Printed fabrics.—The art of printing corahas for making handkerchiefs, door-curtains, scarfs, and namabalis (or chadders containing religious texts) is almost extinct in Murshidabad. The industry has transferred itself to Scarpore and Chandernagore, though silk pieces are taken to these places from Berhampore for the purpose. The dyers of Khagra are chiefly employed in dyeing yarns, but they still do printing to special order. Samples Nos. 71 (a) and (b) illustrate the defunct printed silk handkerchiefs of Murshidabad, and sample No. 72, a printed namabali. The price of these fabrics depends on the quality of corahs used.

Class A (6th).—Bandana or bandannah (tie-and-dye silks) are dyed corahas or matkás with spots or rings, coloured or white. These spots and rings are made by tying strong knots at small distances, according to the required pattern and dyeing the pieces of corah or matká. The word "bandana" in Sanskrit means tying, which is the origin of the term bandannah.* The pieces after patient

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* In his paper on "Art as Applied to the Weaving and Printing of Textile Fabrics," Sir Thomas Wardle, in speaking of the tie-and-dye work, says: "It is extensively practised in India, particularly in Jeyapore and Umar. It was the precursor of printing in the silk handkerchief trade in Odonti and Berhampore, and is a very remarkable means of producing designs in spots, round, oval or square, and plaids."
knotting are dyed and washed and dried, and the knots loosened. White spots or rings are formed at the points where the knots were made. When coloured spots or rings are desired, the strings with which the knots are made are first dyed in that particular colour before the tying of the knots. The colour of the strings is imprinted on the cloth at the points where the knots are made. Pieces with rings instead of spots are called churis. When the rings are small and close together they are called matechurs. Skirts and turbans are made of these materials, and there is a considerable trade with the North-Western Provinces and the Punjab in bánkus and churis. The price of a piece depends entirely on the quality of córah or mahtá used, about 5 annas per piece being added for the dyeing process. Sample No. 69 represents a churi and sample No. 70 a bánku with square spots.

Class B.—Fabrics made with nakshá-looms.

1st. Under this class we have first of all the Baluchur butedár sarí. These sarís with ornamental ground, ornamental border, ornamental corner figures (called kunjas), and a more highly ornamental end-piece or ančhíka, were at one time very highly prized by the upper middle class people of Bengal. Now the ladies of this class go in for the more costly fabrics of Benares. The ordinary Baluchur butedár sarí is rather an ugly fabric to use for personal decoration (No. 92), but some are very neatly made and deserve encouragement (e.g., No. 93). These sarís are made 10 cubits long and 42 to 45 inches wide. The price varies according to quality from Rs. 10 to Rs. 50. For the cheaper articles untwisted and ill-sorted raw silk is used; the numbr of threads used for the warp is also less, the weft is loosely woven, the dyes used are fugitive, and the appearance is maintained by heavy starching, sugar being mixed with the starch used to add to the gloss. A cheap Baluchur butedár sarí can be woven in a week, but a valuable one takes three or four months weaving. Sometimes these sarís are made without ančhíka, but only with four kaláus or kunjas (conventional lotus buds) at the four corners. Such sarís of the same size are somewhat cheaper (Rs. 8 to Rs. 40 instead of Rs. 10 to Rs. 50).

2nd. Rumals (square shawls) and shawls with ornamental borders and corners, in imitation of Kashmir rumals and shawls, are occasionally made to order. Table-cloths (No. 94a) are also turned out from nakshá-looms. The ground is of twilled pattern and white, the ornaments either grey or more highly coloured. The shawls are made 6 cubits long and 8 cubits wide, and the price asked is Rs. 40 or Rs. 50, there being no inferior articles of this class in demand. The high-class sarís, rumals, shawls, and table-covers used to be woven until lately by only one man in the district, or rather the looms turning out these could have been set only by Dubraj, the weaving being done by others working under Dubraj's direction. Dubraj would not set looms for making these high-class fabrics for any one else. He used also to weave at one time shawls with religious texts in the place of the ground ornament, but he gave up this work in his old age, as the operation of weaving required that the cloth-beam should be below the navel, which is considered a sacrilege when one is dealing with a cloth containing religious texts.

3rd. Sáraí and sashes (No. 94) were also woven by Dubraj to order. The width of these is always 1 foot, and the price varies with the length, a rupee being charged for every foot of length. The quality of silk (which is twill) is the same, and there is no variation made in the price. Dubraj's loom for weaving sashes has been acquired by the Rampur Boalín Séercial School, and it is in working order and actually in use in this school. The products of Dubraj's looms are inferior only to the best products of Kashmir and Benares looms. The competition with Kashmir products would not affect the sale of these, as rich
men who use Kashmir shawls and scarfs in the cold weather could use Dubraj's shawls and scarfs in warmer weather, as locally they are so used. But the competition with Benares gold-embroidered sari, shawls, etc., is too strong even for Dubraj's goods. A Hindu lady who can afford to wear a Benares sari will not look at even a high-class Baluchar sari on high days and holidays. One thing, however, should be mentioned in favour of these ornamental silks. They stand any amount of washing which Benares goods do not. It is too late, however, to think of reviving the industry of weaving ornamental silk fabrics, as the only man who could be used as a lever to uplift the industry is now dead. The Society for the Promotion of Indian Arts in London interested itself in the matter and raised some money also, but the local people were extremely aesthetic and the scheme fell through. The only hope of reviving the art now rests on the fact that Dubraj's looms are still in existence.

Class C. Embroidered and other hand-worked fabrics.—Embroidering on silk is chiefly done in rich Jain families and also in some Muhammadan houses for domestic purposes. The few professional embroiderers there are in the district live in City Murshidabad, and they come to Baluchar for embroidering regias and mekhlas that are exported to Assam. A piece of embroidered regia or mehla costs Rs. 40 to Rs. 50. Foreign silks, satin, and velvet are usually chosen by Jain and Muhammadan ladies for their domestic work, in which they often exhibit great skill and taste. Hand-embroidered wearing apparel cannot be had in the district in shops or markets; and the fabric used being usually foreign, the art need only be mentioned here.

100. Knitting of silk socks was an industry of some note in Murshidabad in the days when there were English military officers in the district. The industry is now extinct. I sent an old Murshidabad silk sock to the Economic section of the Indian Museum a few years ago. I was told the industry was confined among some poor women of Berhampore in the palmy days of Murshidabad.

101. Having now given an account of the various classes of silk fabrics woven in Murshidabad, I will now simply quote the portions of the district monographs from the other districts dealing on this subject:

102. The Hooghly monograph furnishes the following particulars regarding the silk fabrics manufactured in that district:

(1) Sagarji piece.—These stand first in point of demand. They are made of a mixture of silk and tamar warp woven with cotton thread. They are made of various lengths from 10 to 38 yards, the breadth being 1½ yard. These are used in the Punjab in making skirts and jackets and wraps for women. They are made with red and white stripes on an orange ground. They are sold for Rs. 2.8 to Rs. 35 per piece.

(2) Mulkho.—These are made of the same materials and are used for the same purposes as above. The length varies from 15 to 32 yards. The stripes are black and orange, and the price varies from Rs. 5 to Rs. 35.

(3) Selai-Khota.—Same as above, but fine black stripes on orange ground. The length varies from 15 to 30 yards and the breadth from ½ inch to 3 yards sold from Rs. 5 to Rs. 20 per piece.

(4) Phulari.—Same as above, but red phal or flowers or yellow or white ground. Size varies from 12 yards by ½ yard to 18 yards by 16 yard. These are made of silk and tamar used in the Punjab as part of the head-dress and khamman, sold from Rs. 2 to Rs. 4-8 per piece.

(5) Jarda or sugali.—These are made in red and white stripes on yellow ground. Size 10 yards by ½ yard, made of silk and tamar warp woven with cotton thread, sold at Rs. 1 per piece. Besides these, a variety called ash in red and blue checks is occasionally manufactured to order. They measure 20 yards by 1½ yard, and sell from Rs. 25 to Rs. 30 per piece."

103. In Burdwan "the silk is made into pieces with embroidered edges, and are used for dhutis, saris, chadder, naphkins, and treaks (turbans)."

104. In Bhubhan "the products which generally consist of dhutis, saris, with printed and plain borders, pieces of 10 yards and 7 yards (thuds), and handkerchiefs, are sold locally and sometimes exported to other parts of the
Province through agents. Thans (pieces 10 yards or 7 yards) are sold at 12 annas to Rs. 1-8 per yard; dhutis with ordinary borders at Rs. 6 to Rs. 10, saris at Rs. 8 to Rs. 15; handkerchiefs at Rs. 3 to Rs. 6 per dozen.

105. The various kinds of silk fabrics manufactured at Bankura and their prices are noted below:

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Price (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Fullam sari, or cloth for females with patterns of flower on them</td>
<td>10 to 20</td>
</tr>
<tr>
<td>(2) Dhuti, or cloth for male</td>
<td>0 to 12</td>
</tr>
<tr>
<td>(3) Thas, or pieces for making dresses with</td>
<td>8 per yard</td>
</tr>
<tr>
<td>(4) Comforter</td>
<td>8 each</td>
</tr>
<tr>
<td>(5) Handkerchief</td>
<td>12 each</td>
</tr>
<tr>
<td>(6) Checks of silk</td>
<td>8 per yard</td>
</tr>
</tbody>
</table>

106. The Bogra monograph gives fuller information on this subject:

"The kinds of silk fabrics manufactured in this district are very limited. The Tantis weave mostly dhutis and chaddars. The other kinds of fabrics are handkerchiefs, thans or pieces for making coats, chapkans, etc., and okawans.

"The things woven are all plain. No ornamentation can be worked in the body of the fabric. Only one weaver knows how to prepare ornamented borders. His name is Maul Tanti of Malatinagar. I have seen him weave Kalkapar dhutis. The Tantis do not dye the fabrics; all fabrics are sold white. Some dhutis are woven with their borders coloured. But the threads for these borders are generally brought from Calcutta. The Tantis do not know how to make fast dyes.

"Of the silk fabrics, we shall first take up dhutis. These are woven either with dyed or with plain borders. There is practically no difference in price between a dhutis with coloured border and one with plain border. Garad dhutis are preferred by Hindus for wearing when sitting at prayers or for worship. Men and widows use dhutis with plain borders, while married women use dhutis with coloured borders. None but Hindus wear garad dhutis.

"A dhuti is generally of the following dimensions:—9½ cubits long x 2¼ cubits wide. The price varies from Rs. 9 to Rs. 12 per dhuti. The thread required for each dhuti will be about 6 chitaks.

<table>
<thead>
<tr>
<th>Description</th>
<th>Price (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price at the rate of Rs. 14 per seer</td>
<td>5 4 0</td>
</tr>
<tr>
<td>Cost of extra labour in preparing the thread for dhutis</td>
<td>0 9 0</td>
</tr>
<tr>
<td>Price of a dhuti</td>
<td>5 13 0</td>
</tr>
<tr>
<td>Margin for the weaver</td>
<td>5 3 0</td>
</tr>
</tbody>
</table>

"A dhuti can be woven this way in eight days. But the weaver will require the labour of another man throughout—generally a member of his family.

"This will give a rough estimate of the profits of the weaver.

"Chadder.—This is a sheet required by men for wearing over the coat or other cover for the upper part of the body. The borders are plain. This is 6 cubits long x 3 cubits wide; price Rs. 6 to Rs. 9.

"Thas (required for making coats, chapkans, chogas, etc.). It is made generally 6 yards long and 1 yard wide. But longer or shorter pieces are made on order. The thas 6 yards long will be sold at Rs. 14 to Rs. 18 according to the quality.

"Handkerchief. Handkerchief 24 inches square sold at 10 annas to Re. 1. Handkerchiefs bigger than this are also woven.

"Okawan or Torchi chadder 6 cubits x 3 cubits. From the manner of weaving this has a better look than plain sheets. The crossings of the warp and the weft show prominent lines inclined both to the length and breadth of the cloth. This form of sheets is believed to be more durable. Price Rs. 2.4 to Rs. 3 per piece."

107. In Maldah "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 khans 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 2½ to 3 cubits in width sell at Rs. 25 to Rs. 28 per pair. Besides these or chaudhurs 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.

The following kinds of cloth are also made of silk or of mixed silk and cotton, the warp being of silk and the woof of cotton:

<table>
<thead>
<tr>
<th>Product</th>
<th>Rs. A.</th>
<th>Rs. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Maldah Guilti Katar</td>
<td>4 0</td>
<td>7 0</td>
</tr>
<tr>
<td>2) Maldah Udakatar</td>
<td>4 0</td>
<td>7 0</td>
</tr>
<tr>
<td>3) Maldah Belkahi Fuldar</td>
<td>9 0</td>
<td>10 8</td>
</tr>
<tr>
<td>4) Chaki Mujahar</td>
<td>9 0</td>
<td>10 8</td>
</tr>
<tr>
<td>5) Sadia</td>
<td>8 0</td>
<td>9 8</td>
</tr>
<tr>
<td>6) Nanghuli</td>
<td>9 0</td>
<td>10 0</td>
</tr>
<tr>
<td>7) Fulam Senjha</td>
<td>10 0</td>
<td>11 0</td>
</tr>
<tr>
<td>8) Kadamfuli (length 6 yards)</td>
<td>14 0</td>
<td>16 0</td>
</tr>
<tr>
<td>9) Chand tara (ditto)</td>
<td>10 0</td>
<td>13 0</td>
</tr>
<tr>
<td>10) Pattadar Sarjha</td>
<td>8 0</td>
<td>10 0</td>
</tr>
<tr>
<td>11) Sarkar Seriha</td>
<td>8 0</td>
<td>9 8</td>
</tr>
<tr>
<td>12) Balbul chasma</td>
<td>9 0</td>
<td>10 0</td>
</tr>
<tr>
<td>13) Maldah Kator Hiradana</td>
<td>6 0</td>
<td>8 0</td>
</tr>
<tr>
<td>14) Maldah Katar Kaltal</td>
<td>6 0</td>
<td>8 0</td>
</tr>
<tr>
<td>15) Marsul Sellas</td>
<td>3 0</td>
<td>6 0</td>
</tr>
<tr>
<td>16) Chamfulia</td>
<td>10 0</td>
<td>11 0</td>
</tr>
<tr>
<td>17) Kasidia</td>
<td>10 0</td>
<td>11 0</td>
</tr>
</tbody>
</table>

108. In Rajshahi only mathi of a superior quality (matha yarn being sometimes mixed with reeled silk yarn) are woven. Matha pieces (thads) are well suited for making durable clothes. Matha dhatis and saris made in Rajshahi are also in requisition, chiefly in the Calcutta market.

109. The Rajshahi monograph speaks of chasam or tape waste (stron) being utilised at Delhi for kamalgabas (waist bands), jhuls for elephants, and for turbans. The chasam is exported to the North-Western Provinces and the Punjab as well as to Calcutta. "As regards the quantity of chasam produced," continues this monograph, "in comparison with silk, it was estimated that 11 villages bordering on the road of Natore from Boshis produced in a year 800 maunds of silk and 2,000 maunds of chasam." The proportion between silk and waste is not, however, correctly put here. More waste is no doubt made by the native system of reeling, partly owing to the inferior cocoons used in the former and partly on account of rapid and careless handling. A maund of khanru silk produces about 25 to 30 seers of waste, while a maund of flature silk produces only 11 to 20 seers of waste. Very little of the waste is utilised in the country, the greater portion being exported to Europe. In some districts borders of cotton saris and dhatis are made with dyed silk obtained from tape-waste. But the total quantity so used in the whole of Bengal must be very insignificant. Pierced cocoons, on the other hand, which are also a kind of waste, are mostly employed in the country for the matha-weaving industry.

110. Including tussar and endi weavers, there are over 43,000 silk-weavers in Bengal (vide Table A, Part III), representing about 9,000 families. There is not a Hindu family so humble that does not aspire to make a show of chels and other indigenous silks on religious festivals. This demand is very large and very constant; and although the silks of one locality may get popular and of another locality may get cast into oblivion, silk-weavers, as a class, are well patronised and their earnings are higher than those of cultivators. The fact that during the last decade the number of silk-weavers has increased from 27,000 to 43,000, is also significant of the prosperity of the Province and the vitality of the Bengal silk industry.
CHAPTER X.

DISPOSAL OF SILK FABRICS.

111. No uniform plan exists for the disposal of silk fabrics in the different districts. Individual weavers going to mahajans (money-lenders), or merchants or shop-keepers, carrying their goods in their own hands, is the general rule. Occasionally one rich weaver secures goods from a number of weavers who look up to him as a sort of patriarch, and disposes of large quantities to rich merchants. A Berhampore merchant gets a requisition for 2,000 pieces of corah, for instance, from Calcutta or Bombay. He sends for Joykristo Mondol of Mirzapur and Batakristo Ramu of Islampur, and he gives them advances and they enter into contract with him. They have great influence with their fellow-caste-men, and they secure the pieces in a short time without much trouble. If the merchants have to deal with small weavers, they would lose a considerable portion of the advances they might make to them. Bisenschand Babu and Khetu Babu of Baluchar, who are both silk merchants and mahajans, buy up large quantities of silks from weavers direct.

112. The following account regarding the disposal of silk is given in the Howrah monograph:

"Silk has no regular market in this district, as no silkcloth is woven here. It is taken to haat or fairs, and sometimes to Ghatal and Calcutta for sale. The produce in thana Jagadharaipur is said to be taken mostly to Furfura in thana Krishnanagar, in the district of Hooghly, and is sold to the dealers of that place. Silk is also sold to the persons who trade in silk, and who give small advances to the cultivators of mulberry. Sometimes cocoons are sold in places in the neighbouring district of Midnapore, where there are silk filatures. The value of indigenous silk trade in this district may be roughly estimated at Rs. 12,500 during the year."

113. The following information is furnished by the Hooghly report on the trade in silk yarns and silk fabrics:

"The Tantis use the following materials in the manufacture of dress-pieces, etc.:

(1) Khaja Meju rehun (silk of superior quality). Price from Rs. 11 to Rs. 13 per seer of 70 tolas, purchased either directly from the Chahi Kaibarta of Khasa Bar in Ghatal or from bunniah middlemen, who purchase from the Chahi Kaibarta.

(2) Suddha Mejjar, from Rs. 1 to Rs. 1.4 per seer less than above.

They employ labourers for cleaning the thread at the rate of Rs. 1 for each seer of good thread turned out. It is said to take from four to seven days for a man to turn out one thread. The thread when ready is called Banak-rehun.

After purchasing the silk they clean it by the process called phirad, i.e., they take the thread from the spindle and gather it on to a lint or reel. About one to two obits weight of silk is lost in this process. The waste silk (Phulki or kichar) on being removed is said to have been formerly sold at from 8 to 10 annas per seer; there is no sale now. The thread is then made into bida or reels.

Besides the weavers, there are a few families of Tantis at Udaipur, Kalagachia, and Sadanganj, who deal in silk thread. They purchase the raw silk from Midnapore.

The thread is sold by the Tantis in Calcutta at a profit of one and a half to two and a half annas per seer to Arracanisse dealers.

The trade is, however, inconsiderable.

A kind of silk thread called pakwan or twisted thread was spun formerly, but has gone out of vogue.

The looms used are the same as those which are used in turning out cotton pieces, and the process of weaving is similar. It is needless therefore to go into details on these points.

All the silk fabrics manufactured are exported."

114. Burdwan silks are sold preferably to dealers of native firms, who come round, as they give the best prices—Rs. 8 or Rs. 7 or Rs. 8 for a piece of garaad silk 10 cubits long, and Rs. 9 for a piece of garaad silk 10 cubits long. In some cases the mahajans advance the money to the weavers to buy yarn from the dealers, and
then bring the silk when manufactured. For this they practically fix their own price, and leave the weavers only a living wage: hence the preference for dealing with the merchants. Very few bring their produce into Burdwan for sale, though a few do, and by thus avoiding the middlemen make better profits. The majority of the Khatua silk goes to Calcutta, where it is sold or exported. Madras Musalmans are very large consumers. They use long pieces, 21 feet by 3 feet, to make their turbans.

116. With regard to Birbhum fabrics, the following account is furnished:—

Birbhum.

"Most part of the manufacture is exported from the district, a smaller portion being disposed of locally, and it is said that a small portion goes to Europe, where it can hardly compete with European-made articles as regards cost, although it is sometimes liked by the Europeans for its quality."

116. In Bankura "all the silk fabrics manufactured are sold locally at Bankura and Vishnupur. The fabrics turned out are said to be more lasting."

117. For Bogra we have the following account:—

Bogra.

"All the silk fabrics manufactured in this district are locally consumed. No exports are known. The weavers either make the cloths to order or take them to probable customers for sale. People also come to their houses and purchase the articles. The produce of this district is not sufficient to supply local demands. Traders in the bazar import silk fabrics from Calcutta or Murshidabad, and they find a market here. The reason for this is the want of a large stock in the district to choose from. The weavers do not produce silk fabrics in a sufficient quantity for sending them to the bazar traders. They cannot weave cloths of varied qualities and prices. Their fabrics are of the medium quality—neither very good nor very bad. So they cannot supply the demands of those who require cheap things or very fine things."

"Anyhow it is not possible that the weavers that now actually work should be able to supply the wants of the whole district; nor is it possible for the weavers to compete with the cheap foreign articles, and the result is that silk-weaving is gradually declining. The total price of silk fabrics woven in this district is estimated at Rs. 1,400 in the year."

Rajshahi.

118. The Rajshahi monograph has the following account regarding the disposal of the matap cloths woven in this district:—

"The cloth woven appears to be disposed of in three ways. The weaver either hands over the cloth to the person who advanced him the cost of the thread, whose order he is merely carrying out, or he sells on his own account, or lastly he sells to a dastal. This is the way most matap cloth is disposed of in the first instance. The great dastal of the district is Gokul Jugi of Kendagiri, near Pala. He buys from Dakra, where, including the immediately neighbouring villages, there are 23 looms, from Mirnagar, and from a few weavers he has at Kendagiri."

Malda.

119. For Malda the following account has been furnished:—

"A very large proportion of the silk fabrics manufactured in the district is exported to Bombay, Calcutta, Jeypur, Benares, and Mirzapur, by the marnars and other money-lenders. There is also a small local demand for cloths made of mixed silk and cotton. There is no internal trade in silk. Silk goods are never sold at the local bazaars or periodical fairs. There are one or two shops in English Bazaar town, where silk fabrics are sold. The two principal Benares firms who have establishments in Maldah for buying silks are those of Messrs. Dwarkar Das, Radhanath Das and Messrs. Saligram Jagannath Das."

120. Table Q at the end of this Part gives some idea of the export of Bengal silks to the North-Western Provinces and Oudh, the Punjab, the Central Provinces, Rajputana, Sind, and other parts of India; by rail, over 10 lakhs of rupees' worth being exported in 1896-97 and over 20 lakhs of rupees' worth in 1897-98. From Table E it will be also seen that in 1896-97 over 11 1/2 lakhs of rupees' worth of Bengal-manufactured silk was exported to foreign countries, and in 1897-98 about 9 lakhs of rupees' worth. This does not represent the export of manufactured silk from the silks districts of Bengal. From Table R it will be seen that Calcutta received over 19 lakhs of Rupees' worth of manufactured silk in 1896-97, and in 1897-98 nearly 16 lakhs of rupees' worth, by rail. The 11 1/2 lakhs and 9 lakhs of rupees' worth of silk exported from Calcutta to foreign countries during those two years must be included in the 19 lakhs and 16 lakhs respectively, but Calcutta receives silks from Midnapore and other
districts by roads, canals, and rivers, which are not included in the 19 lakhs and 16 lakhs. Then there is some inter-district transaction also in Bengal, which is not included in the above figures, nor the local consumption in the silk districts themselves. The export of manufactured silk from the silk districts of Bengal by rail to Calcutta and to up-country is represented by about 33 lakhs of rupees, and the total imports, including inter-district and boat traffic, probably by about 40 lakhs of rupees. To this we add what is consumed locally in the silk districts, the total product of Bengal silk looms, must be estimated at, at least, 50 lakhs of rupees, i.e., at perhaps a higher figure than the product of raw silk which is exported to foreign countries. The raw silk exported by rail to up-country is worth about 15 lakhs of rupees per annum, and the 3,000 maunds of Bengal raw silk exported by steamer to Bombay, Madras, and Burma (vide Table G) are worth another 15 lakhs of rupees. These 30 lakhs of rupees' worth of Bengal silk is woven into fabrics outside Bengal, in other Provinces of India. The value of this silk would come to over 50 lakhs of rupees. Thus out of the silk spun in Bengal, the Indian silk-weaving industry benefits to the extent of over a crore of rupees per annum, while the foreign trade in Bengal raw silk brings to the country another 50 lakhs of rupees per annum. Tables H and J go further to confirm these statements.

121. Leaving out of question the broad channels into which Bengal silks find their way, we have already seen how each district disposes of its products. The information supplied on this point in most of the district monographs is very meagre and unreliable. That 27,000 weavers (vide Table A) are easily able to produce 50 lakhs of rupees' worth of silk can be seen from a little calculation. Of the 50 lakhs of rupees, about 12¹⁄₂ lakhs represent the wages of the weavers, including the profits of the middlemen, and the rest the cost of materials. The 12¹⁄₂ lakhs divided among 27,000 individuals give about Rs. 46 per annum to each individual, or Rs. 184 per family, i.e., about Rs. 15 per month per family. As the profits of the middlemen, including money-lenders, are included in this calculation, the monthly wages estimated per family cannot be considered too high, and this estimate is, in fact, in accord with the statements in the district monographs regarding earnings of weavers. From another point of view we can substantiate this estimate. The Rs. 50,00,000 worth of silk fabrics represents about 4,800 maunds (vide Tables Q. and R.), and as in bleaching and unwinding, raw-silk loses a fourth of its weight, the 4,800 maunds of silk fabrics are equivalent to over 6,000 maunds of raw-silk, including matka, tasar, and emi silks. To this add the 3,000 maunds of raw and waste silks exported to the other Provinces by river, and another 3,000 maunds exported by steamer. This brings us to the total of about 12,000 maunds of raw and waste silk, as the quantity of indigenous silk utilized in Indian looms, which is equivalent to about 480,000 kgs. Now M. Rondot in his statistical work entitled L'Industrie de la soie en France (1894) gives 473,000 kilos of mulberry silk (indigenous) and 20,000 kilos of waste (indigenous) as the quantities consumed in Indian looms. Allowing 15,000 kilos as the total produce of raw and waste silk in the other Provinces, we get 480,000 kilos of Bengal silk consumed in Indian looms, viz., the same quantity we have calculated out. Thus, while the estimate of 50 lakhs of rupees' worth of manufactured silk is borne out by the figures in the Administration Report, and in the Census Report of 1891, and the figures supplied by M. Rondot, the district monographs supply little clue as to where these 50 lakhs of rupees' worth of silk are woven. It is possible, no doubt, to make an imaginary allotment of this amount according to the number of weavers in the different districts, but the result of such allotment would not be accurate by any means. As most of the district monographs give no real clue for tracing the total produce in different centres, the only feasible way, however, of doing this is to make the allotment, as suggested. The census figures of 1891, where positive, are, on the whole, reliable. Silk-weavers who are mainly cultivators or members of other trade or profession, have no doubt been returned as cultivators, &c. So that there were probably about 30,000 silk-weavers in Bengal in 1891 instead of 27,000, and the number seems to have materially augmented during the last ten years, as the condition of the silk industry since 1889 has been steadily improving.
The following table, therefore, gives a fairer estimate of produce in different localities than we can arrive by any other means, at present available.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Number of weavers according to Census Report of 1891</th>
<th>Value of silk woven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burdwan</td>
<td>994</td>
<td>1,80,000</td>
</tr>
<tr>
<td>Birbhum</td>
<td>669</td>
<td>1,00,000</td>
</tr>
<tr>
<td>Bankura</td>
<td>851</td>
<td>1,60,000</td>
</tr>
<tr>
<td>Midnapore</td>
<td>3,456</td>
<td>6,45,000</td>
</tr>
<tr>
<td>Hooghly</td>
<td>1,141</td>
<td>2,00,000</td>
</tr>
<tr>
<td>Howrah</td>
<td>100</td>
<td>12,000</td>
</tr>
<tr>
<td>24-Parganas</td>
<td>70</td>
<td>18,000</td>
</tr>
<tr>
<td>Nadia</td>
<td>98</td>
<td>18,000</td>
</tr>
<tr>
<td>Murshidabad</td>
<td>11,392</td>
<td>21,00,000</td>
</tr>
<tr>
<td>Rajahah</td>
<td>2,312</td>
<td>4,00,000</td>
</tr>
<tr>
<td>Bogra</td>
<td>13</td>
<td>2,000</td>
</tr>
<tr>
<td>Dacca</td>
<td>55</td>
<td>10,000</td>
</tr>
<tr>
<td>Chittagong Division</td>
<td>52</td>
<td>10,000</td>
</tr>
<tr>
<td>Patna</td>
<td>41</td>
<td>7,000</td>
</tr>
<tr>
<td>Bhagalpur</td>
<td>458</td>
<td>80,000</td>
</tr>
<tr>
<td>Malda</td>
<td>2,510</td>
<td>4,60,000</td>
</tr>
<tr>
<td>Sonthal Parganas</td>
<td>96</td>
<td>12,000</td>
</tr>
<tr>
<td>Cuttack</td>
<td>274</td>
<td>50,000</td>
</tr>
<tr>
<td>Balsore</td>
<td>87</td>
<td>10,000</td>
</tr>
<tr>
<td>Puri</td>
<td>221</td>
<td>40,000</td>
</tr>
<tr>
<td>Hazaribagh</td>
<td>6</td>
<td>1,000</td>
</tr>
<tr>
<td>Lohardaga</td>
<td>1</td>
<td>7,000</td>
</tr>
<tr>
<td>Manabhum</td>
<td>212</td>
<td>36,000</td>
</tr>
<tr>
<td>Singhbhum</td>
<td>338</td>
<td>64,000</td>
</tr>
<tr>
<td>Peudatory States</td>
<td>1,710</td>
<td>3,08,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27,286</strong></td>
<td><strong>50,00,000</strong></td>
</tr>
</tbody>
</table>

122. As no distinction is made between mulberry, **tussar** and **endi** silk fabrics in the figures given in the Administration Report, the distinction is made in the above table in a conventional form. Figures with single lines only under them denote chiefly mulberry silk industry, figures with no lines under them denote mulberry silk industry exclusively, and figures with double lines under them denote either **tussar** or **endi** (chiefly **tussar**) silk industry. In other words, about 23,000 persons are employed in silk-weaving, about 2,600 persons in tussur-weaving, and about 1,800 persons in **endi**-weaving, and the respective values of the three classes of fabrics may be put down, in round figures, at 43 lakhs, 4 lakhs and 3 lakhs of rupees, per annum. The Census of 1901 gives us a still more hopeful view of the situation.

123. That the above estimate differs entirely from the estimates annually furnished by district officers may be judged from only one instance. Against 21 lakhs of rupees worth of silk fabrics, which I estimate as the annual production of Murshidabad, the district officer's estimate is only 2½ lakhs. The district monograph on this point has the following remarks:

"No statistics are published, but from what I have been able to learn, I think that the annual value probably does not exceed Rs. 2,50,000. The district administration report of last year mentions Mirzapore alone as having turned out 6,052 pieces of cloth, valued at Rs 43,396; this as against 6,896 pieces valued at Rs. 47,465 of the year before. The Statistical Reporter of May 1879 estimates the annual value at Rs. 6,00,000, but there is no doubt there has been a large decrease."
124. Such statements being based on vague guesses of police officers cannot be relied upon in the same way as the deductions from census figures and figures supplied by Railway and Steamer Companies can be relied upon. Let us see what quantities of silk found their way to Calcutta and to up-country in 1896-97 and 1897-98, as far as can be gathered from Steamer and Railway Companies' returns embodied in the Administration Report for 1897-98 (vide pages 203—210).

<table>
<thead>
<tr>
<th></th>
<th>1896-97</th>
<th>1897-98</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Mds.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Silk piece-goods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>brought down to</td>
<td>300</td>
<td>2,92,200</td>
</tr>
<tr>
<td>Calcutta by rivers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silk piece-goods</td>
<td>1,988</td>
<td>1,626</td>
</tr>
<tr>
<td>brought down to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcutta by rail</td>
<td>2,288</td>
<td>22,28,612</td>
</tr>
<tr>
<td>Total to Calcutta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add silk piece-goods</td>
<td>486</td>
<td>4,73,364</td>
</tr>
<tr>
<td>exported by rail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>from Bengal to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Western</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provinces and Oudh,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab, Central</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provinces, etc.,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(which may be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>assumed to be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>not indigenous)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total quantity of</td>
<td>2,774</td>
<td>27,01,876</td>
</tr>
<tr>
<td>Bengal silk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ascertained to be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>exported.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

125. To the above might also be added some of the 545 maunds, valued at Rs. 5,28,960, exported by rail in 1896-97, and of 788 maunds, valued at Rs. 6,94,640, exported by rail in 1897-98 from Calcutta to up-country. The table in page 210 of the Administration Report does not mention that the manufactured silk so exported by rail to up-country from Calcutta is indigenous; but it seems it is indigenous silk that is meant. Assuming, however, as I have assumed in the above table, that it is all foreign silk that goes from Calcutta to the North-Western Provinces and Oudh, Punjab, etc., and not taking into account any other route of transit to Calcutta and up-country (though there are such routes), not taking into account any inter-district trade and any local consumption, we have to account for over 36 lakhs of rupees worth of silk in 1897-98. As Murshidabad, according to the Census figures (Table A), contains about half the number of silk-weavers there are in Bengal, half the above quantity must have been derived from this district. That gives us at least 18 lakhs. Table J confirms this estimate as 4,135 maunds of silk piece goods exported from Bengal are worth nearly 50 lakhs of Rupees.

126. It will be seen that we have under-estimated the production of Bengal silk fabrics in the preceding paragraph, putting it down at Rs. 36,00,000. I have known weavers carrying bundles of silks with them by rail to Calcutta for sale before the Pujas. No account is taken of such laggard of passengers, and I know a large quantity of silk fabrics produced in Murshidabad find their way to Calcutta as 'railway parcel' or 'personal luggage.' If to this we add the inter-district trade and local consumption, we cannot be far wrong in putting the total production at 50 lakhs. The year 1896-97 being the famine year, there was a very considerable falling off in the silk trade of Bengal with the other provinces of India, and this is the reason for choosing the higher figure of the above table (Rs. 36,21,672) instead of the lower figure (Rs. 27,01,876) as the measure for the existing state of the silk-weaving industry of Bengal. The importance of the silk-weaving industry of Murshidabad and some other districts has therefore been vastly underestimated, and I am of opinion that neither 6 lakhs nor 2½ lakhs of rupees represents by any means the present product of the Murshidabad looms; but,
as shown in the table given higher up, I believe Murshidabad produces more than 20 lakhs of rupees’ worth of silk fabrics annually; and though the export trade in corahs has diminished of late years, from personal observation and enquiry I have ascertained that the silk-weaving industry of Murshidabad is looking up again, and there have been improvements in new and important directions within the last fifteen years. There is a larger internal trade now in superior fabrics, specially in the Jangipur circle, than there has been for many years past, and this may in fact be looked upon as an index of the general prosperity of this Province. The use of silk fabrics is considered even in Europe as a sure index of national prosperity, and the rise and fall of the silk trade is looked upon in the light of a social and political barometer. The famine of 1890-97 affected the use of silk fabrics most materially, but the prosperity that followed in the next year at once brought with it renewed use of silk goods. It should be also noted here that from personal enquiry from native merchants of Berhampore I have ascertained that if it had not been for the Plague, the trade both in Bengal raw silk and manufactured silk would have augmented far more rapidly within recent years. The decrease of trade with foreign countries has brought with it an increase of trade with the other provinces of India, and the general condition of the silk industry is, on the whole, more hopeful than it has been for many years past, and this fact is very clearly brought out by the census of 1901.


128. The principal local merchants who buy for the foreign markets are the Bengal Silk Company, Messrs. Louis Payen & Co., Mr. M. Ferguson and Babu Shashi Bhushan Chowdhury of Berhampore, and Babu Radha Shyam Guin of Ghatal (Midnapore).

129. The costliest silk fabrics are used in Bengal. Some costly fabrics are exported to Assam also, but the quantity is insignificant. The fabrics used in Bengal are sari, dhutia, jora, Baluchir, butidar sari, cheli, gown-pieces, hundu goods, rekhis, eldrikhans, scarfs, shawls, and plain and bordered handkerchiefs. Individual weavers may be seen hawking them about in towns like Berhampore, Rajshahi, Maldah, and Midnapore, and sometimes carrying bundles of silk cloths down to Calcutta as personal luggage by train. Many such weavers come to Calcutta before the Puja time, in September and October, when there is always a brisk sale of silk saris in the Calcutta market. To Europe, corachs, printed handkerchiefs, and gown-pieces, also bacsas and baftas ( tasar mixed with cotton) are exported. To Rangoon are exported phukats handkerchiefs and bunhurs. To the North-Western Provinces and the Punjab are sent matchars or churis made out of matchas and corachs. To Arabia are exported dhurias, chaukuras, and matras. Chulis go to most parts of India, also corachs for printing. Matha dhutas and saris (plain and check) go to all parts of India where there are Maharrats.

CHAPTER XI.

THE NATIVE LOOM INDUSTRY—ITS INDUSTRIAL POSITION.

130. Enough has been said in the last chapter to demonstrate the importance and vitality of the Bengal silk-weaving industry at the present time and its growing importance. There is no doubt the industry has dwindled down into insignificance in certain localities, e.g., in Hooghly, Nadia, Howrah, and Bogra; but it has made progress in others, e.g., in Murshidabad, Bankura,
Burdwan, and Rajeshah. In Midnapore the industry is fairly extensive, but it is in a struggling condition, and the presence of a few enterprising Marwari and other up-country traders may alter the state of the loom-industry, which is at present far too much in the hands of a few rich men, specially if the cocoon-rearing industry of Midnapore can be saved by the Pasteur system.

131. The belief, however, that the English occupation of this country has been detrimental to the interest of arts and industries is so widespread, that a discussion of this question, so far as the silk-weaving industry is concerned, may not be out of place.

132. The silk industry, like the jute, or the tea, or the indigo industries, was developed from insignificant proportions by means of British capital and enterprise; and although this industry has held a lower position during the latter half of this century than it did during the earlier half, it is in a far better position now than it was in the eighteenth century, and in a better position still than it was in pre-British times. The "Reports and Letters concerning the Company's affairs in Bengal, 1661 to 1855," published by Mr. C. R. Wilson, gives a bird's-eye view of the commodities obtainable in Cossimbazar, Murshidabad, Hooghly, Patna, and Balasore, i.e., in the principal marts of Bengal, Behar, and Orissa, in those days. Silk was quite a secondary article of trade in Bengal in those days in Cossimbazar and Murshidabad.

It was recognised as an article of some importance in Patna. In Orissa and Hooghly it did not seem to have been known as an article of trade. With regard to Cossimbazar, the reports say:

"The commodities chiefly vendible in this place are silver and gold. Other commodities are vendible here, but not in great quantities, except chark or trimn. Commodities procurable here are silk taffeties, long and short women's clouts of silk, about 14 covenes long, and several sorts of striped stuffs and striped girdles."

133. With regard to Murshidabad silk fabrics, the 'Reports' have the following note:

"At Murshidabad, above three leagues from Cossimbazar, there are made several sorts of silver and gold girdles from 10 rupees to 60 rupees each, also fine taffeties from 9 to 12 rupees per piece, but none of those goods are near so fine or good as those that come from Persia."

134. In connection with the description about Patna and Benares merchandise, we have the following references to silk:

"English cloth sold by the Flush yard, which is about 1/2 more than the English yard, so are taffeties and all other things measureable at Patanna. You may buy in the bazar anything by the yard, vending much by retail. All manner of Guzarat, Banura, Jhenupore, etc., commodities are to he had here, as gold ashes, untarn girdles, clutches, remerry, etc., all sold by weight, the 11 mace tola, and usually about Rs. 1-15 to Rs. 2-1 per tola."

At Benares 12 course from Patanna and Lahore, 16, threes white cloth fit for Persia to be had called Umbetees and Comomp, from Rs. 1-8 to Rs. 3 per piece in which commodities are invested by Armenian and Mogrull merchants at least ten thousand rupees per annum, transports by land to Surat, and thence by shipping to Persia. Good profits are made of them from thence to Surat. There are better taffeties made at Pattana than Cossimbazar, which are sold from 9 to 16 annas per yard, but no good quantities, but if followed a good quantity might be procured."

135. Bernier, the celebrated traveller of the Seventeenth Century, no doubt, speaks in most glowing terms of the silk as of other industries of Bengal during that Century, but the number of workmen employed in the principal silk factory of Bengal is mentioned by him to be "seven or eight hundred" only, while a good many factories at the present time employ at least twice this number. The passage referring to the silk industry may be quoted here in full:

"In regard to valuable commodities of a nature to attract foreign merchants, I am acquainted with no country where so great a variety is found. Besides the sugar I have spoken of, and which may be placed in the list of valuable commodities, there is in Bengal such a quantity of cottons and silks, that the country may be called the common storehouse for these two kinds of merchandise, not of Hindustan or the Empire of the Great Mogul only, but of all the neighbouring kingdoms, and even of Europe. I have been sometimes amazed at the vast quantity of cotton cloth, of every sort, fine and coarse, white and coloured, which the Hollanders alone export to different places, especially to Japan and Europe. The English, the Portuguese, and the native merchants deal also in these articles to a considerable extent. The same may be said of the silks and the silk stuffs of all sorts. It is not possible to conceive the quantity drawn every year from Bengal for the supply of the whole of the Mogul Empire, as far as Lahore and Cabul, and generally of all those foreign nations to which the cotton cloths are sent. The silks are not certainly so fine as those of Persia, Syria,
Sard, and Barut, but they are of a much lower price; and I know from indisputable authority that, if they were well selected and wrought with care, they might be manufactured into most beautiful stuffs. The Dutch have sometimes seven or eight hundred natives employed in their silk factory at Kassem-Bazar, where, in like manner, the English and other merchants employ a proportionate number.”

136. Thus we get a glimpse of the silk trade of Bengal in the middle of the 17th century. It was not to be compared to the silk trade of Persia. It was poorer than the Benares silk trade, and the only market in Bengal in which silks comparable to Persian silk was to be obtained in any quantity was that of Patna. The *laffetas*, or coloured silks of Cossimabazar (*banhwa*, printed handkerchiefs, *phuliats*, *dharis*, etc.), were to be had. But the industry had to be improved and developed before trade in these and other silk fabrics assumed any importance. And so we find as early as 1670 a factor “well skilled in silk” sent out from England to Cossimabazar. From this time forward for a whole century the Company was unremittent in their zeal to extend sericulture in all departments, until by 1776 “Bengal silk drove all competitors, except Italian and China silks, out of the English market.”

(Geoghegan, page 5.)

137. But the development up to this had come to a stage when the annual exportation reached 500,000 “small pounds,” and this quantity included “all sorts of silk.” What is the state of the industry now? In 1901-02 the exports to foreign countries alone were—

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Of raw silk</td>
<td>737,051 lbs.</td>
</tr>
<tr>
<td>&quot; waste</td>
<td>1,160,754 lbs.</td>
</tr>
<tr>
<td>&quot; silk piece-goods, 1,180,833 yards-about</td>
<td>504,092 yards,</td>
</tr>
</tbody>
</table>

the total representing about 2,000,000 pounds, or about four times the annual quantity exported between 1776 to 1785. Then we must take into consideration the facilities now afforded by rail and steamer communications in Bengal silk (raw and manufactured) being exported to the other provinces of India. Tables H and J show that much larger quantities of raw and manufactured silk grown in Bengal, are used in India, than what are exported, and there is no evidence to show that any considerable quantities of Bengal silk were used in other parts of India in olden times, though Benares and Agra did use some, and there was some export even to Lahore and Cabul.

138. The Company developed the silk-weaving industry by establishing three weaving factories—one at Cossimabazar, one at Malda, and the third at Santipore. “Goods were manufactured, but from the country-reeled or Putney silk. All filature silk was exported raw.” (Geoghegan, page 14.)

139. To what proportions the silk-weaving industry developed under the fostering care of the East India Company is not known. But from what Geoghegan says in the matter, it seems the industry attained to a greater prosperity than now in Malda, but that the Murshidabad silk industry is in a more flourishing condition now than it was in the days of the East India Company. As all that Geoghegan says on the subject of silk manufacture is virtually contained in a single paragraph, it can be easily quoted here in extenso:

“As to the extent of silk manufacture, I have not been able to obtain much information. We have seen that the Company manufactured silk-stuffs at three of its Residencies, but from country-wound silk. The stuffs seem to have been chiefly undyed piece-goods, known as *corahs* and *bandannas*. There was doubtless a good deal of silk made for home consumption also, but I have not found any figures to show either the exports or the total production for the period of the Company’s trade. Buchanan gives an elaborate account of the silk manufacture in Malda and the neighbourhood. The clothes were almost all mixed, the warp being silk and the woof cotton. The warp was generally disposed in stripes, the woof being of one colour. The patterns did not display much taste. There were said to be about 11,000 looms in this region, but not one-third of them constantly employed. Buchanan estimates the value of the stuffs exported annually to the westward, to Murshidabad and Calcutta, at not less than 10 lakhs annually. The industry still exists about Malda and English Bazar, but in a languishing condition. The aspect of the town of Old Malda is that of the dreariest decay. Mr Hoillie, writing in 1758, mentions six kinds of cloth and raw-silk as being exported from Nator (in Rajahpi) both to Europe and to the markets of ‘Bussora, Mocha, Jeddah, Pegu, Acheen, and Malacca.’ From the passage as quoted by Mr Skrine (to whom I am indebted for the reference), it is not quite clear whether the cloths were all of silk.” (Geoghegan, page 24, paragraph 26, and footnote.)
140. With regard to Maldah also, it is not quite clear whether it is not the European side of the industry only that has decayed of late years. That the native silk-reeling industry, also mulberry-growing and cocoon-rearing industries have been steadily improving of late years, I have personally verified and I have also ascertained from native silk merchants of Maldah that they are exporting more silk fabrics from Maldah now than they ever did before. Mr. Morey of Baragharia Factory wrote to me a few years ago that he noticed extension of mulberry cultivation all over Maldah. Discussing this question with Mr. Batabyal, at that time Collector of Maldah, who had sent in a return showing shorter area for mulberry than in previous years, I saw that the general but erroneous impression that the silk industry was gradually dying out was the main reason for pessimistic reports and returns being submitted regarding acreage under mulberry and outturn of silk. Mr. Liottard in the "Memorandum on Silk in India (1883)" makes certain remarks, which represent the true position of the Maldah silk industry at the present time, and, I may add, the progress on the native side of the industry since 1883 has been continuous. "The native side of the industry, on the contrary," says Mr. Liottard following a report by Mr. R. Poreh, Collector of Maldah, "is prospering in its agricultural aspects, and as regards the easy profits made by the natives, the mulberry silk industry must be considered as brisk, prosperous, and flourishing. The greater portion of the cocoons reared in the district is either bought by native manufacturers or are reeled by the rearers themselves, who most of them have one or two reels: the silk reeled by the natives and called khangru is partly bought by silk-piece manufacturers of Bombay, Benares, Delhi, Mirzapur, etc., and partly is used in home manufacture of corakh, mostry, and other kinds of cloth. These cloths are mostly exported to Calcutta, Bombay, Madras, Nagpore, Allahabad, Benares, and Delhi (the largest exports being to Calcutta and Bombay), and partly worn in the district."

141. From a study of Table A it will appear that the native side of the industry has a tendency to revive when the European side of the industry decays. But there is a limit to this, as will be explained later on. The revival of the silk weaving industry can be partly explained by the difficulty cocoon-rearers are now experiencing in obtaining good prices from European factories. The enhanced production of cocoons has thus resulted chiefly in an impetus being given to the native reeling and weaving industries.

142. The notion that the silk industry of Bengal is dying out is so deep-rooted that an official request from the Collector of Murshidabad to the late Maharani Surnomoyi of Cassimbazar to devote the Rs. 20,000 which she had promised in the year of her late Imperial Majesty's Jubilee (1887) to the founding of a silk-weaving school elicited the reply that the Maharani considered that the silk industry of Murshidabad had declined to such an extent that there was no hope of reviving the industry, and that therefore she was not willing to found a silk-weaving school. The establishment of a silk-weaving school in Murshidabad was definitely recommended in the report submitted by Mr. E. W. Collin, c.s., on the Arts and Industries of Bengal, after a personal enquiry into the condition of all the important industries of Bengal. That the silk-manufacturing industry of Bengal can be developed to something still better by systematic training and by proper organisation can be inferred from the fact of the recent development of the Bombay silk-manufacturing industry, though it depends for its raw product on Bengal and China. British interest lies entirely in the direction of developing the silk industries of Bengal, and Mr. Collin's suggestion is warranted not only by the actual vitality of the silk-industry of Bengal, but also by the decaying vitality of the British silk manufacturing industry, which is failing in competition with France, Italy, Switzerland, Germany, and even with Japan. The vitality of the Bengal industry is worth preserving and fostering in the interest even of the British silk industry.

143. Much as has been said of the decay of Bengal silk, it is doubtful if it has ever enjoyed such a healthy vitality in times past as it is now enjoying. We are on the threshold of the Pasteur system of sericulture being accepted by the peasantry of Bengal as the solution of their chief difficulty; we have trades from all the provinces of India coming to Bengal in increasing numbers both for silk piece-goods and for raw-silk and this raw-silk is utilised in the other provinces for manufacture of silk fabrics. Even the European side of the industry has
suffered only a comparative decay, and there is evidence of resuscitation of this branch of the industry in the direction of raw-silk, and waste (\textit{vide} Table C).

144. "Concurrently with the decline in the raw-silk trade," says Mr. Liotard, "a considerable increase is apparent in the exports of waste-silk and piece-goods, thus:

<table>
<thead>
<tr>
<th>Official years</th>
<th>Waste silk</th>
<th>Piece-goods</th>
<th>Goods of silk mixed with other materials</th>
<th>Total value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>1870-71</td>
<td>...</td>
<td>...</td>
<td>Figures not available, 15,03,176</td>
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</tr>
<tr>
<td>1872-73</td>
<td>...</td>
<td>...</td>
<td>available, 18,60,248</td>
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</tr>
<tr>
<td>1876-77</td>
<td>...</td>
<td>...</td>
<td>available, 22,20,985</td>
<td>22,20,985</td>
</tr>
<tr>
<td>1879-80</td>
<td>5,30,476</td>
<td>21,78,937</td>
<td>1,04,738</td>
<td>28,14,151</td>
</tr>
<tr>
<td>1881-82</td>
<td>8,94,213</td>
<td>20,57,722</td>
<td>1,55,282</td>
<td>30,47,317</td>
</tr>
<tr>
<td>1882-83</td>
<td>10,94,361</td>
<td>25,19,997</td>
<td>2,43,990</td>
<td>37,78,348</td>
</tr>
</tbody>
</table>

These figures, coupled with those of raw silk, lead to the inference that the Indian silk production after falling till 1870—80 began in that year to assume a new aspect characterised by an increasing trade in waste silk, piece-goods, and goods of silk mixed with other materials. The export of piece goods, however, has fallen off of recent years.

145. It is not the decay of an old and prosperous industry that has to be mourned, but only a comparative decay in the export of silk piece-goods since the prosperity of 1887-88 (\textit{vide} Table C), and it is a prosperity in the export trade lasting for 20 years from 1870 to 1890 that may be only fondly looked back upon. But other provinces within the last 12 years have been taking more raw and manufactured silks from Bengal than they ever did before, and the comparative decay since 1887-88 in the export of manufactured silk from Bengal is therefore less than a study of the figures in table C alone would warrant one to suppose. Because during a period of 200 years of British transactions in Bengal silk fabrics, there was a boom for 20 years within recent times, it should not be inferred at once that the industry has hopelessly decayed. The memory of this boom in the export trade in silk is no doubt full of regrets to living men who saw it, and who have been also watching the decline for the last 15 years, but looked upon in a proper perspective the 20 years' boom, in one branch of the industry, would appear as a mere passing event which all trades may be expected to pass through. Barring these 20 years, the silk-manufacturing industry of Bengal has never enjoyed such a prosperous period as it enjoys now, and the prosperity is shared chiefly by those districts which have the largest number of silk-weavers in them, with the sole exception of Midnapore, where the decline is due chiefly to the decline in the cocoon-rearing industry caused by silkworm epidemics.

146. Having stated what I consider to be the true industrial position of the Bengal silk-weaving industry, I will now quote from the district monographs the remarks of the various local officers on this subject. They are nearly all pessimistic in tone and based on the groundless belief that the silk industry is decaying. One point noticed by most of them is of vital importance, viz., the harm done to the silk-weaving industry (as to other industries) by the indebtedness of the weavers to mahajans, who charge very heavy rates of interest on advances of money. If the silk-weavers could be relieved of this burden, the industry would be in a still more prosperous condition.

147. The Murshidabad monograph has the following lines bearing on the question of the industrial position of the silk industry as a whole and the silk-weaving industry in particular:

"The method on which many of these weavers carry on their business is industrially a bad one. The sitrature-owners and their employés in many cases advance money to them and
buy their cocoons at a price fixed according to the current rates in the silk market. Interest being charged, the reapers frequently get into financial difficulties. Those who work on their own capital are in a much more favourable position. As a class, reapers are a peaceful and quiet people, and litigation is almost unknown amongst them.

There seems no doubt that the silk-weaving industry is on the decline. The importation of foreign stuffs has of course a great deal to do with this. Another reason lies in the lack of enterprise displayed in disposing of native fabrics. Where there is an attempt at advertisement, it usually meets with great success. It would be a splendid thing for the trade if middle-class Bengalis with a small capital were to hawk round the silk products of Mirzapur and other places. At the time of the famine the sufferings of some of the weavers of this district were much alleviated by the efforts of a native gentleman, who advantageously disposed of their goods in Calcutta. It is a pity that more energy is not displayed in this direction. There is no doubt that as a class their condition is not prosperous, and that they are deeply involved in debt. They do not, as a rule, work for themselves, but for dealers who advance them material and pay them so much for their labour. Some of these dealers employ a very large number of weavers. I am told that in Kandi subdivision some weavers found the industry so little profitable that they have entirely given it up, and in many cases taken to agriculture. Others in the same subdivision have abandoned the weaving of silk for that of cotton. At present the price of cotton yarn is low and the demand for goods fairly great, so that industry is found to be more paying.

148. The Burdwan monograph has the following remarks:

"There are no factories, but each man's loom is kept in a solid and respectable-looking house, considerably cleaner than most native huts ... It is rather hard to find any way of helping these people. Their machines are cheap and effective, and labour is cheap. A great deal of their misfortune is due to their own fault. They have run into debt, and thus either had to get yarn on credit from the merchant who took interest at the rate of a pie in the rupee and bought up the cloth manufactured at the end of the month, after deducting the price of yarn, or else they had to go to the mahajan, who charged interest at the rate of Rs. 2 per seer (i.e., 15-16 rupees worth) of yarn, and then bought at his own price. If they could do cash business, they would be prosperous and contented. The other reason is, of course, European competition.

"There is probably nothing that will prevent the native putting his head in the money-lender's noose; but it is perhaps just possible that the industry might be saved from extinction by other means:"

(1) There might be a better supply of cocoons; it is possible to grow them in this district, as is shown at Kala, but there the growth is only an auxiliary to agriculture. If this cultivation was extended and the cocoons sold directly to the weavers in the district, the initial cost would be lessened.

(2) The products might be advertised; many articles suited for ladies' garments could be made from this silk, and also cloths like Assam silk, though of better and more durable quality, could easily be purchased. If these were advertised and a better market obtained, it would help the weaver, who might then escape from the clutches of the money-lender.

149. The Howrah monograph has the following lines bearing on this question:

"No silk cloth nor any tussor is manufactured here. The trade in silk has considerably decreased, and is gradually dying out. At present the silk industry is carried on on a very small scale. The lower class of people who used to trade in it have taken to cultivation and other pursuits, as they find that the amount of labour spent gives no adequate return."

150. The following lines may be quoted from the Birbhum monograph:

"In this district silk industry is carried on to some extent, and is in a somewhat declining condition, as the genuine silk manufactured in this country cannot compete with the adulterated silk manufactured in Japan."

151. The Bogra monograph has the following lines on this subject:

"In the case of rearing worms, as well as in the case of reeling and weaving, the industry has declined in this district owing to the want of demand, absence of encouragement, and lowering in prices due to competition. There was a time when there were one or more silk factories in this district conducted by Europeans. At that time every facility was offered to the grower of silk for cultivation and disposal of his articles. The factor would advance a lump-sum to a pahar or middleman for bringing up not less than a specified amount of cocoons.

"The pahar would then distribute portions of the advance money among the cultivators either for expenses of growing the plants or for purchase of leaves. The pahar would then take the produce from the cultivators and take his collection to the factory. These factories, therefore, encouraged the cultivation of worms, and took all the produce for exportation to other parts of India or to Europe.

"The silk factory of Nowdapa was situated on the western bank of the Karotoya river, about three miles away from Bogra town. This factory was abolished about 30 years ago. It is said that there was a factory at Kharna, which was abolished long before that, and another at Sajapur, which did not exist for a long time."
The cultivators complain of inadequate prices obtained for the cocoons. This year they are selling cocoons at the rate of Rs. 20 per maund. But last year the price is said to have been as low as Rs. 13 or Rs. 14 per maund; so it is very difficult for a cultivator to make a handsome profit out of this industry.

Of the cocoons grown in this district, only a very small portion is reeled here. Most of the produce is sent to the district of Rajshahi. People living near Bogra take these cocoons mostly to Tahirpur in the Rajshahi district, where they find a ready market. Cocoons are also taken to hâts in the Rajshahi district, which are close to this district. Some portion of the cocoons is purchased in these hâts by cultivators for breeding purposes. It also sometimes happens that the traders or hâts come from Rajshahi and purchase and take away cocoons. Now and then the cultivator, from that district also come for purchasing cocoons for breeding.

The proportion of export to local consumption is estimated at 18 annas to 8 annas. But it should also be noted that a major portion of the silk thread reeled in this district, small as it is, is also sent to Rajshahi. The local reeilers purchase the cocoons at the house of the cultivator, or he himself takes his produce to the reeler. In some of the hâts of this district a small quantity of cocoons can also be purchased.

The number of persons actually employed in the weaving of gurad is extremely small. There are not more than half a dozen skilful weavers in gurad silk in this district. There are, however, other members of the family of a weaver who know something of the work and help him. Many Tanis have given up the occupation and have taken recourse to cotton industry or to agriculture. The silk industry is not at all very paying, and it is not possible for a Tani to maintain himself by silk-weaving alone.

The processes of bleaching the threads, arranging them after bleaching, reeling, stretching, warping, arranging the threads on the reels, forming the heads and fitting up the whole thing require a large amount of labour and many of the above processes require the help of one, two or more additional hands. So silk-weaving is far from a profitable concern. The weaver has got to take recourse to agriculture or some such thing.

The weavers of silk proper are Hindus. The silk industry imparts to them a certain importance, as they are the few representatives of workers in an art which was once the pride of India.

Not a single weaver can be said to be well-to-do. The Tanis when they keep lands do not plough fields themselves, but servants do the field-work for them.

Generally one family keeps a single loom; but there are instances of a family of weavers keeping two looms, but they are seldom worked together constantly. One loom is worked for preparing things urgently required, and the other for things that may be taken up at leisure.

It will appear from the above that the silk industry in this district is of very limited extent. The industry has deplorably declined in all its branches. Some 30 years back, dealing in silk in some shape or other was a very easy way to fortune. Besides the growers of the worms, there was a class of middlemen who used to buy silk from the growers and dispose of them on a large scale in the hâts famous for trade in silk. Tahirpur, in the district of Rajshahi, was the most important place in this respect for the people of Bogra. Even now Tahirpur draws a major portion of the produce of this district in the shape of cocoons. There are many people now in this district who admit that their fathers and grandfathers grew rich by dealing in silk. Besides buying cocoons for sale, these middlemen also worked several furnaces each for reeling silks, and sold the thread.

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At a time growing of mulberry or rearing worms was considered the most lucrative employment for agriculturists.

It is said that the decline of this trade has impoverished many people. The mulberry-fields bore very high rates of rent, for it is the common practice in this part of the country to leave the improvement of the land to the cultivator alone, while the zamindar comes in for his full share of the increased profits. In a village where good paddy-fields do not bring more than Rs. 1-8 per bigha, a mulberry-field bears Rs. 4 as rent per bigha.

Owing to the decline in the industry these mulberry-fields are lying waste, although the poor cultivator is paying very high rents for them. The zamindar will not allow him to surrender these raised fields alone. If he is to surrender all, he should surrender the whole jote, which he cannot. So he is paying every year rents at a very high rate for fields which do not bring a piec into his pocket. So the decline in the industry is doubly detrimental to the interests of the cultivators.

Several reasons are suggested for this decline, among which are—

(i) Want of encouragement by Government or factories, &c.
(ii) Falling off in the prices due to competition with imported articles.
(iii) The mulberry plant is said to be less thriving than before.
(iv) Diseases among worms. It is said that the worms do not thrive as before.
(v) Want of demand for cocoons and the difficulties of carriage.

It is very difficult for a man to carry cocoons to distant places for sale. People who grow only a limited quantity cannot themselves carry their produce to the purchasers, nor is there any way of selling the produce at home, except to people who will pay a low price by deducting a commission for undertaking the sale.

The new railway opened up to Bogra may remove this difficulty to a certain extent. But on the whole it is believed that the silk industry of the district will gradually die out if no encouragement be offered from outside.
152. The Maldah monograph may be also quoted fully on this subject, though I do not at all agree with the pessimistic view taken in this monograph of the condition of the industry:

"Maldah has, from a very ancient time, been famous for its silk industry. It is even now the largest silk-producing district in Bengal. About 70,000 mounds of cocoons are grown.

"It has been stated above that the silk-weaving industry is in a very decayed state. The best weavers of Shibganj, where the finest cloths are made, demand Rs. 8 to Rs. 13 a month. The Tantis were once a rich community. Owing to the importation of cheap foreign goods, the demand for indigenous silk fabrics has much decreased: imported goods are, however, less durable than country-made articles. If the best varieties of country-made fabrics could be sent to industrial exhibitions, which are now so numerous, it might help to revive this decaying industry. The backward state of the industry is due as much to ignorance on the part of purchasers regarding the quality of these fabrics, who generally prefer the gaudier articles of foreign manufacture, as to the want of organisation and enterprises on the part of the weavers, whose poverty prevents them from advertising their goods to any appreciable extent.

"No attempt has hitherto been made to give an impulse to the industry, and the weavers are too poor and illiterate to do it themselves. The weavers as a class are very poor. It is very seldom that they sell their manufactures to the consumers direct. They are entirely in the hands of the mahajans or money-lenders, who make advances to them for the purchase of thread and the support of their families. Frequently it is the mahajan who supply the thread, and the weavers get nothing but their wages. The wages for the manufacture of a piece of sari amount to about Rs. 2, which means that the weaver is paid at the rate of 4 to 6 annas a day.

"The silk industry is thus entirely in the hands of the mahajans, who are generally Marwaris. So long as this state of things continues, it is hopeless to expect that the industry will flourish.

"A very large proportion of the silk fabrics manufactured in the district is exported to Bombay, Calcutta, Jeypur, Benares, and Mirzapur by the Marwaris and other money-lenders. There is also a small local demand for cloths made of mixed silk and cotton. There is no internal trade in silk. Silk goods are never sold at the local bazaars or periodical fairs. There are one or two shops in English Bazar Town, where silk fabrics are sold.

"The industry cannot possibly be improved, unless capital is invested for the purpose of advertising the goods widely and for creating a demand for them among the well-to-do people of the country and also for inducing the weavers to manufacture a large variety of new patterns of goods for which there is likely to be a demand in Europe, America, and other countries. It is well known that the silk fabrics made in Birbhum district are exported in considerable quantities to London, and find a ready market there. There is no reason why Maldah-made cloth should not also find a foreign market, especially as Maldah grows the cocoons, which Birbhum purchases."

153. To this last point raised in this monograph, it may be answered, that Maldah silks are largely exported to foreign markets, far more than Birbhum silks. To another point mentioned in this monograph, I may say, there is a considerable trade in Maldah silk fabrics quietly carried on in the district. Every time I visited the villages of Maldah I noticed peripatetic weavers vending their silk cloths.

154. That the import of foreign silks into Bengal is materially affecting the indigenous industry is an opinion with which I entirely differ. The purposes for which the two kinds of silk are employed are different. Foreign silks as an article of luxury have been in use in India from very ancient times, and mention is made of Chandrakanta in Kalidas's Sakuntala, and in later writings, of Persian silk. But these were never to be employed on ceremonial occasions. A peculiar notion of purity is attached to indigenous silk fabrics by the whole Hindu population of India; and though the use of silk is enjoined and universally current in the celebration of certain rites, there is never a Hindu wedding or funeral in which the use of foreign silk is ever thought of. The amount of import into Bengal of silks of all kinds bears no comparison to the amount of export, and the tendency is not towards increase. Table M shows that during six recent years an average of only about Rs. 9,651 worth of raw silk has been imported into Bengal, while the export of raw silk from Bengal into other countries and into other Provinces of India is worth over a crore of rupees (vide Table H.) There is practically no import of waste silk into Bengal, while the export is valued at over 10 lakhs. About Rs. 25,000 of sewing silk, about 5 lakhs of rupees' worth of silk piece-goods, about 5 lakhs of rupees of piece-goods made of inferior fibre mixed with silk, and about Rs. 9,000 worth of ribbons and other silk goods are now imported annually into Bengal from foreign countries, or a total of less than 11 lakhs. Against this we have 50 lakhs' worth of Bengal Silk Fabrics only, most of which
is woven to meet the requirements of this country. Table K gives figures for import for the whole of India, which no doubt shows some tendency towards increase during the last 30 years, but not more than is warranted by the consideration of increase of population and of prosperity. Besides such articles as sewing silk, ribbons, etc., are imported into India almost exclusively for the European and Eurasian population. The wardrobe of an ordinary Hindu or Muhammadan may have no cotton or woollen fabrics produced in Indian looms; it may not have any foreign silks, but it is very rarely without some Indian silks. It is also well recognised that Bengal silks last for many years, and if carefully used, they last for two or three generations, while foreign silks are never lasting. That Bengal produces 50 lakhs of rupees' worth of fabrics and imports only 11 lakhs of rupees' worth of silks of all sorts is in itself a strong proof of the native vitality and stability of the Bengal silk industry.

155. There is another point of very considerable importance which has a direct connection with the increased use of indigenous silk fabrics in India. The spread of English education has resulted in a very peculiar degree in a widely spread sentiment of patriotism, and the use of indigenous articles that are of real intrinsic merit is spreading very rapidly among the educated classes. The development in the manufacture of high-class silks has been quite phenomenal in the Mirzapur centre of the Murshidabad industry within recent years.

156. It may be mentioned here that the value of Bengal raw silk in foreign-markets has depreciated to about half of what it was 20 years ago. This depreciation rather than any material diminution of produce has resulted in considerable strain, chiefly in the condition of the foreign trade with Europe. The depreciation in the value of Bengal raw-silk in European markets has resulted in no appreciable change in the selling price of cocoons or of khamru silk, and the strain which is felt by European exporters is hardly shared by native cocoon-reapers, silk-spinners, or silk-weavers, who do not depend mainly on the condition of the European markets for the sale of their respective produce. The European silk factor may buy cocoons for Rs. 30 a maund and lose money by doing so, while the khamru spinner may pay Rs. 32 for the same cocoons and pay higher wages to his workers, and sell his poor silk for Rs. 14 a seer, while the superior European flat-reeled silk scarcely fetches a higher price. The native competition is keen, and in some localities, as in Maldah, more than equal. This competition is injurious to the European trade, but so far it has been conducive to the prosperity of the industry as a whole; but should European silk factors ever retire from the field altogether, the harm that will be effected to the Bengal silk industry will be incalculable. Bogra and Mirzapur are now suffering keenly owing to the withdrawal, entire in the one case and partial in the other, of European enterprise. Native merchants (chiefly Marwari money-lenders) try to take all the good out of an industry, and ultimately leave it in a wretched condition. There is always money-lending at high rates of interest associated with native enterprise, and in the absence of European rivalry this money-lending saps the foundation of any industry.

157. I would conclude this chapter by a quotation from the "Hand-book of Sericulture":

"Import of silk into India—The import of foreign silk thread into India has declined considerably of recent years, while the transhipment of Bengal silk thread into other parts of India has developed with rapid bounds during the same period. The figures given below will show to what insignificant proportions the import trade in foreign silk thread has been reduced within recent years:"

<table>
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<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Seers</td>
<td>Rs.</td>
</tr>
<tr>
<td>1885-86</td>
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<td>1889-90</td>
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</tbody>
</table>

The import of silk into India consists chiefly in piece-goods. The total import of silk thread and silk pieces for four years since 1889 has been:

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1889-90</td>
<td>2,84,51,600</td>
</tr>
<tr>
<td>1890-91</td>
<td>2,50,14,300</td>
</tr>
<tr>
<td>1891-92</td>
<td>3,01,46,360</td>
</tr>
<tr>
<td>1892-93</td>
<td>2,81,76,510</td>
</tr>
</tbody>
</table>
"From what has been said, it can be clearly inferred that India buys two or three crore of rupees' worth of foreign silk. This is the least hopeful feature of the Indian silk trade. If India bought two or three crores of rupees' worth of English silk, she could have conserved herself with the thought that it was a price paid for loyalty to England. But nearly the whole of this import is from continental countries and not from England. England on her part has been showing anxiety of late for utilising more of the Indian raw material. The condition of the English silk trade, again, has become most deplorable. England now imports annually about 24 crores of rupees' worth of silk from other countries, while she exports only three crores of rupees' worth. For England to buy 17 to 18 crores of rupees' worth of silk-pieces manufactured in France, Germany, Switzerland and Italy is not to her advantage. England has not always used foreign silks in such large quantities. For the last 30 years the import of foreign silks into England has steadily increased, while the export of English silks into other countries has steadily declined. The more silk thread she imports and the less of piece-goods she exports, the better it is for her. But the course of the English silk trade has gone on exactly in the reverse order for the last 30 years. It is pretty nearly certain that England will be unable to compete successfully with other European countries in the silk trade. English labourers are not satisfied with the wages of even Rs. 60 per month. Italian and French labourers are quite as skilful as English labourers in weaving silk, but they receive about Rs. 30 to Rs. 40 per month. The labour strikes we constantly hear of from England are most intense in the case of silk factories. The foremost silk-weaving establishments in England (viz., those of Messrs. Lister and Company) sometimes find it difficult to work more than four days in the week. A few years ago Messrs. Lister and Company used to export about fifty lakhs of rupees' worth (£30,000) of velvet per annum to America alone. The American export of velvet of this Company has gone down to about six lakhs of rupees (£25,000) worth per annum. It seems to be only one means now by which England can combat successfully with the continental silk trade, viz., by transferring the centres of competition from Manchester, Manningham, and Leek to Baluchar, Mirzapur, Benares, Amritsar, and Srinagar. Such a policy alone can restore the commercial supremacy which England enjoyed in the days of the East India Company. The interests of England and India are identical in regard to the silk trade. Indian silk-weavers are artisans of no mean order. Skilled Indian labour guided by English enterprise can produce silks of European excellence and finish. Indian weavers work on the monthly wages of Rs. 5 or Rs. 6 only."

158. A visit to the Economic section of the Indian Museum, where silks of very superior quality manufactured in Europe out of Kashmir silk, since the above remarks were published, are prominently displayed, would amply satisfy any one of the cogency of these remarks.

CHAPTER XII.

STATISTICAL TABLES.

A few explanatory notes bringing out the special information which is desired to be conveyed in each case by the following tables are given below:

Table A.—The population of Bengal which depend on the silk industry.—This Table, compiled from the census figures of 1901 and 1891, shows that the silk-weaving industry of Bengal has made considerable strides during the last decade. The number of silk weavers including silk dyers and sellers of silk cloths, increased from 27,301 in 1891 to 43,836 in 1901. This table, however, also shows a very serious falling off in the number of mulberry growers, silkworm rearers and cocoon-gatherers, the numbers for 1891 and 1901 being respectively 92,318 and 55,256. It does not, however, appear very clear, how the number of spinners could have remained about the same, i.e., 19,904 in 1901 as against 19,238 in 1891, and how the number of weavers has increased so largely, if there has been an actual falling off in the number of cocoon rearers and mulberry growers. In page 32, paragraph 69, it has been shown, how the silk industry of India, which is virtually the silk industry of Bengal, declined from 1875 to 1885, but that since then there has been a steady improvement for the last 16 years. The improvement in the export trade in raw silk which is a fact, and the improvement in the silk-weaving industry, cannot be accounted for by the figures for silkworm-rearers and cocoon-gatherers as given in the census tables for 1901. A very considerable proportion of cocoon rearers must have been returned as cultivators pure and simple. I am inclined to put the number of mulberry growers, cocoon-rearers and sellers, including "partially agriculturist" and "dependants" at even a higher figure than 92,318, which was the figure for 1891, and estimate the total population of Bengal which depends wholly or partly on the silk industry at 160,000 instead of 118,189, the corresponding figure for 1891 being 138,557.
Table B.—Relative importance of the different branches of the Bengal silk industry.—This Table has been based on the census figures for 1891. I do not think the silk-rearing industry has declined to that extent at any rate within the last ten years to which the census tables for 1901 would lead us to suppose it has. The figures for 1891 also are very low in some cases for cocoon-rearers. Palamau, Manbhum and Singhbhum which have "Nil" against them under this heading, must have thousands of Tusser-rearing Senthals and others living in them, as will appear from the district monographs which will be quoted later on. The tendency to class cocoon-rearers as pure cultivators was only more exaggerated during the last census. The Tusser and Endi rearing industries are far more extensive than this Table would lead one to infer, and the mulberry silk industry also has been understated in the departments both of rearing and weaving.

Table C.—Export of raw silk, waste and silk piece goods from India to foreign countries during the last twenty years.—This Table shows improvement in the export of raw silk and waste, but a considerable decline in the export of piece goods. It is compiled from the Annual Report of the Bengal Chamber of Commerce for 1901 and the Annual Statement of the Director-General of Statistics for 1902. The figures must be considered reliable. But it should not be inferred from these that the silk-weaving industry of Bengal has been declining of late years. There is no doubt a great decline in the export of Corahs and other cheap silks to foreign countries, but the use of indigenous silks has been increasing by leaps and bounds during recent years in India itself. This improvement has more than compensated for the decline in the export trade in Indian silks to other countries.

Table D.—More detailed view of export of silk from India by sea.—This Table, compiled from the Annual Statement of the Director-General of Statistics for 1903, shows the present strength of the export trade in the different branches of the silk industry, the total value coming up to about seventy lakhs of rupees.

Table E.—Countries to which Bengal silk (raw and manufactured) is exported. This Table has been compiled from the Bengal Administration Report for 1900-1901. It shows how England, France, Australia and Arabia including Turkey in Asia are the greatest patrons of the manufactured silks of this Province, while France, England, Italy and Turkey in Asia are the greatest patrons of the Bengal raw silk.

Table F.—Relative importance of English, French and Nankina trade in Bengal silk fabrics.—This Table has been compiled from the Bengal Administration Reports and from the Annual Report of the Bengal Chamber of Commerce. It shows how Bengal silk has been losing the patronage of France of late years, also the greater stability of the English and Arabian markets as the natural outlets for Bengal silk fabrics.

Table G.—Exports of raw silk (including cocoons) from Calcutta.—This table gives in a succinct form the relative importance of different foreign and Indian markets over sea for the Bengal raw silk.

Table H.—Export of raw silk from different parts of India by rail and river.—This table shows how the indigenous raw silk in circulation in the country is about 32,000 mounds against 16,000 mounds of foreign raw silk, and nearly 27,000 mounds out of 32,000 mounds represent what goes out from Bengal filatures and indigenous ghais. The value of 32,000 mounds of raw silk, about 12,000 mounds of which is 'waste', is about one crore and twelve lakhs of rupees. As the value of the raw silk exported to foreign countries is about fifty lakhs (vide Table D), the value of what is utilised in the other Provinces of India is about seventy lakhs of rupees, producing cloth to the value of at least a crore of rupees.

Table I.—Export of silk piece goods from different parts of India by rail and river.—This table shows how the indigenous silk fabrics of India in circulation in the country is more than double in quantity of foreign silks. The value of 7,000 mounds of silk fabrics is over fifty lakhs of rupees. Of this ten or eleven lakhs (vide Table D) only represent foreign export. Of the 6,925 mounds of indigenous silks, Bengal sends out 4,135 mounds, and calculating the price of one mound of manufactured silk at Rs. 800, the value of the export from Bengal looms comes to over 33 lakhs of rupees, of which twenty-five lakhs represent the export to other Provinces and eight lakhs over sea.
Table K.—Imports of silk into India from foreign countries during thirty years.

Table L.—More detailed view of imports of foreign silk into India.

Table M.—Import of foreign silk into Bengal.—These three tables being studied together show that Bengal uses comparatively little of foreign silks, either raw or manufactured.

Table N.—Import of raw silk into different parts of India by rail and river.—This table shows how Bombay and the Punjab are the most prominent importers of foreign raw silk for manufacturing purposes, while the Central Provinces and Madras are the chief places next to Bengal where the indigenous raw silk is used for manufacturing purposes. It also shows how much Indian raw silk is used in the country as foreign raw silk.

Table O.—Import of silk piece goods into different parts of India by rail and river.—This table shows how Calcutta is the principal emporium of Indian silks, while the Punjab, the United Provinces and Bombay also patronise Indian silk fabrics to a considerable extent.

Table P.—Imports of raw silk (including cocoons) from the different districts of Bengal into Calcutta.—This table compiled from the Bengal Administration Report gives some idea of the produce of silk in different districts of Bengal. It does not take into consideration the raw silk that goes to the other provinces of India, nor what is used in the Bengal looms, nor does it give a fair idea even of the relative production of different districts. Malda comes out at a great disadvantage in this table as the silk filatures of Malda send a good deal of their produce to the central factory of Rajeshahi by country boats, &c., to be there tested and packed up before despatch to Calcutta.

Table Q.—External Railway Traffic of Bengal in silk.

Table R.—Internal Railway Traffic of Bengal in silk.—These two tables have been considered at length in pages 55 and 56 of this Monograph.

Table S.—Relative importance of export and import of Bengal silk.—This table brings out the importance of the export trade in Bengal silk and the insignificance of the import trade in foreign silks.

Table T.—World’s Production of silk.

Table U.—World’s Importations of silk.

Table V.—World’s Exportations of silk.

Table X.—Consumption of mulberry raw silk in different countries.

Table Y.—Consumption of spun silk in different countries.

Table Z.—Total consumption of silk yarn in different countries.—These tables, taken from M. Natalis Rondot’s work L’Industrie de la soie en France (1894), explain themselves, and they show the position occupied by India (i.e., by Bengal chiefly) as a producer and user of silk among the many silk producing countries of the world.

### Table A.

The population of Bengal which depend on the Silk industry.

<table>
<thead>
<tr>
<th>NAME OF DISTRICTS</th>
<th>Silk worm raisers, cocoons gathereers, &amp;c.</th>
<th>Silk spinners and filature staff.</th>
<th>Silk weavers, dyers, sellers, &amp;c.</th>
<th>Total population depending on silk industry.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1901</td>
<td>1901</td>
<td>1901</td>
<td>1901</td>
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<tr>
<td>Burdwan</td>
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<td>Patna</td>
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<tr>
<td>Calcutta</td>
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<tr>
<td>Nadia</td>
<td></td>
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<td></td>
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<tr>
<td>Gorakhpur</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total for Burdwan Division</td>
<td></td>
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<td></td>
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<tr>
<td>Total for Presidency Division</td>
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<tr>
<td>Carried over</td>
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</tbody>
</table>

Remarks:

The number of cocoons-reapers including "partly agriculturists" and "dependents" could not have declined so very much within the last decade, while the filature industry scarcely shows any deterioration and the weaving industry shows considerable expansion. The figures for cocoons-reapers are evidently too low, and these must have been generally classed as cultivators, in most districts. There being only 19 cocoons-reapers including dependents in Nadia, for instance, is on the very face of it, absurd.
<table>
<thead>
<tr>
<th>Name of Districts</th>
<th>Silk worm reapers, cocoon growers, and Mulberry growers</th>
<th>Silk spinners and distillery staff</th>
<th>Silk weavers, dyers, sellers, &amp;c.</th>
<th>Total population depending on silk</th>
<th>Remarks</th>
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<tbody>
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<td></td>
<td>1901</td>
<td>1902</td>
<td>1901</td>
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<td>13 Rajabah</td>
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<td>8,705</td>
<td>1,344</td>
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<td>21 Dinajpur</td>
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<td>Total for Dina Division</td>
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<td>24 Tippu</td>
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<td>25 Tippu</td>
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<td>26 Tippu</td>
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<td>27 Chittagong Hill Tracts</td>
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<tr>
<td>Total for Chittagong Hill Division</td>
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<tr>
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<td>31 Pelle</td>
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<td>1</td>
<td>1</td>
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<td>38 Cuttack</td>
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<td>20</td>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
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<td>53 Sutalo Chhota</td>
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<td>16</td>
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<tr>
<td>Total for Sutalo Chhota Division</td>
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<td>16</td>
<td>16</td>
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<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Total for whole Bengal</td>
<td>33,256</td>
<td>33,256</td>
<td>19,054</td>
<td>19,054</td>
<td>43,528</td>
</tr>
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</table>
## Table B.

### Relative importance of the different branches of the Bengal silk industry.

(Table based on the Census figures for 1891.)*

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<td>N11</td>
<td>6</td>
<td>N11</td>
<td>6</td>
<td>N11</td>
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<tr>
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*The Census figures for the silk industry for 1891 appearing to me more unreliable than those of 1891. I have based this Table on the Census figures for 1891.

N. C. R.
Table C.

Export of raw-silk, "waste," and silk piece-goods from India to foreign countries during the last twenty years.

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<th>YEAR</th>
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<th>Waste</th>
<th>Silk piece-goods</th>
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<td>lbs.</td>
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<td>yds.</td>
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<td>748,693</td>
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<tr>
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<td>601,576</td>
<td>834,405</td>
<td>2,658,217</td>
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<tr>
<td>1883-84</td>
<td>673,309</td>
<td>885,365</td>
<td>2,781,128</td>
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<tr>
<td>1884-85</td>
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<td>950,983</td>
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<td>1885-86</td>
<td>358,071</td>
<td>1,023,807</td>
<td>3,728,213</td>
</tr>
<tr>
<td>1886-87</td>
<td>449,515</td>
<td>1,020,595</td>
<td>3,161,179</td>
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<td>1887-88</td>
<td>453,568</td>
<td>998,255</td>
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<td>1888-89</td>
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<td>1890-91</td>
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<td>1898-99</td>
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<td>1899-1900</td>
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Table D.

More detailed view of export of Silk from India by Sea.

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<th>1893-94</th>
<th>1895-96</th>
<th>1897-98</th>
<th>1899-1900</th>
<th>1901-1902</th>
<th>Average export of five years</th>
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<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
</tr>
<tr>
<td></td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>60,724,530</td>
<td>lbs. 60,724,530</td>
</tr>
</tbody>
</table>

Total value | Rs. 60,724,530
### Table E

Countries to which Bengal Silk (raw and manufactured) is exported.

<table>
<thead>
<tr>
<th></th>
<th>Raw.</th>
<th>Manufactured.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1867-68</td>
<td>1868-69</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>France</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Germany</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Italy</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Portugal</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Turkey in Asia</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Other Countries</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

### Table F

Relative importance of English, French, and Nukoda trade in Bengal silk fabrics.

<table>
<thead>
<tr>
<th>Year</th>
<th>To United Kingdom of Great Britain and Ireland</th>
<th>To France</th>
<th>To Arabia and Turkey in Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yds.</td>
<td>Yds.</td>
<td>Yds.</td>
</tr>
<tr>
<td>1787-79</td>
<td>888,337</td>
<td>426,882</td>
<td>134,649</td>
</tr>
<tr>
<td>1789-80</td>
<td>1,074,479</td>
<td>687,437</td>
<td>131,372</td>
</tr>
<tr>
<td>1802-81</td>
<td>858,024</td>
<td>861,500</td>
<td>138,853</td>
</tr>
<tr>
<td>1821-32</td>
<td>749,961</td>
<td>978,446</td>
<td>127,716</td>
</tr>
<tr>
<td>1833-44</td>
<td>1,611,720</td>
<td>624,398</td>
<td>105,250</td>
</tr>
<tr>
<td>1845-56</td>
<td>1,368,481</td>
<td>1,003,356</td>
<td>82,925</td>
</tr>
<tr>
<td>1857-68</td>
<td>2,580,285</td>
<td>924,036</td>
<td>130,218</td>
</tr>
<tr>
<td>1869-70</td>
<td>2,336,056</td>
<td>618,621</td>
<td>102,180</td>
</tr>
<tr>
<td>1871-82</td>
<td>2,574,534</td>
<td>691,590</td>
<td>25,837</td>
</tr>
<tr>
<td>1883-84</td>
<td>1,907,905</td>
<td>710,591</td>
<td>72,996</td>
</tr>
<tr>
<td>1885-96</td>
<td>1,430,859</td>
<td>738,776</td>
<td>72,334</td>
</tr>
<tr>
<td>1897-98</td>
<td>1,448,010</td>
<td>392,326</td>
<td>51,526</td>
</tr>
<tr>
<td>1899-00</td>
<td>1,084,310</td>
<td>412,184</td>
<td>87,141</td>
</tr>
<tr>
<td>1900-01</td>
<td>1,067,775</td>
<td>295,228</td>
<td>94,563</td>
</tr>
<tr>
<td>1893-94</td>
<td>1,326,165</td>
<td>339,166</td>
<td>95,205</td>
</tr>
<tr>
<td>1895-96</td>
<td>789,240</td>
<td>291,538</td>
<td>111,466</td>
</tr>
<tr>
<td>1896-97</td>
<td>789,136</td>
<td>359,051</td>
<td>215,439</td>
</tr>
<tr>
<td>1897-98</td>
<td>726,595</td>
<td>345,469</td>
<td>206,829</td>
</tr>
<tr>
<td>1898-99</td>
<td>735,191</td>
<td>125,033</td>
<td>138,653</td>
</tr>
<tr>
<td>1899-00</td>
<td>776,350</td>
<td>116,173</td>
<td>102,811</td>
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<tr>
<td>1900-01</td>
<td>816,581</td>
<td>169,787</td>
<td>70,820</td>
</tr>
<tr>
<td>1901-02</td>
<td>665,315</td>
<td>174,715</td>
<td>97,193</td>
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### Table G

**Exports of Raw Silk (including cocoons) from Calcutta.**

<table>
<thead>
<tr>
<th>Year</th>
<th>1896-97 (Mds.)</th>
<th>1897-98 (Mds.)</th>
<th>1898-99 (Mds.)</th>
<th>1899-1900 (Mds.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To United Kingdom</td>
<td>5,064</td>
<td>9,152</td>
<td>6,733</td>
<td>8,406</td>
</tr>
<tr>
<td>Other Foreign ports</td>
<td>9,432</td>
<td>6,871</td>
<td>8,925</td>
<td>10,934</td>
</tr>
<tr>
<td>Madras</td>
<td>2,706</td>
<td>1,206</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Other ports in Madras</td>
<td>126</td>
<td>118</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Bombay</td>
<td>622</td>
<td>1,048</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other Indian ports</td>
<td>156</td>
<td>157</td>
<td>170</td>
<td>14</td>
</tr>
<tr>
<td>Burma</td>
<td>153</td>
<td>134</td>
<td>212</td>
<td>212</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18,259</strong></td>
<td><strong>18,686</strong></td>
<td><strong>16,971</strong></td>
<td><strong>20,248</strong></td>
</tr>
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</table>

### Table H

**Export of Raw Silk from different parts of India by rail and river during recent years.**

<table>
<thead>
<tr>
<th>Year</th>
<th>1897-98 (Mds.)</th>
<th>1898-99 (Mds.)</th>
<th>1899-1900 (Mds.)</th>
<th>1900-1901 (Mds.)</th>
<th>1901-1902 (Mds.)</th>
<th>Average (Mds.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Foreign</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Provinces (excluding chief sea-ports)</td>
<td>194</td>
<td>50</td>
<td>72</td>
<td>73</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>Native States</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Chief sea ports—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bombay</td>
<td>18,478</td>
<td>17,900</td>
<td>15,027</td>
<td>11,558</td>
<td>15,979</td>
<td></td>
</tr>
<tr>
<td>Karachi</td>
<td>900</td>
<td>972</td>
<td>1,219</td>
<td>1,028</td>
<td>2,839</td>
<td></td>
</tr>
<tr>
<td>Other ports</td>
<td>85</td>
<td>9</td>
<td>85</td>
<td>43</td>
<td>77</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16,657</strong></td>
<td><strong>18,931</strong></td>
<td><strong>16,406</strong></td>
<td><strong>12,701</strong></td>
<td><strong>19,816</strong></td>
<td><strong>16,502</strong></td>
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<tr>
<td>(2) Indian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Provinces (excluding chief sea-ports)</td>
<td>23,825</td>
<td>23,579</td>
<td>24,089</td>
<td>18,160</td>
<td>24,212</td>
<td></td>
</tr>
<tr>
<td>Bengal</td>
<td>1,124</td>
<td>946</td>
<td>2,388</td>
<td>1,778</td>
<td>4,414</td>
<td></td>
</tr>
<tr>
<td>Other Provinces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24,948</strong></td>
<td><strong>24,525</strong></td>
<td><strong>26,477</strong></td>
<td><strong>19,928</strong></td>
<td><strong>28,626</strong></td>
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</tr>
<tr>
<td>Native States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mysore</td>
<td>2,903</td>
<td>2,666</td>
<td>3,128</td>
<td>4,099</td>
<td>5,149</td>
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<tr>
<td>Other States</td>
<td>75</td>
<td>1</td>
<td>327</td>
<td>53</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>Chief sea ports—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcutta</td>
<td>1,808</td>
<td>2,401</td>
<td>1,164</td>
<td>1,632</td>
<td>2,109</td>
<td></td>
</tr>
<tr>
<td>Bombay</td>
<td>751</td>
<td>388</td>
<td>1,918</td>
<td>363</td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>Karachi</td>
<td>296</td>
<td>346</td>
<td>728</td>
<td>415</td>
<td>329</td>
<td></td>
</tr>
<tr>
<td>Madras ports</td>
<td>1,928</td>
<td>800</td>
<td>490</td>
<td>160</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32,125</strong></td>
<td><strong>30,984</strong></td>
<td><strong>34,406</strong></td>
<td><strong>26,670</strong></td>
<td><strong>36,606</strong></td>
<td><strong>32,153</strong></td>
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</table>
Table J

Export of Silk Piece-goods from different parts of India by rail and river during recent years.

<table>
<thead>
<tr>
<th>Year</th>
<th>1897-98</th>
<th>1898-99</th>
<th>1899-1900</th>
<th>1900-1901</th>
<th>1901-1902</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mds</td>
<td>Mds</td>
<td>Mds</td>
<td>Mds</td>
<td>Mds</td>
<td>Mds</td>
<td>Mds</td>
</tr>
<tr>
<td>(1) FOREIGN.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Provinces (excluding chief sea-ports).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native States</td>
<td>71</td>
<td>169</td>
<td>25</td>
<td>68</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chief sea-ports —</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bombay</td>
<td>1,877</td>
<td>3,781</td>
<td>2,468</td>
<td>1,335</td>
<td>2,086</td>
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</tr>
<tr>
<td>Karachi</td>
<td>1,034</td>
<td>437</td>
<td>463</td>
<td>692</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other ports</td>
<td>52</td>
<td>481</td>
<td>194</td>
<td>38</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3,468</td>
<td>4,886</td>
<td>3,073</td>
<td>2,736</td>
<td>2,781</td>
<td>3,386</td>
</tr>
<tr>
<td>(2) INDIAN.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Provinces (excluding chief sea-ports).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assam</td>
<td>490</td>
<td>364</td>
<td>355</td>
<td>318</td>
<td>458</td>
<td></td>
</tr>
<tr>
<td>Bengal</td>
<td>4,088</td>
<td>3,140</td>
<td>2,443</td>
<td>2,142</td>
<td>2,399</td>
<td>3,456</td>
</tr>
<tr>
<td>Bombay</td>
<td>735</td>
<td>698</td>
<td>2,443</td>
<td>417</td>
<td>844</td>
<td></td>
</tr>
<tr>
<td>Other Provinces</td>
<td>496</td>
<td>230</td>
<td>466</td>
<td>722</td>
<td>193</td>
<td></td>
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<tr>
<td>Native States</td>
<td>89</td>
<td>63</td>
<td>19</td>
<td>3</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Chief sea-ports —</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcutta</td>
<td>724</td>
<td>518</td>
<td>346</td>
<td>311</td>
<td>1,417</td>
<td>675</td>
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<tr>
<td>Bombay</td>
<td>658</td>
<td>913</td>
<td>801</td>
<td>782</td>
<td>1,279</td>
<td></td>
</tr>
<tr>
<td>Other ports</td>
<td>106</td>
<td>211</td>
<td>374</td>
<td>788</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7,512</td>
<td>6,117</td>
<td>5,356</td>
<td>8,443</td>
<td>7,385</td>
<td>6,925</td>
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</table>

Table K

Imports of Silk into India from foreign countries.

<table>
<thead>
<tr>
<th>Year</th>
<th>Yarn</th>
<th>Piece-goods</th>
<th>Silk mixed with other materials</th>
</tr>
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<td>Lbs.</td>
<td>Yards</td>
<td>Yards</td>
</tr>
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<td>1870-71</td>
<td>2,328,854</td>
<td>4,653,411</td>
<td></td>
</tr>
<tr>
<td>1871-72</td>
<td>1,799,723</td>
<td>4,775,023</td>
<td></td>
</tr>
<tr>
<td>1872-73</td>
<td>1,933,565</td>
<td>5,010,632</td>
<td></td>
</tr>
<tr>
<td>1873-74</td>
<td>2,284,836</td>
<td>5,469,168</td>
<td></td>
</tr>
<tr>
<td>1874-75</td>
<td>2,469,372</td>
<td>7,266,159</td>
<td></td>
</tr>
<tr>
<td>1875-76</td>
<td>2,408,274</td>
<td>770,280</td>
<td>346,270</td>
</tr>
<tr>
<td>1876-77</td>
<td>1,403,057</td>
<td>5,075,749</td>
<td></td>
</tr>
<tr>
<td>1877-78</td>
<td>2,167,345</td>
<td>7,680,711</td>
<td>1,248,005</td>
</tr>
<tr>
<td>1878-79</td>
<td>1,813,999</td>
<td>7,300,804</td>
<td>1,535,965</td>
</tr>
<tr>
<td>1879-80</td>
<td>2,002,050</td>
<td>7,467,815</td>
<td>1,039,403</td>
</tr>
<tr>
<td>1880-81</td>
<td>2,511,802</td>
<td>11,628,163</td>
<td>1,945,922</td>
</tr>
<tr>
<td>1881-82</td>
<td>1,683,663</td>
<td>10,397,147</td>
<td>1,404,417</td>
</tr>
<tr>
<td>1882-83</td>
<td>2,355,940</td>
<td>8,514,213</td>
<td>1,155,142</td>
</tr>
<tr>
<td>1883-84</td>
<td>2,210,781</td>
<td>9,627,673</td>
<td>922,388</td>
</tr>
<tr>
<td>1884-85</td>
<td>1,814,282</td>
<td>10,501,778</td>
<td>1,155,142</td>
</tr>
<tr>
<td>1885-86</td>
<td>1,724,677</td>
<td>8,990,399</td>
<td>1,155,142</td>
</tr>
<tr>
<td>1886-87</td>
<td>1,733,007</td>
<td>10,541,862</td>
<td>2,626,011</td>
</tr>
<tr>
<td>1887-88</td>
<td>2,595,635</td>
<td>11,760,401</td>
<td>3,970,372</td>
</tr>
<tr>
<td>1888-89</td>
<td>2,038,529</td>
<td>10,952,732</td>
<td>4,223,332</td>
</tr>
<tr>
<td>1889-90</td>
<td>2,360,058</td>
<td>11,426,168</td>
<td>3,978,949</td>
</tr>
<tr>
<td>1890-91</td>
<td>2,405,721</td>
<td>10,932,619</td>
<td>1,997,677</td>
</tr>
<tr>
<td>1891-92</td>
<td>2,088,391</td>
<td>11,790,744</td>
<td>3,146,107</td>
</tr>
<tr>
<td>1892-93</td>
<td>2,583,293</td>
<td>12,558,447</td>
<td>2,844,631</td>
</tr>
<tr>
<td>1893-94</td>
<td>2,943,705</td>
<td>13,355,422</td>
<td>3,062,298</td>
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<tr>
<td>1894-95</td>
<td>2,493,614</td>
<td>9,955,154</td>
<td>3,992,772</td>
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<tr>
<td>1895-96</td>
<td>3,023,825</td>
<td>13,369,494</td>
<td>5,031,282</td>
</tr>
<tr>
<td>1896-97</td>
<td>2,285,818</td>
<td>10,865,569</td>
<td>5,693,313</td>
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<tr>
<td>1897-98</td>
<td>2,049,608</td>
<td>10,185,716</td>
<td>4,012,052</td>
</tr>
<tr>
<td>1898-99</td>
<td>2,350,866</td>
<td>12,271,372</td>
<td>4,393,684</td>
</tr>
<tr>
<td>1899-1900</td>
<td>1,694,848</td>
<td>8,512,032</td>
<td>3,633,836</td>
</tr>
<tr>
<td>1900-1901</td>
<td>2,533,377</td>
<td>17,415,318</td>
<td>3,208,349</td>
</tr>
<tr>
<td>1901-1902</td>
<td>2,182,453</td>
<td>12,695,260</td>
<td>4,247,000</td>
</tr>
</tbody>
</table>
TABLE L
More detailed view of imports of foreign Silk into India.

<table>
<thead>
<tr>
<th>Raw Silk</th>
<th>1897-98</th>
<th>1898-99</th>
<th>1899-1900</th>
<th>1900-1901</th>
<th>1901-1902</th>
<th>Average of five years</th>
</tr>
</thead>
<tbody>
<tr>
<td>lbs.</td>
<td>Rs.</td>
<td>lbs.</td>
<td>Rs.</td>
<td>lbs.</td>
<td>Rs.</td>
<td>lbs.</td>
</tr>
<tr>
<td>Raw Silk</td>
<td>1,611</td>
<td>8,846</td>
<td>1,016,881</td>
<td>12,26,671</td>
<td>1,597</td>
<td>16,018</td>
</tr>
<tr>
<td>Silk piece-goods</td>
<td>1,124</td>
<td>2,917</td>
<td>1,709,122</td>
<td>13,96,224</td>
<td>9,407</td>
<td>45,956</td>
</tr>
<tr>
<td>Goods of Silk mixed</td>
<td>3,950</td>
<td>6,556</td>
<td>903,957</td>
<td>7,42,778</td>
<td>6,330</td>
<td>35,237</td>
</tr>
<tr>
<td>with other materials</td>
<td>1,683</td>
<td>6,556</td>
<td>1,414,557</td>
<td>10,07,375</td>
<td>6,077</td>
<td>40,685</td>
</tr>
<tr>
<td>Sowing thread</td>
<td>5,957</td>
<td>9,255</td>
<td>1,308,549</td>
<td>11,26,619</td>
<td>3,896</td>
<td>19,658</td>
</tr>
<tr>
<td>Other yarns</td>
<td>15,494</td>
<td>22,055</td>
<td>905,627</td>
<td>8,93,087</td>
<td>3,983</td>
<td>11,594</td>
</tr>
</tbody>
</table>

Average consumption of foreign silk in Bengal.

<table>
<thead>
<tr>
<th></th>
<th>lbs.</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw silk</td>
<td>4,966</td>
<td>9,651</td>
</tr>
<tr>
<td>Silk piece-goods (pure and mixed)</td>
<td>1,223,883</td>
<td>1,054,276</td>
</tr>
<tr>
<td>Other silk goods</td>
<td>5,359</td>
<td>28,596</td>
</tr>
</tbody>
</table>

TABLE M
Import of foreign Silk into Bengal.

<table>
<thead>
<tr>
<th>Year</th>
<th>Raw silk</th>
<th>Silk piece-goods (pure and mixed)</th>
<th>Other silk goods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs.</td>
<td>Rs.</td>
<td>lbs.</td>
</tr>
<tr>
<td>1897-98</td>
<td>1,611</td>
<td>8,846</td>
<td>1,016,881</td>
</tr>
<tr>
<td>1898-99</td>
<td>1,124</td>
<td>2,917</td>
<td>1,709,122</td>
</tr>
<tr>
<td>1899-1900</td>
<td>3,950</td>
<td>6,556</td>
<td>903,957</td>
</tr>
<tr>
<td>1900-1901</td>
<td>1,683</td>
<td>6,556</td>
<td>1,414,557</td>
</tr>
<tr>
<td>Total</td>
<td>15,494</td>
<td>22,055</td>
<td>905,627</td>
</tr>
</tbody>
</table>

TABLE N
Import of Raw Silk into different parts of India by rail and river.

<table>
<thead>
<tr>
<th></th>
<th>1897-98</th>
<th>1898-99</th>
<th>1899-1900</th>
<th>1900-1901</th>
<th>1901-1902</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(I) FOREIGN.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>6,156</td>
<td>6,418</td>
<td>4,006</td>
<td>6,413</td>
<td>8,749</td>
<td></td>
</tr>
<tr>
<td>Bombay</td>
<td>7,723</td>
<td>6,850</td>
<td>9,655</td>
<td>8,611</td>
<td>10,968</td>
<td></td>
</tr>
<tr>
<td>Other Provinces</td>
<td>1,460</td>
<td>879</td>
<td>748</td>
<td>861</td>
<td>870</td>
<td></td>
</tr>
<tr>
<td>Native States</td>
<td>16</td>
<td>27</td>
<td>26</td>
<td>116</td>
<td>208</td>
<td></td>
</tr>
<tr>
<td>Chief sea-ports</td>
<td>174</td>
<td>29</td>
<td>26</td>
<td>31</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16,657</td>
<td>18,973</td>
<td>14,405</td>
<td>12,701</td>
<td>19,816</td>
<td></td>
</tr>
</tbody>
</table>

| **(II) INDIAN.** |         |         |           |           |           |         |
| Bengal | 934  | 1,301  | 1,440 | 1,224  | 1,337    |         |
| Central Provinces | 2,190 | 2,126 | 2,414 | 3,794 | 2,269 |         |
| Madras | 1,043 | 843  | 601  | 305   | 1,171   |         |
| Other Provinces | 1,788 | 879 | 808 | 556 | 1,917 |         |
| Native States | 71 | 72 | 79 | 43 | 83 |         |
| Chief sea-ports | 21,746 | 21,317 | 21,704 | 14,699 | 21,389 |         |
| Bombay | 766  | 963   | 1,816 | 1,361  | 3,179    |         |
| Karachi | 2 | 4 | 81 | 15 | 31 |         |
| Madras ports | 2,949 | 2,644 | 3,026 | 4,172 | 6,171 |         |
| Total | 33,125 | 30,984 | 34,406 | 26,670 | 36,606 |         |
### Table O

**Import of Silk piece-goods into different ports of India by rail and river.**

<table>
<thead>
<tr>
<th></th>
<th>1897-98</th>
<th>1898-99</th>
<th>1899-1900</th>
<th>1900-1901</th>
<th>1901-1902</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Provinces (excluding chief sea-ports)</td>
<td>3,207</td>
<td>2,706</td>
<td>2,910</td>
<td>2,044</td>
<td>2,704</td>
</tr>
<tr>
<td>Native States</td>
<td>80</td>
<td>1,949</td>
<td>153</td>
<td>76</td>
<td>68</td>
</tr>
<tr>
<td>Chief sea-ports</td>
<td>61</td>
<td>173</td>
<td>16</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,448</td>
<td>4,828</td>
<td>3,078</td>
<td>2,736</td>
<td>2,781</td>
</tr>
<tr>
<td><strong>2. INDIAN.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Provinces (excluding chief sea-ports)</td>
<td>236</td>
<td>261</td>
<td>445</td>
<td>158</td>
<td>185</td>
</tr>
<tr>
<td>Bengal</td>
<td>1,026</td>
<td>845</td>
<td>609</td>
<td>869</td>
<td>1,099</td>
</tr>
<tr>
<td>United Provinces of Agra</td>
<td>1,391</td>
<td>1,765</td>
<td>1,592</td>
<td>1,725</td>
<td>1,079</td>
</tr>
<tr>
<td>Punjab</td>
<td>386</td>
<td>448</td>
<td>365</td>
<td>1,191</td>
<td>415</td>
</tr>
<tr>
<td>Other Provinces</td>
<td>140</td>
<td>80</td>
<td>24</td>
<td>77</td>
<td>147</td>
</tr>
<tr>
<td>Native States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chief sea-ports</td>
<td>3,206</td>
<td>1,925</td>
<td>1,704</td>
<td>3,806</td>
<td>1,835</td>
</tr>
<tr>
<td>Calcutta</td>
<td>787</td>
<td>673</td>
<td>684</td>
<td>689</td>
<td>596</td>
</tr>
<tr>
<td>Bombay</td>
<td>446</td>
<td>120</td>
<td>93</td>
<td>47</td>
<td>119</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,512</td>
<td>6,117</td>
<td>3,559</td>
<td>8,443</td>
<td>7,385</td>
</tr>
</tbody>
</table>

### Table P

**Imports of Raw silk (including cocoons) from the different districts of Bengal into Calcutta.**

<table>
<thead>
<tr>
<th>From</th>
<th>1896-97</th>
<th>1897-98</th>
<th>1898-99</th>
<th>1899-1900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midnapore</td>
<td>2,141</td>
<td>2,191</td>
<td>1,118</td>
<td>1,127</td>
</tr>
<tr>
<td>Birbhum</td>
<td>886</td>
<td>1,255</td>
<td>745</td>
<td>1,053</td>
</tr>
<tr>
<td>Bankura</td>
<td>113</td>
<td>487</td>
<td>493</td>
<td>135</td>
</tr>
<tr>
<td>Burdwan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hooghly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Howrah</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-Parganas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murshidabad</td>
<td>7,913</td>
<td>9,750</td>
<td>13,227</td>
<td>13,764</td>
</tr>
<tr>
<td>Nadia</td>
<td>997</td>
<td>1,051</td>
<td>1,426</td>
<td>841</td>
</tr>
<tr>
<td>Jessore</td>
<td>15</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rajshahi</td>
<td>3,351</td>
<td>4,290</td>
<td>3,805</td>
<td>4,049</td>
</tr>
<tr>
<td>Bogra</td>
<td>Nil</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maldah</td>
<td>1,088</td>
<td>455</td>
<td>150</td>
<td>242</td>
</tr>
<tr>
<td><strong>Total mulberry silk</strong></td>
<td>16,504</td>
<td>19,553</td>
<td>20,064</td>
<td>21,211</td>
</tr>
<tr>
<td>Gaya</td>
<td>28</td>
<td>9</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Singhbhum</td>
<td>1,281</td>
<td>1,508</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Manbhum</td>
<td>17</td>
<td>Nil</td>
<td>247</td>
<td>102</td>
</tr>
<tr>
<td>Balasore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total of tosser</strong></td>
<td>1,326</td>
<td>1,743</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Assam (chiefly endi)</td>
<td>95</td>
<td>448</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Other Provinces of India</td>
<td>77</td>
<td>11</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Total of all raw silks imported into Calcutta</strong></td>
<td>18,002</td>
<td>21,755</td>
<td>21,512</td>
<td>21,854</td>
</tr>
</tbody>
</table>
### Table Q

**External Railway Traffic of Bengal in Silk.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total.</td>
<td>To Calcutta</td>
</tr>
<tr>
<td>Raw silk (including cocoon), 1905-06</td>
<td>121</td>
<td>60,706</td>
</tr>
<tr>
<td>Raw silk (including cocoon), 1907-08</td>
<td>30</td>
<td>11,450</td>
</tr>
<tr>
<td>Manufactured silk (Indian), 1905-06</td>
<td>82</td>
<td>60,400</td>
</tr>
<tr>
<td>Manufactured silk (Indian), 1907-08</td>
<td>73</td>
<td>48,100</td>
</tr>
</tbody>
</table>

### Table R

**Internal Railway Traffic of Bengal in Silk.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total down traffic.</td>
<td>Down traffic to Calcutta.</td>
</tr>
<tr>
<td>Raw silk (including cocoon), 1905-06</td>
<td>121</td>
<td>1,20,07,002</td>
</tr>
<tr>
<td>Raw silk (including cocoon), 1907-08</td>
<td>30</td>
<td>1,10,08,284</td>
</tr>
<tr>
<td>Manufactured silk (Indian), 1905-06</td>
<td>82</td>
<td>1,90,35,154</td>
</tr>
<tr>
<td>Manufactured silk (Indian), 1907-08</td>
<td>73</td>
<td>1,40,10,002</td>
</tr>
</tbody>
</table>

### Table S

**Relative importance of Export and Import of Bengal Silk.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Raw Silk.</th>
<th>Manufactured Silk.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs.</td>
<td></td>
</tr>
<tr>
<td>1899-90</td>
<td>160</td>
<td>48,301</td>
</tr>
<tr>
<td>1899-90</td>
<td>875</td>
<td>3,71,872</td>
</tr>
</tbody>
</table>
### Table T
**World's Production of Silk.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Silk</th>
<th>Waste</th>
<th>Total production</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>10,500,000</td>
<td>8,500,000</td>
<td>19,000,000</td>
</tr>
<tr>
<td>Japan</td>
<td>3,900,000</td>
<td>3,200,000</td>
<td>71,000,000</td>
</tr>
<tr>
<td>Indo-China</td>
<td>650,000</td>
<td>550,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>India</td>
<td>625,000</td>
<td>550,000</td>
<td>1,175,000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>1,040,000</td>
<td>855,000</td>
<td>1,965,000</td>
</tr>
<tr>
<td>Asiatic Turkey</td>
<td>700,000</td>
<td>650,000</td>
<td>1,350,000</td>
</tr>
<tr>
<td>Turkey in Europe</td>
<td>160,000</td>
<td>50,000</td>
<td>210,000</td>
</tr>
<tr>
<td>Balkan States</td>
<td>30,000</td>
<td>15,000</td>
<td>45,000</td>
</tr>
<tr>
<td>Greece</td>
<td>35,000</td>
<td>20,000</td>
<td>55,000</td>
</tr>
<tr>
<td>Austro-Hungary</td>
<td>2,650,000</td>
<td>220,000</td>
<td>485,000</td>
</tr>
<tr>
<td>Italy</td>
<td>4,200,000</td>
<td>3,600,000</td>
<td>7,800,000</td>
</tr>
<tr>
<td>France</td>
<td>720,000</td>
<td>690,000</td>
<td>1,320,000</td>
</tr>
<tr>
<td>Spain and Portugal</td>
<td>80,000</td>
<td>50,000</td>
<td>130,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>30,000</td>
<td>50,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Germany</td>
<td>Nil</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Great Britain</td>
<td>Nil</td>
<td>30,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Morocco</td>
<td>5,000</td>
<td>5,000</td>
<td>10,000</td>
</tr>
<tr>
<td>United States and Canada</td>
<td>5,000</td>
<td>50,000</td>
<td>55,000</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,000</td>
<td>Nil</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>23,246,000</td>
<td>19,210,000</td>
<td>42,456,000</td>
</tr>
</tbody>
</table>

### Table V
**World's Importations of Silk.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Silk</th>
<th>Waste</th>
<th>Total importation</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Japan</td>
<td>10,000</td>
<td>2,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Indo-China</td>
<td>175,000</td>
<td>600,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>India</td>
<td>40,000</td>
<td>40,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>40,000</td>
<td>200,000</td>
<td>240,000</td>
</tr>
<tr>
<td>Russia in Europe</td>
<td>12,000</td>
<td>12,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Arabia</td>
<td>12,000</td>
<td>12,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Turkey in Asia</td>
<td>200,000</td>
<td>200,000</td>
<td>400,000</td>
</tr>
<tr>
<td>Turkey in Europe</td>
<td>2,000</td>
<td>2,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Balkan States</td>
<td>6,000</td>
<td>6,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Austro-Hungary</td>
<td>500,000</td>
<td>540,000</td>
<td>1,040,000</td>
</tr>
<tr>
<td>Italy</td>
<td>1,400,000</td>
<td>755,000</td>
<td>2,155,000</td>
</tr>
<tr>
<td>France</td>
<td>5,310,000</td>
<td>6,590,000</td>
<td>12,900,000</td>
</tr>
<tr>
<td>Spain and Portugal</td>
<td>125,000</td>
<td>1,300,000</td>
<td>3,425,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2,175,000</td>
<td>2,200,000</td>
<td>4,375,000</td>
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<tr>
<td>Germany</td>
<td>2,390,000</td>
<td>390,000</td>
<td>3,280,000</td>
</tr>
<tr>
<td>Belgium</td>
<td>75,000</td>
<td>75,000</td>
<td>150,000</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1,140,000</td>
<td>3,290,000</td>
<td>4,430,000</td>
</tr>
<tr>
<td>Egypt</td>
<td>170,000</td>
<td>170,000</td>
<td>340,000</td>
</tr>
<tr>
<td>Tuns and Tripoli</td>
<td>75,000</td>
<td>75,000</td>
<td>150,000</td>
</tr>
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<td>Algeria</td>
<td>30,000</td>
<td>30,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Morocco</td>
<td>65,000</td>
<td>65,000</td>
<td>130,000</td>
</tr>
<tr>
<td>United States and Canada</td>
<td>2,650,000</td>
<td>630,000</td>
<td>3,280,000</td>
</tr>
<tr>
<td>Mexico</td>
<td>10,000</td>
<td>10,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Australia</td>
<td>140,000</td>
<td>140,000</td>
<td>280,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17,610,000</td>
<td>14,957,000</td>
<td>32,567,000</td>
</tr>
</tbody>
</table>
### Table W.

**World's Exportations of silk.**

<table>
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<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>4,750,000</td>
<td>3,780,000</td>
<td>8,530,000</td>
</tr>
<tr>
<td>Japan</td>
<td>2,840,000</td>
<td>1,800,000</td>
<td>4,640,000</td>
</tr>
<tr>
<td>Indo-China</td>
<td>75,000</td>
<td>120,000</td>
<td>195,000</td>
</tr>
<tr>
<td>India</td>
<td>160,000</td>
<td>600,000</td>
<td>760,000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>125,000</td>
<td>630,000</td>
<td>755,000</td>
</tr>
<tr>
<td>Turkey in Asia</td>
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<td>550,000</td>
<td>1,170,000</td>
</tr>
<tr>
<td>Turkey in Europe</td>
<td>135,000</td>
<td>20,000</td>
<td>155,000</td>
</tr>
<tr>
<td>Balkan States</td>
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<td>...</td>
<td>10,000</td>
</tr>
<tr>
<td>Greece</td>
<td>22,000</td>
<td>385,000</td>
<td>93,000</td>
</tr>
<tr>
<td>Austria and Hungary</td>
<td>415,000</td>
<td>...</td>
<td>93,000</td>
</tr>
<tr>
<td>Italy</td>
<td>5,200,000</td>
<td>1,670,000</td>
<td>6,870,000</td>
</tr>
<tr>
<td>France</td>
<td>2,430,000</td>
<td>1,900,000</td>
<td>4,330,000</td>
</tr>
<tr>
<td>Spain and Portugal</td>
<td>50,000</td>
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<td>90,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>740,000</td>
<td>700,000</td>
<td>1,440,000</td>
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<tr>
<td>Germany</td>
<td>490,000</td>
<td>550,000</td>
<td>1,040,000</td>
</tr>
<tr>
<td>Belgium</td>
<td>20,000</td>
<td>...</td>
<td>20,000</td>
</tr>
<tr>
<td>Great Britain</td>
<td>105,000</td>
<td>435,000</td>
<td>540,000</td>
</tr>
<tr>
<td>Egypt</td>
<td>4,000</td>
<td>...</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18,191,000</td>
<td>13,180,000</td>
<td>31,371,000</td>
</tr>
</tbody>
</table>

### Table X.

**Consumption of mulberry raw-silk in different countries.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>China</td>
<td>5,750,000</td>
<td>...</td>
<td>5,750,000</td>
</tr>
<tr>
<td>Japan</td>
<td>1,150,000</td>
<td>10,000</td>
<td>1,160,000</td>
</tr>
<tr>
<td>Indo-China</td>
<td>1,000,000</td>
<td>175,000</td>
<td>1,175,000</td>
</tr>
<tr>
<td>India</td>
<td>475,000</td>
<td>625,000</td>
<td>1,100,000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>850,000</td>
<td>...</td>
<td>850,000</td>
</tr>
<tr>
<td>Russia in Europe</td>
<td>...</td>
<td>460,000</td>
<td>460,000</td>
</tr>
<tr>
<td>The Levant</td>
<td>115,000</td>
<td>460,000</td>
<td>515,000</td>
</tr>
<tr>
<td>Austria and Hungary</td>
<td>100,000</td>
<td>360,000</td>
<td>460,000</td>
</tr>
<tr>
<td>Italy</td>
<td>150,000</td>
<td>260,000</td>
<td>410,000</td>
</tr>
<tr>
<td>France</td>
<td>630,000</td>
<td>2,960,000</td>
<td>3,690,000</td>
</tr>
<tr>
<td>Spain and Portugal</td>
<td>40,000</td>
<td>120,000</td>
<td>160,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>40,000</td>
<td>...</td>
<td>40,000</td>
</tr>
<tr>
<td>Germany</td>
<td>1,900,000</td>
<td>900,000</td>
<td>2,800,000</td>
</tr>
<tr>
<td>Great Britain</td>
<td>...</td>
<td>900,000</td>
<td>900,000</td>
</tr>
<tr>
<td>United States and Canada</td>
<td>...</td>
<td>2,650,000</td>
<td>2,650,000</td>
</tr>
<tr>
<td>Mexico</td>
<td>10,000</td>
<td>...</td>
<td>10,000</td>
</tr>
<tr>
<td>Egypt, Tunisia, Algeria, and Morocco</td>
<td>...</td>
<td>250,000</td>
<td>250,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10,280,000</td>
<td>12,450,000</td>
<td>22,730,000</td>
</tr>
</tbody>
</table>
### Table Y.

**Consumption of spun-silk in different countries.**

<table>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>China</td>
<td>1,500,000</td>
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<td>1,500,000</td>
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<tr>
<td>Japan</td>
<td>400,000</td>
<td></td>
<td>400,000</td>
</tr>
<tr>
<td>Indo-China</td>
<td>200,000</td>
<td></td>
<td>200,000</td>
</tr>
<tr>
<td>India</td>
<td>220,000</td>
<td></td>
<td>220,000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>2,150,000</td>
<td></td>
<td>2,150,000</td>
</tr>
<tr>
<td>Russia in Europe</td>
<td>100,000</td>
<td></td>
<td>100,000</td>
</tr>
<tr>
<td>The Levant</td>
<td>20,000</td>
<td></td>
<td>20,000</td>
</tr>
<tr>
<td>Austria and Hungary</td>
<td>180,000</td>
<td></td>
<td>180,000</td>
</tr>
<tr>
<td>Italy</td>
<td>220,000</td>
<td></td>
<td>220,000</td>
</tr>
<tr>
<td>France</td>
<td>500,000</td>
<td></td>
<td>500,000</td>
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<tr>
<td>Spain and Portugal</td>
<td>125,000</td>
<td></td>
<td>125,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>300,000</td>
<td></td>
<td>300,000</td>
</tr>
<tr>
<td>Germany</td>
<td>900,000</td>
<td></td>
<td>900,000</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1,200,000</td>
<td></td>
<td>1,200,000</td>
</tr>
<tr>
<td>United States and Canada</td>
<td>200,000</td>
<td></td>
<td>200,000</td>
</tr>
<tr>
<td>Mexico</td>
<td>5,000</td>
<td></td>
<td>5,000</td>
</tr>
<tr>
<td>Egypt, Tunis, Algeria, and Morocco</td>
<td>90,000</td>
<td></td>
<td>90,000</td>
</tr>
<tr>
<td>Australia</td>
<td>50,000</td>
<td></td>
<td>50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,870,000</td>
<td>2,105,000</td>
<td>6,975,000</td>
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</tbody>
</table>

### Table Z.

**Total consumption of silk yarn in different countries.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Consumption.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Kilos.</td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>7,250,000</td>
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<tr>
<td>Japan</td>
<td>1,560,000</td>
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<tr>
<td>Indo-China</td>
<td>1,375,000</td>
</tr>
<tr>
<td>India</td>
<td>1,320,000</td>
</tr>
<tr>
<td>Central Asia</td>
<td>1,065,000</td>
</tr>
<tr>
<td>Russia in Europe</td>
<td>550,000</td>
</tr>
<tr>
<td>The Levant</td>
<td>535,000</td>
</tr>
<tr>
<td>Austria and Hungary</td>
<td>600,000</td>
</tr>
<tr>
<td>Italy</td>
<td>630,000</td>
</tr>
<tr>
<td>France</td>
<td>5,900,000</td>
</tr>
<tr>
<td>Spain and Portugal</td>
<td>200,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1,525,000</td>
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<tr>
<td>Germany</td>
<td>3,100,000</td>
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<td>Great Britain</td>
<td>1,450,000</td>
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<tr>
<td>United States and Canada</td>
<td>2,850,000</td>
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<tr>
<td>Mexico</td>
<td>15,000</td>
</tr>
<tr>
<td>Egypt, Tunis, Algeria, and Morocco</td>
<td>340,000</td>
</tr>
<tr>
<td>Australia</td>
<td>50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29,705,000</td>
</tr>
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</table>
PART IV.

SILK-WEAVING AND DYEING.

CHAPTER XIII.

BLEACHING.

159. The art of bleaching silk is a very ancient one, and it is mentioned in the Institutes of Manu (c.f. Koushibikaro-shuha=Silk and shawl are to be bleached with urine and water). The ancient method, though recognized by dhobis, is not practised by weavers in bleaching yarn. Whatever the yarn used for weaving, Eastern filature-reeled silk or shaamru, twisted or untwisted, or matki thread (which is always twisted thread), bleaching usually precedes weaving. In the case of corahs, however, bleaching follows weaving, the meaning of the word corah itself being 'unbleached.' The colour of the raw Bengal silk, both of European and native manufactures, is yellow, that is, like that of the cocoons out of which it is made. This, however, is not a permanent colour, and it has to be removed by bleaching it white before it is dyed. The silk of the annual Barapala cocoons is usually white, but this also has to be subjected to the bleaching process before it can be dyed. In bleaching a seer of silk—a one pow (½ lb.) of saji (crude carbonate of soda) is powdered and mixed up with 2½ seers of hot water, and the liquid strained through some piece of cloth for a number of times, or (b) half-a-seer of ashes obtained by burning plantain leaves only is mixed up with 2½ seers of hot water, and the liquid strained as before, or (c) half-a-pow of saji and one pow of the ashes are mixed with the water and then strained as before. A piece of cloth is spread over a basket, and the water to which the powdered saji, or ashes, or a mixture of the two, has been added is poured on to the cloth and gathered in a vessel underneath. This liquid is again poured into the basket and strained a second time. The straining is repeated until the liquid looks like oil. This liquid or lye is mixed with about half-a-mound of water and boiled. Into this boiling water the seer of silk is introduced, out of which it is taken when the bleaching is done and washed in a tank of clean water. After the silk is dry it will be found on weighing that it has lost about a quarter of its weight by the bleaching operation. If a piece of white (or undyed) silk weighs 21 tolas, it should be inferred that 21 + 4 = 25 tolas of unbleached silk thread have been used in weaving it.

160. Weavers usually do their own bleaching and even their own dyeing, but corahs are bleached by dhobis or professional washermen, and there are professional bleachers in Murshidabad as there are professional dyers. Men are the chief operators, but they are sometimes assisted by women. There are probably not more than a hundred professional silk-bleachers in the district of Murshidabad. They earn about six or eight annas per diem; but as the washing of corahs is a fluctuating business, the professional bleachers cannot be said to be very well off. They live chiefly at Khagia, Saidabad, and Kunjaghat, where the principal dyeing establishments of Murshidabad are situated. The process of bleaching is done somewhat differently in Bankura and Bogra, and the following extracts on the subject will show how the work is done in those two districts. The Bankura monograph has the following lines on this subject:

"The first process that the navabi-reeled silk undergoes in the hands of the weaver is winding all silks of different degrees of fineness on different lathe. The second process is that of bleaching; for this silk is boiled for an hour in water mixed with the ashes of ed leaves. It is then washed and dried and again rolled on a lathe. A sort of gum, prepared by boiling parched paddy in water, is then applied. The warp and woof are then prepared,
the former consisting of two strands and the latter of four strands of thread. After the warp and the woof are prepared, they are separately dyed."

161. The Bogra monograph has the following lines on this subject:—

"Bleaching.—For this purpose the 8-shaped skein of twisted thread is taken away from the khatta.

The skein is then tied at the two extremities by two strings passing through the two loops. These knots serve the purpose of keeping the turns of the thread from being entangled with each other.

A solution is then prepared of soap water, water in which rihka fruits had been steeped and ashes of plantain leaves. No definite proportions are given for the ingredients of the solution, as they are all things that can be used singly for the purpose of ordinary washing.

This solution is then boiled and the skein of threads steeped in it, held by the string in the extremities. The skein is stirred now and then with the strings. When the requisite amount of whiteness is acquired, the skein is taken off, thoroughly washed with pure water and then dried.

The next process is that of arranging the washed thread called paikara.

Two flat pieces of split bamboo are inserted through the two loops in the skein, and the strings are untied and taken off. Then the two bamboo pieces are gently pulled apart, so as to give a moderate tension to the thread. The turns of the thread are then arranged one by one on the bamboo pieces so as to allow reeling. The thread is then reeled off into latian.

Then the thread is starched with rice gruel or a similar substance obtained by boiling khai (fried paddy) in water. When the thread is still wet, it is reeled once. When dry the reeling is repeated, which process removes the superfluous starch, as the thread is allowed to pass between the thumb and forefinger of the left hand. The thread is now ready for the next process of warping locally called land-laland or land-parned."

CHAPTER XIV.

Dyeing and Printing.

162. Dyeing is done either in the thread or in the piece. In both cases bleaching (of the thread or of pieces of cloth), and in most cases mordanting, precedes dyeing. The following seventeen colours are recognised in Bengal:—

(1) Indigo, (2) black, (3) blue, (4) grey or light blue, (5) red, (6) light red or anndrānād (i.e., pomegranate-seed colour), (7) yellow, (8) orange, (9) green, (10) purple, (11) banah (i.e., chocolate), (12) pitambari, (13) sonati, (14) himranakanthi, (15) mayurkanthi, (16) dhupchād, and (17) dasthina. Of these, black and blue colours are not recognised in Murshidabad, Malda, and Rajshahi. The last five colours are in each case the effect of the combination of two colours—one employed for the warp and the other for the woof. Pitambari (i.e., appropriate to Siva) colour, for instance, is produced by red warp and orange weft; sonati (golden) colour, by green warp and orange weft; hiramankanthi (parrot-necked) colour, by green warp and red weft; mayurkanthi (i.e., peacock-neck) colour, by red warp and green weft; dhupchād (i.e., light and shadow) colour, by red warp and blue weft, and dasthini (i.e., sky) colour, by blue warp and red weft. Silks of such combined colours are known as shot-silks.

163. Mordanting.—As a rule, bleached silk needs mordanting before a dye can be permanently fixed into it. To mordant a seer of bleached silk, 10 tolas of alum is used. This quantity of alum is mixed up with about 10 seers of water and boiled. The silk is put into the alum water when it is still hot, and turned about in the solution for half-an-hour to get the fibre mordanted evenly. It is then wrung out and put in the dye in a moist state. This preparatory mordanting is not required for dyeing silk with lac, anatto, and indigo.

159. Indigo and grey.—Ten tolas (4 ounces) of indigo is used for having the indigo vat ready for one dip. Six such dips in six days would make the colour of the silk almost black, and one dip makes it grey. The number of dips depends on the kind of colour wanted. Silk which has been dipped in six vats is regarded in Murshidabad as black; while in Bankura and Bogra, the art of dyeing silk with a true black dye, seems to be known. To the indigo vat
is added some lime, some ashes obtained by burning indigo-refuse, and some powdered seed of châkandá (Cassia tora). When these are not used, the colour in the silk is not permanent. The quantities are regulated by the appearance of the liquor in the vat and not by the weights, handfuls, of these substances being thrown into the vat and the whole stirred. The froth or scum which rises on the top should be blue, but underneath the froth on the surface the liquor should look green. These appearances indicate that the indigo has properly dissolved. These substances (ashes, lime, and cassia tora seed) are not put in the indigo-vat when it is intended to get only a fugitive dye. In weaving figured fabrics silk weft dyed in fugitive indigo is used, when white ornamentation on white ground is ultimately desired. The blue colour helps the weaver to weave in the pattern neatly and properly, as he can see the work better if the figures are of a different colour from the ground. Such cloths get gradually bleached white by washing. To dye silk grey the bleached silk is put in the indigo-vat, wrung out, and dried. If the silk is to be dyed a deeper shade, the dry silk already dyed grey, as described, is again put in an indigo vat. The operation is repeated six times (60 tolas of indigo being thus used up) if the colour wanted is very deep, almost black. Of all the dye-stuffs used in Bengal, indigo is the most expensive, though in the silk districts, where indigo is generally produced, there is a great deal of illicit traffic in this dye, unknown or undetected by indigo factors from whose factories the article is robbed and sold cheap in shops. Weavers in Murshidabad pay only about 8 annas for every 10 tolas of indigo, or about Rs. 4 per seer, at which price they could not always get the article in the wholesale market. To dye silk grey, only 10 tolas of indigo are needed for each seer of silk, and it costs Rs. 1 per seer inclusive of labour. If the silk is dyed black by six dips, the cost comes to Rs. 4 per seer.

165. Black.—The Bogra monograph gives the following recipe for producing black colour in silk:

"The following things are kept steeped in water for two days, viz., haritaki (Terminalia chebula), amlok (Bombax officinale), bakara (Terminalia bellirica), and bâila (Anacardiun indica). Then the thread to be dyed is kept steeped in this water with the other ingredients for, say, five days. After that the fruits are thrown away and the silk thread boiled with the solution. Haritaki and amlok are two well-known fruits. Bakara or bâila is fruit sold by hāmiyas in the bazar. The fourth ingredient (bâila) is the thing used by washermen for marking clothes. No definite proportion was given for the ingredients to be used."

166. In Bankura black dye is obtained from "haritaki, iron filings, and ferric sulphate in small proportion." In the Sonthal Parganas tusser yarn is dyed black by first bleeding it in lye, then putting it in a mixture of water to which powdered myrobolans and bakara have been added, boiling the yarn in this mixture, and finally burying it for a night in black tank earth. It is taken out in the morning and washed.

167. Blue.—Two or three dips in the indigo-vat are employed for producing "blue" colour in Murshidabad. In Bankura "blue is made of indigo, haritaki, soap, and a few other ingredients."

168. Red and light red. — To get the exact shade of red on silk is considered by native weavers a very difficult art. The reason for this is two-fold: first, native weavers do not weigh their dye-stuffs, etc., nor keep exact time by the clock, nor measure the temperature of liquids with thermometers, but do everything by guess-work; secondly, lac and lodh (Symposca racemosa) dust are both substances which are more or less adulterated, and it is impossible to get exact results simply by weighing, while a hydrometer is not in use. The weavers depend on experience to get the exact shade of red. The lac is first made into a coarse powder with a quern. It is then placed on some vessel, some water added to it, and it is rubbed with the palm of hand against the vessel. While this rubbing goes on, saji is dusted over it. For each seer of lac 1½ to 1½ tola of saji is used. Two to three times the quantity of raw silk to be dyed is the proportion of lac used. After the rubbing of the lac and the saji is over, the paste is transferred to a piece of cloth spread inside a basket. The basket is placed on three pieces of bamboo over a trough (gama). Water is then poured over the paste in the basket, and the solution of the dye gathered in the trough below. About 30 seers of water is used, when a seer of silk has to be dyed, for
getting all the colour of the paste into the trough. The boiling of the liquid so obtained, goes on for about three hours. When the boiling is going on lodh dust is sprinkled over the liquid. The quantity of lodh used is the same as the quantity of saji that has been already used for making the paste. To ascertain when the ‘bowl’ of liquid is exactly ready, the following test is used:—A drop of the boiling liquid is dropped into a vessel of plain water. If it sinks to the bottom of the vessel in the form of a ring, the ‘bowl’ is ready. If it does not sink in this neat manner, but disperses in the water, it should be inferred that it requires more saji to make it right. A solution of saji has then to be added until the boiling liquid satisfies the test. If the drop of the liquid appears too dark (blackish), a little more lodh dust is dusted to make the ‘bowl’ right. When the ‘bowl’ is ready, the gamla is taken down from the fire and kept covered up for a day. Next day it is again put on the fire, and as soon as boiling takes place, bleached (but not mordanted) silk is put in the liquid and stirred. When this stirring of the silk in the boiling liquid is going on, tamarind water is added to it. The tamarind used for this purpose should not be quite fresh from the tree nor very old. It should be a few months old. For a seer of silk a seer of tamarind in seed is used. When the proper shade of colour has been obtained, a chitak of alum is put in the liquid, the silk stirred for a moment longer, taken out, wrung, and dried. If alum is not used, the dyed silk requires to be ‘lodhed’ before the dye is permanently fixed. To ‘lodh’ a seer of the dyed silk half a powa (4 lb.) of turmeric is made into a paste and mixed up with half a powa of lodh dust, and the mixture boiled in about 15 seers of water. The dyed silk is put in this liquor and taken out, when the dyeing will be quite finished. If there is too much water in the ‘bowl’, the colour obtained is pink. To get a seer of bleached silk dyed red at a dyeing establishment costs Rs. 2-8.

169. In Bogra “the silk to be coloured red is first mordanted in a boiling solution of alum. The lac is powdered and kept steeped in water for one day. Then the powder, as far as possible, is thrown away and the solution boiled. Then the silk is steeped in the solution.” The black and red dyes obtained in Bogra are not quite fast, and Bogra weavers sometimes obtain coloured silk thread from the Calcutta market.

170. The Bankura monograph says:—“Red is made of lac dye. The lac is finely powdered. It is then boiled with tamarind, alum, and khar” (i.e., crude sodium carbonate).

171. In Burdwan “resin from the banyan and ashad (peepul) trees is used” for obtaining red dye in silk. “The resin is rubbed with water in an earthen vessel, and then the thread with alum and the bark of the lodh plant is put in.” By resin of the banyan and peepul trees, is no doubt meant lac.

172. Yellow.—Four seers of sawdust of jack wood (Artocarpus integrifolia) and one seer of bakash (Adhatoda vasica) leaves are boiled together in half a maund of water. The liquor is strained off and a seer of bleached and mordanted silk put in, stirred well, taken out, wrung, and dried. This process is repeated three times more, when the yellow colour will be permanently fixed in the silk. The four seers of sawdust cost two annas. To make the liquor four times and get the silk dyed yellow, costs, therefore, about one rupee per seer.

173. In Burdwan “bazar turmeric is used for obtaining a yellow dye.”

Orange.—The following account of this dye is taken bodily from the “Hand-book of Sericulture”:

“Of all the dye-stuffs used in Bengal for dyeing silk, kanelsa dust is considered the best. This substance is found as a granular deposit on the fruits of a small tree called Abir or Pat sindur (Malolthus philippinensis). This tree is found in most Indian forests. The dust can be gathered in abundance in the forests of Dehra-Dun, Manbhum, Singhbum, Jalpaiguri, and of Central India. In Murshidabad, however, it is difficult to procure this article for dyeing silk, and its use is therefore extremely limited. Weavers cannot get undiluted kanelsa dust even by paying 20 or 26 rupees for a maund. Brickdust and sand are the substances used for adulterating kanelsa dust. If the weavers are to secure pure kanelsa dust, they should propagate the trees at Mirzapur, Baluchar, Khagra, Jalipur-chak, and Badhav-Bishnupur, which are the principal centres of silk-weaving in Murshidabad. The trees being small, they fruit within four or five years after they are planted. The fruits or capsules ripe in February to April. When they ripen they burst, and that is the proper
time for collecting them. The fruits are like bar (Ficus indica) fruits. The kamela dust is analogous to the dust that is seen on bar fruits. When the fruits are not sufficiently ripe, the kamela dust is greenish in colour. In this state the proportion of dyeing material obtained from the dust is smaller. If the fruits, on the other hand, are allowed to get too ripe, the dust gets detached from the fruits and carried away with wind. It is important therefore to gather the fruits at the right time. When they are gathered at the proper time the dust contains over 75 per cent. of dyeing material. In gathering the dust Sontals place the fruits on a string charpoy (bedstead) and spread a cloth underneath. The fruits are rubbed against the strings of the charpoy, and the dust comes showering down on the cloth. Anatto trees are commonly grown by weavers close to their houses. The kamela dust gives a permanent orange, while the colour obtained from anatto is not altogether so.

That it is very important to propagate the pat-sindur tree in Murshidabad is therefore self-evident. The propagation of trees is not such hard work as the cultivation of agricultural crops, and one or two high-caste men can easily earn their livelihood by propagating trees yielding dye-stuffs in Murshidabad. There is no better or faster dye than what is obtained from kamela dust, and its introduction into the European market is also within the range of probability.

The preparation of the dye.—Orange colouring matter is obtained not only from kamela dust, but also from the dust of bar fruits, but the latter yields a much poorer dye. In the Sontal Parganas, Manbhum, and the neighbouring districts, an orange (almost red) dye is obtained from the roots and barks at the base of the trunk of the tree called Cheki (Occumia tontsone). The kamela dust is sometimes used mixed up with bar dust or cheli wood. The mixture yields a deeper orange. Anatto and bakam (Cassapina anna) wood are also sometimes used mixed up with kamela dust. These mixtures also yield a deeper orange. Used by itself, the boiled liquor imparts a straw colour to silk. In Murshidabad the kamela dye is prepared in this way—One powa (1 lb.) to one powa and a-half of soji and a similar quantity of lodh are boiled together with about ten seers of water. The liquor is strained out and again boiled. One powa of kamela dust, mixed up with half a tala of colous oil, is put in the boiling liquor, half the quantity being put in first and the remaining quantity afterwards. A seer of bleached and mordanted silk is then introduced into the boiling liquor and well stirred until the dyeing is finished. The use of bakam wood in conjunction with kamela dust to get a deeper colour is also in vogue in Murshidabad.

Cost of dyeing silk orange with kamela dust—

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate (A. F.)</th>
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<tbody>
<tr>
<td>Mordasting a seer of bleached silk with alum</td>
<td>0 2 0</td>
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<tr>
<td>Price of one powa of kamela dust</td>
<td>0 4 0</td>
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<tr>
<td>Do half-a-powa of bakam wood dust</td>
<td>0 0 6</td>
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<tr>
<td>Fuel for making the liquor</td>
<td>0 1 6</td>
</tr>
<tr>
<td>One powa of soji</td>
<td>0 0 6</td>
</tr>
<tr>
<td>Ditto lodh</td>
<td>0 0 6</td>
</tr>
<tr>
<td>Labour</td>
<td>0 2 0</td>
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Total cost of dyeing a seer of silk orange with kamela dust | 0 11 0 |

Anatto orange.—One-half powa of anatto seed (price three annas) is boiled with 15 seers of water. Half a powa of soji is powdered and got previously ready mixed up with water and strained. When the anatto liquor is boiling, this soji water is poured into it, and the boiling continued for a few minutes more. Another way of preparing the liquor is to put the soji water in the plain water, tie the anatto seeds in a piece of cloth, suspend it in the water, and get the boiling done afterwards. This saves the straining of the liquor before it is boiled again. In either case the raw silk (that is, silk which has not been bleached or mordanted) is put in the boiling liquor, get evenly dyed by stirring, washed in clean water afterwards, and get dried. To dye a seer of silk orange with anatto, costs less than eight annas. The anatto orange is not so fast as the kamela orange, that is, it fades gradually in time and by washing. The colour obtained by the use of anatto is brighter, and anatto is also cheaper and more readily available than kamela dust. The use of anatto is, therefore, much more common in Murshidabad and other districts than that of kamela.

174. The Bankura monograph has this short notice on jarad or orange colour in silk:—“Jarad is made of kamela powder, khar (crude sodium carbonate), and alum.”

175. The following accounts of green, purple, and baneshi dyes are taken from the “Handbook of Sericulture”:

Green.—Neither in Murshidabad nor in any other part of Bengal is the art of producing a fast green dye commonly known to weavers. The shawl-makers of Kashmir can produce a fast green dye. How they do it, and if the dye is applicable to silk, are not known. Silk is dyed green in Murshidabad in the following way:—One seer of bekash
(Adhatoda vasica) leaf and five seers of jack-wood saw-dust are boiled together in water, strained, and a seer of bleached and mordanted silk dyed yellow by stirring in the manner already described. The silk is then put in a 'spent' indigo vat, when it becomes green. By 'spent indigo vat' is meant a vat which has been already used for dyeing silk blue, and in which there is very little blue-colouring matter left. If 10 tolas of indigo are bought for 8 annas, it may be assumed that 2 annas' worth of indigo still remains in the vat after it has been used for dyeing silk blue.

"Cost of dyeing silk green——

<table>
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<tr>
<th></th>
<th>Rs.</th>
<th>a.</th>
<th>p</th>
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<tr>
<td>For bleaching</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>&quot; mordanting</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
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(Baksh leaf costs nothing, as it is found in abundance everywhere).

Five seers of jack-wood saw-dust | 0   | 2  | 6  |
Fuel for making the liquor        | 0   | 1  | 6  |
Indigo left in the 'spent vat'    | 0   | 2  | 0  |
Labour                          | 0   | 6  | 0  |

Total cost of dyeing a seer of silk green | 1   | 1  | 0  |

"Fast green.—Have one seer of bleached silk mordanted with half a seer of powdered alum mixed with eight seers of water, and kept over night soaked in this mixture. In the morning the silk is to be wrung nearly dry and shaken up. The same evening that the silk is soaked in alum water a seer of dry saritha (Nyctanthes arbor-tristis) flower-buds is to be kept soaked in 10 or 12 seers of water——also over night. The water with the flower-buds is to be boiled in the morning, and the liquor afterwards strained out into another vessel by means of a cloth. Into this hot saritha liquor is to be plunged the mordanted silk while it is still moist, and kept stirred so that all parts of the silk may be evenly dyed. When the liquor gets somewhat cold, the silk is to be wrung out and shaken up. The remains of the flower-buds on the cloth are then to be put into the liquor and boiled again for about half an hour, and the liquor strained out once more as before with the help of the cloth. The silk is to be put again into this liquor and kept inside it for an hour, occasionally stirred as before. For facility of stirring, the skeins are tied with a tape and plunged in the liquor. After an hour's soaking in the liquor, the silk is to be taken out and wrung nearly dry and shaken up.

"Next day have 12 seers of cold water in a ganda and mix with it two tolas of aniline green, which is sold in the bazar as European green. Have the silk while still moist plunged into this green water and stirred in it until the desired shade of green is obtained. This green will be found to be permanent.

"Purple.—Bleached and mordanted silk is first dyed red in the lae liquor, and then put in the indigo vat. A small quantity of lae is used that the silk may be dyed light red. The cost of dyeing silk light red is Rs. 1-8 for a seer. The subsequent dyeing in the indigo vat costs another rupee. The total cost of dyeing silk purple is therefore Rs. 2-8 per seer.

"Chocolate (banesh).—Banesh is black with a shade of red. To obtain this colour the silk is first dyed deep red in the lae liquor, and it is then dipped once in the indigo vat. It costs Rs. 2-8 to get a seer of bleached silk dyed deep red. The subsequent bleaching costs 12 annas; that is, the total cost of dyeing silk banesh is Rs. 3-4 per seer.

176. Weight of dyed silk.—It has been said, a seer of raw-silk is reduced in weight to 12 chitak after it has been bleached. These 12 chitakes of bleached silk weigh about 12½ chitak after it has been dyed. When silk is dyed green 12 chitak enhance to 12½ chitak in all other seasons except during the rainy season, when the enhancement in weight is half a chitak more. Silk is naturally highly hygroscopic in character. This hygroscopicity increases when it is dyed green. Twelve chitakes of bleached silk weigh 13½ to 14 chitak after it has been dyed deep blue.

177. Secrecy.—Most of the monographs speak of the reticence on the part of the weavers in giving information about silk-dyeing. They also speak of the use of European chemical dyes being very common. In Birbhum "colour is not generally used in dyeing saris." This is all the information on this subject obtained from this district. In Rajshahi "there is no silk-dyer."

178. European dyes.—The use of aniline dyes, which is so very much easier than that of country dyes, is bound to extend. All aniline dyes are not equally fugitive. They are all more or less fugitive when they are exposed to sunlight for any length of time; and the encouragement of the native dyes which are
permanent is very necessary. But if aniline dyes must be used, those that can stand alkaline washing should be alone used. The Rampur Boys' Sericultural School has instituted some experiments in this direction, and so far the Maypole Soap (obtainable of Messrs. Whiteaway, Laidlaw and Company) seems to have given very showy results. A short account of the experiments conducted in this school may be of interest, as the shades of colour obtained were very beautiful.

179. The soap washes and dyes the silk at one operation. Soaps of the following colours are made:—pink, cream, mauve, heliotrope, light blue, canary, fawn, orange, cardinal, rose pink, salmon pink, scarlet, cerise, terra-cotta, nut-brown, crimson, maroon, navy blue, and black. A cake of soap is dissolved in half a gallon of boiling water in an enamelled vessel. The soap dissolves in the boiling water in about a minute. When all the soap has dissolved the thread or fabric is put in the bath and kept stirred, in a simmering, but not in a boiling state, for a quarter of an hour, when the vessel is taken down altogether from the fire and left to cool. When thoroughly cold the yarn or the fabric is rinsed in cold water, a little starch being used if the fabric is needed to be stiff. In that case after wringing and drying, the fabric is ironed. If the colour obtained is not sufficiently deep, a second operation may be necessary.

180. In Hooghly aniline dyes are in common use for dyeing silk. The following lines occur in the report from that district on this subject:—

"The colours used are—Red, green, orange, and violet. The dyes are not fast. For red, magenta is used. Aniline dyes are used for green. Orange or yellow is made of takan seeds and kamala dust (see Mr. N. G. Mukerji's "Hand-Book of Sericulture," section 223), and sometimes from aniline dyes. Aniline dyes are also used for producing violet."

181. Printing.—Dyeing and printing pieces of corah is a decaying industry for Murshidabad. Whether country dyes or European aniline dyes (magenta, etc.) are used, the dyeing liquor—of a thicker consistency than that used for dyeing yarn—is mixed up with a quantity of cotton wool when printing has to be done. Wooden blocks with religious texts or conventional designs carved on them are used for taking up the dyeing material from the cotton-wool pad, and the piece of silk being spread out properly on a wooden platform, the imprinting of the design is done on the piece. Where mordanting is necessary the piece is mordanted beforehand with alum.

182. Bandanna dyeing.—There is a special process of dyeing pieces of corah, called Bandanna dyeing or Bandhu dyeing. To make a piece of bandhu knots are put on a piece of silk at regular intervals with cotton threads. Thousands of knots are sometimes put on a piece before it is plunged in alum and in the dyeing vat. It is then washed in clean water, and the knots are taken out, when it is seen the knotted spots remain white, while the ground becomes dyed. The knots being put at regular intervals, the presence of the spots does not look bad, but the slight effect is produced with such enormous labour that it is hardly worth producing. Bandhus, in fact, are made only out of cheap corahs and mātkas. The spots are sometimes made coloured by plunging a white spotted bandhu in a coloured vat, when the spots take one colour, while the ground becomes altered in colour. Another process of dyeing silks in the piece is called “momin” or waxing. A momin piece is produced with drops of melted wax being arranged in regular figures in those spots which are meant to remain without colour. After this the piece is plunged in the dyeing vat, and the wax afterwards removed. If the white spots are required to be coloured, the piece is afterwards put in another vat, when the spots take the colour of this vat, while the ground becomes altered in colour by the mixture of two colours. Thus, if the waxed piece is put in the yellow dyeing vat, and after removing the wax, if it is put in the indigo vat, the spots originally waxed take blue, while the ground is coloured green. Pieces of silk are sometimes dyed with the help of stiff clay exactly in the same way as they are dyed with the help of wax, little pellets and strings of clay being used for drawing the figures on the piece before it is mordanted and dyed. The practice also prevails of protecting portions of a piece by tying them with strips of leather or of strong cloth, plunging the piece in a dye vat, then protecting the dye portions, and dyeing those protected in the former operation in a different colour. In making bandhus, knots are sometimes put with freshly coloured pieces of cotton thread,
when, after the piece is dyed and the knots taken out, little rings are formed all over the piece of the colour of the cotton thread used for knotting.

183. Dyers.—Dyeing is usually done by the weavers themselves, but where, as in Murshidabad, silk-weaving is done on an extensive scale, there is more division of labour; and as there are special twisters of yarn, so are there special dyers' establishments. These are miniature factories, employing eight or ten men each, in brick-built houses, containing a number of vats embedded in the floor, and also a number of brass and copper pans. There are probably between twenty and thirty such factories in the district of Murshidabad. The men who work in them are chiefly Tanits and Ralbartas. They are moderately prosperous, their wages amounting to about four annas a day. Baluchar, Khagra, Mirzapur, and Islampur may be regarded as the chief centres of the industry. Radha Krishna Khan and Mohesh Chundra Mandal of Khagra, with Bhagbat Dhusan Dara of Kunjavghata are the principal dyers of the district.

184. A diagram sheet at the end of this Monograph (No. 98 to 115) illustrates the silk-dyeing industry of Murshidabad.

CHAPTER XV.

Processes preparatory to weaving.

185. The process of unwinding skeins of raw silk and gathering them into latius of shorter skeins of thread of oven thickness and without break has been already described. The raw silk thus gathered into latius is sometimes employed for warping without any further processes being gone through, as in weaving sarus. The process of twisting has been also described. The twisted thread gathered into latius is employed for warping in the case of pakwan or superior fabrics. The processes of bleaching and dyeing have been also described. Bleached and unbleached thread, dyed and undyed thread, twisted and untwisted thread, are employed in producing different classes of fabrics. The warp may be bleached and dyed, or the thread used in the warp may have been bleached and dyed before warping takes place.

186. Warping.—The next process to be described therefore is warping. Four posts (A, B, C, and D) are planted in the ground as shown in the figure (Fig. 10). They are so planted that the width B to C may allow a man to move

![Fig. 10.—Warping.](image)

about freely in the space enclosed within the four posts. The distances A B and C D are so measured out that the total of A B, B C, and C D may be equal to the required length of the pieces to be woven at one setting of the loom. If, for instance, the loom is set for weaving five 10-yard gown-pieces, the warp has
to be made 50 yards long, and the four posts are set at a distance of 24 yards lengthwise and two yards breadthwise. Kathis or bamboo laths, 3 ½ feet long and ½ inch in width, are then planted, singly or in pairs, about 8 feet apart from post to post, except from A to D. The yarn (twisted or raw silk) is then taken in two charkies of more compact and of stronger make than the charkies used for unwinding skeins of raw silk. One of these is represented in the figure (Fig. 11). Each charki is provided with a handle called hulti (a), ending in a glass or metallic loop or ring. The threads pass out from the two charkies through the two loops, and are laid on alternate sides of the kathis and posts. Both charkies are used simultaneously by the same person who holds one in each hand. The threads of both charkies are first knotted together, and the operator begins by putting the united thread round the post at A. He then walks on in the direction of B, laying the threads of the two charkies alternately on both sides of the kathis and posts. How the two threads (A and B) are alternately laid from the two charkies, from A to B and B to C and C to D, is diagrammatically represented in section in the following figure (fig. 12.)—

As the operator moves on with the charkies, the threads are drawn out without any effort. As he approaches each post or kathi he passes one thread by the right of it and the other by the left, in such a manner that the two threads may intersect between two kathis or a post and a kathi. The operator
proceeds in this manner up to D, no intersections being made at or between B and C, the thread simply passing round them. The same process is repeated when the operator comes back from D to A, laying two more threads above the first two. This goes on till the requisite number of 'shana' is obtained, whether 1,200, 1,800, 2,000, or 2,400 double (and sometimes quadruple or eight-fold) threads in the yard of width. If the cloth is to be one yard in width and of first quality, 2,400 double threads are laid one above another before the warp is ready. The set of intersections between a pair of kathis is called jaldi. The kathis are removed when the warping is completed and tapes inserted in their places. These keep the two sets of thread from the two charkhees quite separate during the processes of bleaching and dyeing if the warp is bleached and dyed before it is introduced into the loom. If no bleaching or dyeing is done at this stage, but the warp removed to where the loom is, slender bamboo rods (called jods or jod-kathis) are introduced at once instead of tapes, where the posts and the kathis are. The jod-kathis are also introduced into the warp after the warp has been bleached or dyed, the tapes being removed and bamboo lathis inserted in their places.

187. The warp with jods inserted in them is rolled up and brought to where the loom is. One extremity of the warp is then attached to the yarn-beam or off-beam (ab) of the loom by a series of knots, and the whole warp with the jods is wound round this beam (fig. 13)—

![Figure 13.—Improved loom used in the Rajshahi Sericultural School, showing the yarn-beam.](image)

188. Then begins the next operation, which is called shana-parana, i.e., passing the warp through the reed. This is a work of great patience, and this is the reason for weavers objecting to weave one or two pieces only. When they are sure of being able to dispose of eight or ten pieces of any fabric, they go in for setting the loom, though the weaving of the eight or ten pieces may take them two or three months. This accounts for silk-weavers needing to spend a good deal of money in advance. If ten gown-pieces have to be woven, silk for the warp for all the ten pieces must be bought at once, and it means an outlay of over Rs. 100. When a weaver gets an order to weave one or two pieces of some fabric and receives half the price in advance, say Rs. 20, he is still unable to begin work. He looks out for possible buyers of other six or eight pieces, and he needs an advance of another Rs. 80 or Rs. 100 before he can begin his work. This is how silk-weavers get entangled with mahajans. The mahajan assures the weaver he will buy the remaining pieces at cost price, and he advances the requisite amount of money at a high rate of interest. The weaver may succeed in selling the remaining pieces at a profit to outsiders; but if he fails, he sells them to his mahajan at cost price, and out of the profits of sale of the one or two pieces for which he had received order, he has to pay the mahajan interest on the loan.
189. The process of inserting the threads of the warp through the reed and attaching them to the cloth-beam or near beam, is thus described in the Bogra monograph:—

"A jalā or crossing is brought near the extreme rod. Then the operator introduces a needle through an interval in the reed, and the second operator, sitting on the other side of the reed where the whole yarn is, encloses the needle by two or more threads (ordinarily three) by a temporary loop. Then the first operator pulls this loop out into the other side of the reed by means of the needle. The number of threads to be introduced through each interval depends upon the width of the cloth to be woven, the total number of threads in the warp, and the number of interstices in the reed employed. But this number cannot be less than two. Having introduced, say, the first three threads through the first interval in the portion of the reed selected, they are drawn out a little. Then the next three threads are introduced in the same manner through the second interval, and so on.

"This proceeds on to some distance in the reed, say one inch. Then a slender bamboo rod (c) is placed above the threads in the first half inch and below the threads in the second half. The ends of these two sets of threads are brought together and knotted in a single knot; so as to leave the rod between the knot and the reed.

"Then another inch of the reed is worked in the same manner, and the threads knotted beyond the rod (c) as before. Thus when the end of the warp is reached, the newly-introduced rod (c) is held in position and cannot get off in a direction parallel to the warp threads (see fig. 14).

"The warp is now ready for the process of forming healds."

Fig. 14.—Arrangement of reed and healds.

Explanation of the figure.

a, a—Design or frame enclosing the reed.

b—Shād or reed.

c—Yarn-beam.

d—Knots on the sets of warp threads.

e, e—Stirrup or cramp.

f, f—Beams of the healds called moori.

g, g—Shafts of the healds called saw.

h, h—Bamboo rods tied with the shafts of the healds and connected with the treads.

190. Forming of healds.—The next operation, viz., forming of healds (or baupurana), is also fully described in the Bogra monograph, and this monograph may be again quoted here:—

"For forming each set of healds four round rods are required, viz., two of the thickness of the little finger and two others much less thick, and all of them a little longer than the width of the warp.

*(The treads are not shown in this figure).*
"The thicker rods are called hame and the thinner ones moories."

"One of the jolts or intersections being brought to a convenient position, the two rods (or jons corresponding to this are removed, after putting in their places two pieces of thin split bamboo, about 2 inches wide.

"Then one of the thinner rods, intended for the heads, is placed over the warp, and an instrument called fundi is placed close to it, also above the warp. This fundi consists of a rectangular piece of thin split bamboo about 1/4th inch in width, with one of the ends rounded off, which contains a hole. A thick cotton thread is passed through the hole and tied with the fundi. The thread is tied at the other extremity with the apex of a small, hollow, metallic cone.

"A thick silk thread from a charki is then introduced between the upper and lower sets of threads in the warp, and drawn out to the other side, where the fundi has been placed.

"The extremity of this thick thread is tied by a slip-knot with the slender rod mentioned above.

"The operator then picks up a loop from this thread by his forefinger between the first and the second thread in the upper set. This loop then passes round the fundi, and is knotted on to the slender rod close to the fundi, by turning the end of the loop twice, so as to form a second loop through which the slender rod (called moori) is made to pass.

"When the next loop is picked up between the second and the third warp thread, any slackness in the first loop and the corresponding knot round the moori is removed. The same process is repeated with the second loop, and so on to the end. The fundi is meant for regulating the length of each loop which is formed round it. The fundi is moved onward as the work proceeds, and in the end the string tied to the fundi will be found to have passed through all the loops.

"Then one of the thicker rods (hame) which have all conical ends, fitting exactly into the hollow cone, is taken up and one end of it is pressed into that hollow cone. The string of the fundi being pulled at the other end draws the cone and with it the base shaft, so that in the end the shaft occupies the position of the string, having passed through all the loops.

"The moori is then tied with this base shaft at several places (see fig. 14). After this the whole thing is turned upside down, and the jolt or intersection moved beyond the set of loops formed. Thus the set of threads that have been dealt with before are again on the surface. Then another moori is taken up and loops formed with the fundi in the same manner as before, with this exception that the new loops formed enclose each thread as well as the one string of the loop that is already round it. Then the base shaft is introduced as before and tied with the new moori.

"This completes half the process of forming the heads. The remaining set of threads is dealt with in a similar manner to complete the process.

"Fig. 14 shows the sets of heads when completed: $e'$, $e''$ are the moories, and $f$ and $f'$ the corresponding base shafts.

"Now the whole thing is ready for fitting up in the loom."

191. The description of setting the loom is also fully given in the Bogra monograph. Though the Bogra loom is ruder in construction than the Murshidabad looms, a full description of it is a good introduction to the explanation of more complicated forms. The Bogra loom consists of the following parts (Fig. 15): —

![Fig. 15.—The Bogra silk-loom.](image-url)
Four stout posts of wood (a) or bamboo are planted in the ground, forming a rectangle.

Two parallel bars called sodhara (b) are attached to the tops of these posts, each joining a front and a back post.

There is a pit (k) dug in front of the place where the operator is to sit (k). On either side of this pit, and near the two front posts, are planted two short posts which support the cloth beam, locally called kola-norod (a), and allow it to turn.

The yarn-beam, also called asrod (b), is suspended from the top of the two back posts by strings passing round it which allow it to turn. The cloth beam is provided with a cross peg called moron (f), at the right-hand end. The end of this peg is tied, from time to time, by a string with the post that is near, so as to keep the cloth beam in position.

The yarn-beam has two similar holes at right angles to one another, also in the right-hand end.

A rod called khil (c) fits in one of these holes, and rests with the other extremity on the ground.

The yarn-beam can be prevented from turning by means of this rod, and can be kept in any position by varying its length.

The warp had been wound round the yarn-beam after taking it out. The beam, with the warp, is now brought in, and the former is placed in its position.

Then the reed or sana (w) is fitted on to the dapti (c).

The dapti consists of two stout pieces of palm-wood nearly equal to the beams in length, about 4 inches wide and little less than an inch in thickness.

The edges of these bars are nearly rounded off.

One of these bars is placed below the reed parallel to the cloth beam with the narrow face uppermost.

The other bar of palm-wood is then placed in a similar position above the sana. The sana now fits in into two grooves in the bars, one below the upper one and the other above the lower one. The two bars are then joined by means of iron rods passing through holes in their extremities. The bars are then tied with one another at either end. The whole thing is now termed dapti.

This dapti is suspended by two strings from a moveable cross rod, which is supported on the two sodhara, and is called chalna (d).

The warp is kept at a tension by tying the extreme rod in it with the cloth beam, by means of a string or strings in such a manner that the rod is at some distance from the beam.

The shafts of the heels are then suspended from a rod (also called chalna) supported on the two sodhara in the following way:

Two or more nakhis (p) are hung down from the rod so as to rest about a foot higher than the upper shafts of the heels. A nakh consists simply of a piece of bamboo rod of the thickness of a pencil, suspended from above by a string tied to its centre, and provided with two other strings, tied with its extremities, which hang down. One of these two strings is tied with the front shaft of heels and the other string is tied with the back shaft while the nakh is suspended from another chalna resting on the sodhara.

Thus when one shaft of heels is pulled down, the nakh, acting as a lever, pulls up the shaft of the other set of heels.

Below the lower shaft (baw) and moroni of each set of heels is tied a bamboo pole (see fig. 14, g, g). These two poles are tied by strings with the two treads, locally called ghora (f), one with the right ghora and the other with the left one.

In an arrangement for weaving plain cloths with plain borders, only two treads are necessary.

The treads are put in the pit in front of the operator. The operator sits on a wooden plank (z) and lowers his feet into the pit, this arrangement dispensing with the use of a chair and diminishing the height of the apparatus considerably. The whole thing is now ready for the process of weaving.

When ornamental borders are to be woven with the cloth, a few more sets of heels are formed at the two borders suspended by similar nakhis, and an additional number of treads corresponding with these are fitted up, the operator working them all by the feet. Only one artist knows the preparation of ornamental borders in this district. The process is complicated and difficult to learn.

In weaving terchi (twill) sheets, four sets of heels are made instead of two. There are, therefore, four treads. In such cloths the successive crossings of the threads of the warp and of the weft form rather prominent lines at an angle with the length of the cloth.

These cloths are very rarely woven. They are never woven except on order. Only two weavers in the district know how to weave terchi sheets.

192. Charging of Spools.—Having got the warp placed in the loom, the weft is got ready for introduction into shuttles. This is done by untwisted threads (but dyed or undyed, raw or bleached, as the case may be) from two latias being gathered into spools, which are small pieces of bamboo tubes of a size just fitting into shuttles. Spool after spool is taken and attached to the narrow end of the axle (fig. 16, A), of a spinning wheel. As the handle H is turned the axle A rotates very rapidly as also the spool connected with it. The threads (f and g) from the two latias or charkiues, placed on the pivots c and c, [one
charki only (C) being shown in the figure, as planted on the pivot c,] come out freely and get wound round the spool as a single thread F. When a sufficient number of spools have been charged (with threads of different colours if necessary), the operator is ready to begin weaving. He takes up a shuttle (fig. 17) which is made of steel, and puts a spool inside it in the manner shown in the figure, and the weaving proceeds as shown in fig. 13.

![Fig. 16.—Charging of spools.](image)

![Fig. 17.—Maku or shuttle.](image)

CHAPTER XVI.

Weaving.

193. There is nothing special about the methods ordinarily employed in silk-weaving, and the same looms are employed in some districts for weaving both cotton and silk fabrics, the looms employed in silk-weaving being indistinguishable from those employed in cotton-weaving. There are, of course, as many varieties of looms as there are patterns of weaving. The more complex there is in the pattern, the greater is the number of healds. The more complex figured patterns cannot be woven with looms fitted with healds only, but by special arrangements of harness-cords and loops to be described in the next chapter.

194. The ordinary loom for weaving dhutis, corahs, and plain gown-pieces (not twill) used in the different silk districts, differs in no essential respect one from another. An improved loom used in the Rampur Boalia Sericultural School (fig. 13) and the ordinary country loom of Bogra (fig. 15) have been already illustrated in the previous chapter. These may be said to be the most refined and the crudest silk-loom respectively used for weaving corahs and gown-pieces in Bengal. In principle they are identical in construction. Instead of sitting on a stool, bench or chair, the ordinary weaver sits on the floor, his legs hanging down a rectangular hole dug out or built round in the floor. The table-like arrangement of the Rampur Boalia School is nicer and more convenient, but it is not so steady or substantial, while the reed being suspended with wooden shafts instead of strings makes this part of the Rampur Boalia arrangement more satisfactory. The pulleys (PPPP) of the Rampur Boalia loom, which work the healds, are also an improvement over the corresponding nachans of the Bogra loom. The flys-huttle has been also successfully employed in this school. This simple mechanical arrangement makes the working of the shuttle easier and swifter.

195. We give here also the sketch of a Murshidabad loom and one of the Malda loom. Representing similar parts by the same figures, it will be seen how they correspond almost exactly with each other and with the other two looms illustrated in the previous chapter. The differences that occur are only in the manner in which strings are suspended or posts propped up or supported, and so on. A general description of the Murshidabad
and Malda looms (set as illustrated in the two figures—figs. 18 and 19) for weaving saris may be given here, and also a general description of the process of weaving.

Fig. 18.—The Maldah loom.

Fig. 19.—The Murshidabad loom.

196. The whole framework is rectangular—about 6 feet long and 4 feet wide, and it consists of the following parts:

(1) AAAAA are four khanties or upright posts, a yard high, fixed in the ground at the four corners of the loom.
(2) A, A, are two kol-khunties or support-posts, each about nine inches high, placed just in front of the khnunies nearest to the operator. These are the pivots for the cloth beam.

(3) aa is the kol-naroj or kol-norod (cloth beam) which rests on the kol-khnunies.

(4) i is biskarmar-khnuti, which is an iron hook rigidly fixed to the ground. This is not shown in the figure illustrating the Murshidabad loom. At this point is the Art-god, Bishvakarma (lit., the Architect of the Universe) worshipped by the weaver with great ceremony once a year, and daily he bows down before this hook when commencing the day's work. To it is tied the handle of the cloth beam (l) that the warp may remain stretched, and that the cloth beam may not roll.

(5) BB are the two bahus or shafts placed lengthwise on the four khunies, on which are placed loosely the chald-bajus or thaldbajus (ch. ch.), i.e., moving battens.

(6) From the bahus are suspended two strings, to which the dakti or the reed frame (cc) is suspended. From the chald-bajus resting on the bahus are suspended wooden pulleys or nachniee, or both wooden pulleys and nachniee, to which the bahus or healds are attached.

(7) The dakti or dapti (cc), reed-frame, which consists of two battens, between the grooves of which lies the reed or shand, are made of the common reed (char-kati). There are 1,000, 1,200, 1,500, 1,800, 2,000, 2,200, or 2,400 dents in the shand, and a shand with a larger number of dents is put in the dakti when a close web is required to be woven. As the cloth is woven, the dakti is further and further removed along with the chald-bajus, until the weaver finds it inconvenient to reach the shed. To the yarn-beam (bb) is fixed an iron lever (J), which is worked to loosen the warp. This is not shown in the Murshidabad loom. The bamboo handle (l) of the cloth beam is then worked to roll up the cloth that has been woven, the lever re-attached to the biskarmar khunti, and the weaving is continued, the dakti and the chald-bojus being at the same time brought closer to the operator.

(8) The bahir-naroj (bb), called also bahir-norod (warp or yarn-beam), is suspended by means of ropes or supported on two small posts, one of which (Aa) is shown in the figure illustrating the Murshidabad loom. The figure illustrating the Bogra loom (fig. 15) shows how the yarn-beam is suspended from the off-posts by means of ropes, while also resting against the off-posts.

(9) The bahus or healds (dd) have to be adjusted every time the loom is set. A bahus consists of a slender stick (shir), and a thicker stick (dangi) at the top, arranged side by side, and a thicker stick (dangi), a slender stick (shir), and a batten of wood (juthas) at the bottom. Between these two sets of sticks a cord is arranged in loops crossed in the middle, where the particular threads of the warp meant for this particular heald are made to lie. In other words, the cord of the heald is made to pass successively through the proper threads, the cord being fastened at each passage through the Warp to the top or the bottom sticks.

(10) The pasha-narai or treadles (ff) are attached to the healds at their bottom, with ropes crossing each other as they go up. They are not shown in the Murshidabad loom. These treadles are simply bamboo sticks resting on one end on a fulcrum (garkibel) which in turn is fixed on two wooden pivots called (garkhas). Between the free ends of the treadles are planted a number of upright bamboo sticks called barkatis which keep the treadles from interfering with one another. It requires a good deal of practice to work the healds properly.
The toes of the weaver alone are used in this operation. As one heald is lowered some of the threads of the warp are lowered and a shed or space is formed between the web already woven and the two series of warp threads so divided. Along this space the shuttle is passed, say, from right to left. Then the dakti is used for pressing the thread (or the double thread) laid by the shuttle. Another heald is then pressed, another set of warp threads goes down, and the shuttle is passed through the ‘shed’ now formed, the other way, i.e., from left to right. In plain weaving two healds are thus alternately worked, and the shuttle passed from left to right and right to left along the ‘shed’ formed each time while the dakti helps to press the web close. When coloured checks are woven, the warp is made of different coloured threads, and the weft is also laid with shuttles, more than one, containing threads of different colours. The weaver knows which heald to press to bring down a thread of a certain colour. When the border is ornamental two or four healds are worked for the border only.

(11) The kālāni or kōnt dhanuk (fig. 20) is a bow-shaped stick made with two pieces of bamboo, with an iron pin at each end. This helps to keep the warp stretched breadthwise when the weaving is going on. Two or three of these are generally used within one cubit of the web. The pins are fixed to the borders or ‘salvages.’ One katani is shown in situ in the Bogra loom (fig. 15).

197. As the weaving goes on, the web is rolled in from time to time in cloth beam, the jōa-kathiśa taken out from the warp as each approaches the furthest heald, and when one piece (5 yards, 7 yards, or 10 yards, as the case may be) has been woven, an inch of warp is left without weft and the weaving of the next piece commenced. When a portion of the second piece has been woven, the first piece may be unrolled from the cloth beam, if necessary, and disposed of. When the weaving of a piece is finished, it is cut out and stretched in the manner shown in the figure (fig. 21) and a blunt knife, called shipti, which

![Fig. 20.—The Katani.](image)

![Fig. 21.—Sizing the cloth.](image)
fabric, but it is a vicious practice. The sugar spoils the fibres, and a fabric sized with sugar gets spotted, being stored for any length of time in the rainy season. Sizing is also practised to make some of the stuffs heavier. Weavers themselves are opposed to weighting, as the local sale of all silks is invariably conducted on three principles, viz., (1) by actual count of the threads used in the warp; (2) by the length and width of the stuff; (3) by the regularity and other excellence of the web. Dealers in Calcutta, however, go mainly by weight. An unsized piece of chaukara, for instance, 10 yards long and 42 inches wide, weighs (if the piece is a 2,000 shárdá piece) about 10 ounces. The Calcutta dealers, however, want that the 2,000 shárdá-chaukara pieces should uniformly weigh 12½ ounces per piece. An inferior piece weighing 7 ounces only may by sizing be made to weigh 12½ ounces, for the benefit not of the weaver, but of the dealer or merchant, who trades with other countries or other parts of India, where they judge a piece of silk by its touch and look.

198. The Burdwan monograph states that 1,000 cubits of wrap are warped round the yarn beam at a time, and that it takes 3 to 3½ months to turn this amount into cloth. The Burdwan silk-weaver must have very good business to be able to weave 10 cubits a day uninterruptedly for 100 days. It is not impossible work, but it is heavy work, and it is only when weavers have very good business that they work at such high pressure, but probably 100 cubits was only meant and not 1,000 cubits, as 100 cubits of warp is considered the right quantity to put in at a time in the district of Murshidabad, which is the recognised centre for silk-weaving.

199. The Malda monograph speaks of superior cloths being of 2,500 to 3,000 shárdás. The ordinary Murshidabad maximum is 2,400. But probably some Malda weavers can weave closer webs.

200. In weaving matkás the same system is followed, but the number of dents in the reed used for weaving matkás is smaller.

201. In weaving corahs which are exported in thousands, more wholesale methods of weaving are employed. Warp for 10 or 12 pieces is first introduced; afterwards by knotting to the last piece more warp is put in. Two warp threads are passed through each reed-space and one through each base-space. The shuttle lays four warp-threads at each stroke. Inclusive of the cost of setting the loom, it costs one rupee per piece to weave corah which are of the standard dimensions, i.e., 7 yds. X 1 yd. It takes a weaver 2 days to weave a piece of corah. With the fly-shuttle loom introduced by Messrs. Shaw, Wallace & Co., viz., with Messrs. Hattersley’s Domestic Loom one weaver can finish one piece of corah per day.

CHAPTER XVII.

SPECIAL PROCESSES OF WEAVING.

201. No attempt has been made in any of the district monographs to describe those processes of weaving which result in highly complex webs. Mrityunjaya Sirkar, who was the cleverest plain silk-weaver of Murshidabad, was asked at one time by the writer of this Monograph if he could construct looms for weaving ornamental fabrics like those made by Dubraj. After many efforts he succeeded in reproducing the border of Dubraj’s shawls and table-covers without the corner ornaments. It is by a special arrangement of healds for the borders that he produced his plain shawl with a wide ornamental border, an article which is now highly valued in the Berhampore market. He also succeeded in producing a sari with ornamental ground (sample 91a). Mrityunjaya was familiar with the naksha loom of Baluchur, but it is of such complicated mechanism that he failed to understand and reproduce it. There is now no one in the district since Dubraj’s death who understands the mechanism of those looms (fig. 22) which are still in use in the Baluchur circle for producing figured fabrics. When any of these looms would get out of order Dubraj was sent for to set it right, but he reserved the neatest patterns for himself. The looms for turning out these patterns are in possession of Dubraj’s son, who is represented in fig. 22a weaving a piece of figured sari, in a loom left by his father.
202. It seems from the wording of some of the district monographs that figured silks are woven elsewhere also. The Bankura monograph, for instance, speaks of a Fullam sari, or cloth for females with patterns of flower on them, as being sold for 10 to 20 rupees a piece. These are probably something like the Baluchur butedar sari. Then there is in the Maldha monograph mention made of the "Maldha Belkhali Fuldar," the "Fullam sardhì," the "Kadam fulk," and the chándhara sari, valued at Rs. 9 to Rs. 16, which are probably figured. A different system of weaving figured patterns is also alluded to in the Midnapore monograph, in connection with the Tussar-weaving industry. An arrangement for raising and lowering some of the threads of the warp in regular succession, of introducing coloured thread with spools only instead of shuttles, and thus bringing out coarse patterns of flowers (something in the Punjab Phulkari style), is recognised in cotton-weaving also. Gulashár cotton sari, however, cannot be compared in complexity of web or richness of design even to the ordinary Baluchur butedar sari. I will quote here my description of the naksha loom, given in the article on the Silk Industry of Murshidabad, which appeared in the Journal of Indian Art (No. 38), which will help to illustrate Figs. 22 and 22a, which have been reproduced from photographs of two of these complicated looms:

"The arrangement of the loom used for making Baluchur butedar, shawls, and scarfs is somewhat different. The cloth beam is placed on two pillars or platforms, the weaver sitting on a plank resting on the same pillar alongside the cloth beam, his legs going between, and his feet working the treads, which are fixed in the floor at one end in the same manner as the treads are fixed in the pit in the case of the ordinary loom. The warp-beam is also placed on the floor, being slightly elevated with two pivots. Thus the warp runs up in a slant from the warp-beam to the cloth beam, instead of horizontally, as in the case of the ordinary loom. The use of four heads where two only is essentially necessary, has already been mentioned. The essential peculiarity of the naksha-loom consists in the presence of the shādi, or a large number of strong twines running across and above the warp just beyond the sheds. Each of these twines is attached below to a certain number of threads in the warp by means of long loops of strong cotton suspended vertically from the twines and allowing one, two, or more warp threads to pass through each, according to the figure intended to be brought out. Abobe the twines are attached two naksha or sets of harness-cords, which the draw-boy, sitting beyond the twines on an elevated platform, manipulates, thus bringing up each time a number of twines, which in their turn raise by means of the loops the required threads of the warp. To make the 'sheds' on this side the reed distinct, two nauglis or plough-shaped wooden wedges suspended from the ceiling with ropes are thrust in by the weaver among the twines. He then passes the little sticks called shikika (not 'spools' put in shuttles) charged with coloured weft threads through the 'sheds,' along the whole width of the piece, corresponding to the different buts or figures. When the coloured threads for the buts have been once passed, the nauglis are withdrawn while the reed is pressed home to the web, the treads worked, and the shuttle passed once to lay one thread of the ground weft. The reed is again worked, and then the draw-boy manipulates the cords of the naksha which govern the elevation of the warp for the two borders only. The nauglis are again thrust in to bring the two sheds on the two sides (for the borders) distinctly up, and then the two sticks with coloured threads meant for the two borders are passed through the sheds once. Another weft-thread for the ground is then put in with the shuttle. These three sets of operations go on throughout the weaving. As a rule there are two naksha for the borders, two for the buts, two for the anchia or the ornamental end piece, and one for the beginning and finishing up. The 'draw-boy' manipulates a 'harness cord' for the buts and the weaver puts in a thread for the buts. At the next operation, viz., the putting in of a weft-thread for the ground, the 'draw-boy' does nothing; then the 'draw-boy' manipulates a harness-cord for the border, while the weaver puts in a thread for the border. At the next operation again the 'draw-boy' does nothing, while the weaver passes the shuttle to put in another weft thread for the ground. At each operation, therefore, time is spent by the weaver not only in his own manipulations, but also in watching those of the boy. For richer designs as many as 14 naksha are sometimes employed. It is easy therefore to imagine how a piece five yards long and 42 inches wide can take as much as six months for a weaver and his boy to weave, beginning at the adjusting of the loom and ending in the completion of the first piece, for even in the case of the figured patterns 0, 10, and sometimes 20 pieces are turned out before a readjustment of the loom is allowed.

203. An ordinary loom costs Rs. 4 to Rs. 10, while a naksha loom costs Rs. 30 to Rs. 40.

204. Figure 22 illustrates a naksha loom that has been set up at the Rampur Boali Sericultural School by one of Dubraj's workmen. It is not so complicated as the looms which produce sari with ornamental ground (Fig. 22a). Figure 22 illustrates the weaving of a shawl with a wide ornamental border, and
Fig. 23a of a sari with ornamental ground, border, kunja or corner figures and anchila or ornamental end piece.
PART V.

INFERIOR SILKS.

CHAPTER XVIII.

The tasar Silk Industry.

Introductory.—There are several classes of cocoons, spun by wild or semi-wild silk-worms of different species, which go by the generic name of tasar or tusar. Those recognised in commerce are according to the quality of the silk they yield—(1) the Yamamai cocoon of Japan (Antheria Yamamai), (2) the China tasar (Antheria Pernyi), (3) the Muga cocoon of Assam (Antheria Assama), and (4) the Bengal tasar (Antheria mylitta). Cocoons, such as the Attacus atlas and the Actias selene, which are not utilized in commerce, are known as Bharwus in Manbhum.

206. Of these, the Bengal tasar cocoon has the greatest length of fibre, though the fibre is inferior to that of the other three classes of tasar mentioned and it is also more difficult to reel.

207. The Yamamai cocoon is so highly prized in Japan that by law capital punishment may be awarded to any person exporting seed cocoons or eggs of this insect. Though some attempts have been made at the introduction of this insect (which feeds on the oak) into Europe, the attempts have not met with any practical success, and Yamamai tasar silk, which is almost as good as mulberry silk, is still made only in Japan.

208. The China tasar cocoon is smaller than the Bengal tasar cocoon. The average length of fibre is 550 metres, as compared with 700 metres which the average length of fibre on the Bengal tasar and the European mulberry cocoon, and with 250 metres which is the average length of fibre on a Bengal mulberry cocoon. In reeling a China tasar cocoon an average of about 300 miligrammes of 'waste' are obtained, while in reeling a Bengal tasar cocoon, an average of about 720 miligrammes of 'waste' are obtained. The proportion of reealable silk in fresh tasar cocoons of Bengal is about 8 per cent., while it is about 5 per cent. in the case of fresh China tasar cocoons. The Bengal tasar cocoon has a few other advantages over the China tasar cocoon. The tenacity of the 'bave' (i.e., the double fibre as it comes out of the mouth of the silk-worm) is 38½ grammes, as compared to 18 grammes which is the tenacity of the bave of the China tasar. The elasticity of the bave is 21½ per cent., as compared to 19 per cent. which is the elasticity of the bave of the China tasar. The Bengal tasar also loses less of its weight in bleaching; China tasar losing as much as 21 per cent., while Bengal tasar loses only 11 per cent. The Bengal tasar is, however, more difficult to bleach and dye than the China tasar. The Bengal tasar is reared by Sonthals, Kolas and other aboriginal tribes of Bengal who live in warm localities, where the oak on which the China tasar feeds cannot be propagated. In the cold, regions of Bengal where the oak is to be found (i.e., in the Darjeeling district), wages are nearly four times larger than it is in those places where Sonthals and other aboriginal tribes live.

209. The rearing of the tasar silk-worm requires an amount of patience and skill which without the aid of heredity it is difficult to attain. The introduction of the China tasar rearing industry in the Darjeeling hills, which seems to be in contemplation, is likely to be attended with peculiar difficulties, and the success of the enterprise is extremely doubtful. In connection with the contemplated introduction of the China tasar by the Forest Department, I may here quote the opinion of Mr. Otto Anz, a distinguished tasar expert, contained in a letter, dated Yinho-mpa, China, dated the 9th November 1897, addressed to Her Majesty's Consul at Newchwang:—

"I further venture to remark that it would be a pity in my opinion to abandon the native tasar silk of India, as my study of these have shown that they possess qualities..."
specially adapting them for important requirements of the silk industry; I hope to be able
to prove this in the course of next year. But while recommending to further, may, to
greatly increase, the culture of Indian tasar (Antheria mylitta), on an improved basis, I am
entitled strongly to support Mr. Wardle’s suggestions to introduce into India the culture
of Antheria Perayi too. The silk of the latter has other properties which for other
requirements give a value superior to that of Antheria mylitta, and from a point of view,
considering the economic value of both kinds for India as a whole, I should think that it would
not be wise to neglect it now; or as the one of two silks, the oak silk is not indigenous in
India, to import its culture to the benefit of the cool and hilly regions, while the culture of
tasar, mylitta, would, if based on better principles, largely benefit the poorer classes of the
people in the tropic parts of India.”

210. So the Bengal tasar, though it has been greatly ousted by the China
risin in the European market, has a future before it, if full advantage
is taken of its capabilities. It seems strange that the cocoons should
be gathered in the jungles of Singhbhum, Manbhum, Sonthal Parganas, and
even of Assam, and brought down to the filatures of Murshidabad for
reeling. The tasar silk reeling and weaving industries must be estranged
from the mulberry silk-reeling and weaving industries, and the former deve-
loped on their own lines. There should be no difficulty in establishing tasar
factories in tasar-growing districts, where labour and fuel (both coal and
wood) are abundant and cheap.

211. The industries (those of rearing, reeling and weaving) exist in
the same original condition in those districts, in which the mulberry silk-rearing,
reeling and weaving industries existed in other parts of Bengal before these
were developed by British enterprise and capital. The climate of those
districts is also more congenial to Europeans than the climate of Lower Bengal.
A tasar-reeling and weaving company organised on European principles, and
working in the tasar-growing districts is likely to have a very prosperous
career before it.

212. It will be best to deal with the tasar silk industry district by
district.

Murshidabad.—It has been already said tasar cocoons are reeled in
European filatures in the district of Murshidabad, but they are imported from
distant places. Tatar-reeling is done chiefly at the Bajarpura (opposite
Berhampore) and Narayanpur Factories.

213. Hooghly.—The following extracts from the Hooghly monograph refer
in the tasar industry of the Jahanabad subdivision of that district:

“Weaving of tasar and mixed fabrics.—Fabrics made of tasar and of a mixture of tasar
and cotton are manufactured in several scattered villages in thana Goghat, but chiefly in
Shambazar, Badangaon, Krishograjan, Bettiah, Kayapata, Phubi, Hajipur, Mohebagia,
Kirtichandapur, Debhanda and Gosainbazar.

“I have not been able, owing to the villages being scattered over a large area to
ascertain the number of people engaged in this business. The figures supplied by the police
appeared to me to be altogether unreliable. The number, however, may be roughly taken to
be between 300 and 300.

“The fabrics manufactured by these people are tasar saries for women and jors (or suits
of kirti and chuddar) for men, besides dress-pieces made of a mixture of tasar and cotton.
These fabrics are sold in local markets or at Ghatal and other centres.

“Tazar-weaving is in vogue in several villages in thana Goghat and notably in the
villages in Badangaon outport. The area included in Badangaon outport is contiguous to
those parts of Bankura and Midnapore where there is an important tasar industry. The
industry appears to have extended to this subdivision from Babunpur, Ghatal, and Garbeta.
The chief centre is Shambazar.

“The fabrics manufactured are such as are in local demand, and consist chiefly of
saries or kirtis.

“The people engaged in this industry belong for the most part to the Tanti caste and
to a more limited extent to the castes of Kamar, Kumar, Jolas, Gouls, Chandals, and
Bagdis.

“The fabrics are purchased by mahajans or wholesale dealers who make advances to
the weavers, and are sold by them at the fairs or markets at Ramjibazar in Midesap,
at the Howrah sad, and at the local bazaars.

“Tazar-spinning.—Tazar-spinning is confined to Sripur, Malhubati, Bauri, Hajipur,
Kirtichandapur, Borjoo, Gosainbazar, Shambazar, and Baburampur in thana Goghat. These
spinners are included amongst the tasar weavers mentioned above.

“The tasar thread is spun from cocoons imported from Manbhum and Singhbhum.
The fabrics are made either of pure tasar thread or of tasar mixed with cotton thread.

The tasar-spinning is done entirely by women and gives occupation to most of the
widows of the weaving classes.
The following are the different kinds of cocoons used in spinning:

(1) Dabo (superior) at Rs. 10 per 1,280. | (2) Bagui (medium) at Rs. 9 per 1,280.  
(3) Jadui (inferior) at Rs. 7 per 1,280.

"Tasar thread is bought at Rs. 7 to Rs. 8 per seer of 70 tolas direct from the manufacturers of Sultampur in Ghatal, and also to a more limited extent, from Manikbat, Raipur, Salpur, &c., in Jahangabad.

"Tasar sari and dhutis made of tasar are made in the following sizes:

Sari.
5 yards by 1 yard 9 inches.
3 yard by 2 feet 7 inches.

Dhuti.
5 yards by 1 yard 9 inches.

Besides these pure tasar sutiings are made to order measuring 10 yards by 1 yard for the use of Bhadraloks. These are sold for Rs. 11 per piece and are made in one quality only, called chamesuti, i.e., two threads warp and two threads woof. The texture is very strong.

"The sari which have a red or black border and the dhutis are made in two qualities:

(1) Chamesuti, i.e., two threads warp and two threads woof.
(2) Der-suti, i.e., one thread warp and two threads woof.

"The first quality of sari is sold at from Rs. 6 to Rs. 6-8 per piece and of dhutis at about Rs. 7 per piece, the second quality being sold at Re. 1 less per piece.

"Kethe cloth.—A worse kind of tasar called ketha is made at Badanganj. Only about ten families of weavers are engaged in this manufacture. The fabric is made of pierced tasar cocoons and is purchased by dealers from Calcutta and Orissa. It resembles in appearance the well-known Assam silk.

"Garha suti.—A mixed fabric called Garha suti is sometimes made to order. It consists of a mixture of cotton and tasar. The size usually made is 10 yards by 1 yard. The material is suitable for sutiings and is sold at Rs. 8 per piece.

"The industry is in a decidedly prosperous condition. In fact it has to some extent taken the place of the old cotton industry. Owing to the depression in the cotton trade, the cotton weavers have taken to tasar manufacture, the looms being entirely adapted for the purpose.

"The time of the year when the fabrics are in the greatest demand is the marriage season in spring. The business is slackest during the rains. The cloths are worn during festive occasions and in the performance of religious ceremonies. Borderless tasar cloths are largely used by widows, an idea of sanctity being associated with silk and tasar. During the rains the tasar weavers betake themselves to cotton weaving."

214. Burdwan.—In the district of Burdwan tasar spinning and weaving are carried on in the Sadar and Katwa subdivisions. In the Sadar subdivision they are carried on in the following places:

In Galiya thans—

<table>
<thead>
<tr>
<th>Place</th>
<th>Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khanpara</td>
<td>29</td>
</tr>
<tr>
<td>Uttarpara</td>
<td>42</td>
</tr>
<tr>
<td>Halbazar</td>
<td>26</td>
</tr>
<tr>
<td>Jagatpur</td>
<td>29</td>
</tr>
<tr>
<td>Kolapara</td>
<td>60</td>
</tr>
</tbody>
</table>

In Satgachi thans—

<table>
<thead>
<tr>
<th>Place</th>
<th>Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menari</td>
<td>7</td>
</tr>
<tr>
<td>Radhakantapura</td>
<td>30</td>
</tr>
<tr>
<td>Tantigar</td>
<td>6</td>
</tr>
</tbody>
</table>

Total 228

Thus in the Sadar Division about 228 families are dependent on the tasar industry: they are all Tantis by caste.

215. In the Katwa subdivision, thanks to the efforts of Radhicananda Ray of Amdanga, an officer in the employ of a former Nawab Nazim, tasar cocoong-rearing, silk-spinning and weaving are carried on in the following villages:

"Bagdi, Gosalkaniga, Madhapat, Mustului, Amdanga, Chhorang, Panchheria, Jagadanandapur, Chandul, Sribati, Mutki, and Maygachi.

"Employment is given to about 500 families.

"Various castes take part in the growing and spinning, but the weavers are Tantis of the Navasak caste, which is only inferior to Brahmins, Baidyas, and Kayasthas.
"No cocoons from which rayon or parad might be manufactured are grown in this subdivision or imported: all importations are in the form of yarn. Cocoons for tasar silk manufacture are grown at Kalna along the banks of the river. Cocoons are imported from various places, of which Chaibassa in Singhbhum is the most favoured. Sonamukhi in Bankura, Hussengoon in Cuttack, and some places in the Sonthal Parganas also send cocoons. These are imported by Uriya merchants and also by traders from Rajgram, Bankura, and elsewhere: at Katwa there are a few merchants who import.

The cocoons are of various classes, viz.—

1. Daba, the best quality, comes exclusively from Chaibassa in Singhbhum; one kahan makes two seers of yarn. Its price is Rs. 12-8 to Rs. 13-2 for 1 kahan = 1,280 cocoons.

2. Bagrai, which also comes from Singhbhum, produces 11 to 11½ seers of yarn per kahan, and its price is Rs. 8-12 to Rs. 9 per kahan.

3. The mugo, which comes from Hazaribagh, produces 11½ to 12½ seers of yarn per kahan, and its price is Rs. 7 to Rs. 8-8 per kahan.

4. Jaidui or winter cocoons is a quality imported from various places in the cold weather: it produces only 12 to 13 chittaks of yarn per kahan, and is sold at Rs. 3 to Rs. 5 per kahan.

"Yarn for tasar manufacture is prepared in the following way:

If the cocoons are not dead, they are hung in a cloth ever boiling water until they become so. After being dried in the sun, they are placed in a vessel containing water, cattle-urine, and potash or soyi water (the former being preferred at Katwa, the latter in the Salar) and boiled for about an hour. As they become soft they are taken out and peeled by the finger and placed in a stone vessel. The spinning is done by the women of the family, while the males weave or engage in other occupations. The spinner takes hold of the cocoon and pinches it and draws out the fibre. The thread is wound on to a bamboo frame (latia) which is held in the right hand. The cocoon is kept on the left side of the spinner, and as the thread passes over the right thigh, it is twisted with the left hand before it passes on the latia. The women manage to weave about two seers of yarn a month, and they sell the best quality yarn for Rs. 12½ to Rs. 14 a seer. As the price at which they purchased the cocoons of the best sort was Rs. 12-8 to Rs. 13-2, their average monthly earnings are rather under Rs. 2. One anna a day is about the rate of wages prevalent."

216. Midnapore.—In Midnapore tasar cocoons are found in the jungles of Gogooi, Mooga, Sildha, and Ramgaoa. The jungle mahals towards the western side of the district generally and the jungles of Mourbanj, and Dhalbhum produce these cocoons in abundance. They are imported from these places, and they gradually find their way into the villages of Anandapora in thana Keshpore and Keseri in thana Narayanganj, where weavers live.

217. The following account is furnished in the district monograph regarding the present industrial position of the tasar-weaving industry in these two villages:

"These villages are wholly inhabited by weavers who prepare various sorts of d'lvre novets, and thins from the silk, and after local sale send out the surplus to Calcutta for sale there. At one time the weavers of Anandapora and Keseri made their fortune by preparing tasar cloth, but for about 20 years the industry is on the decline, owing to want of purchasers for their cloths and owing to the influx of machine-made European silk cloths of all sorts, which being superior in make and comparatively cheaper in price, the people like and do not care to buy cloths made by native weavers in the native method, and the best weavers complain that they can hardly make Rs. 10 a month for their livelihood."

218. The following description is also furnished in the same monograph of the rearing and manufacturing processes in vogue in this district:

"One or two wild cocoons are found upon trees known as askha (Terminalia tomentosa). These are plucked from the trees in the months of Ajin and Kartic, and are kept inside a small pot made of green leaves and kept tied to a small twig of the tree full of leaves, and in some cases a month the caterpillar* comes out of the cocoon, and another caterpillar or is soon found there. Wheneve it comes no one can say, and after both these have grown well for about a month, they give out eggs. When some hundreds of eggs are produced at this time, small twigs containing green leaves are put upon these little worms, and they go on feeding upon these new leaves, and gradually numbers get attached to these newly-cut twigs. At this time the little worms with the newly-cut twigs are removed to different parts of the tree as also to other trees having large quantities of leaves. In this way all the little worms produced from the original cocoons are removed to numbers of branches and trees, and they gradually grow to the size of big caterpillars and form cocoons. In the course of three months—October and September are favourite months for putting in young worms upon trees, and in January they rise and are collected by the dealers and taken to different markets. The seed-cocoons are always found in jungles.

* Female moth is urant.
+ Male moth is urant.
; This is a mistake, eggs being laid by the female the very next day.
They are never reared at home. Every year during the rainy season the jungly people, who live inside the jungle, go out in search of seed-cocoons, and each person collects about 20 to 30 cocoons, from which they prepare the seedlings, which they plant upon different trees, and in the course of three months, they get their supply of tasar cocoons in abundance.

"The different kinds of tasar in this district are—"

1. Jorai
2. Fooni
3. Annetia
4. Bagru
5. Joora
6. Doba
7. Moogtal

"Ashna, sol, and plum trees are the best plants for growing tasar cocoons.

"The hardest kind of coconuts that do not get hollowed by pressure is the best kind of tasar. The cocoons are either reddish, yellowish, or blackish in colour. The colour does not affect the matter of—" if the cocoons are the hardest in kind—"the softer kinds known as jorai, fooni, and annetia are the worst kinds of tasar.

"The cocoons are boiled in water mixed with alkaline matter or Fuller's earth. The upper covering gives a sort of coarse silk called locha, which is first taken out in a separate latai (spindle). Then the softer and better kind of silk comes out, and this is taken in a separate latai (spindle). The tasar cocoons are never sold by weight. They are sold by peson or 80 in number, and are valued according to the quantity of silk that is produced from the 80 cocoons. The best kinds of cocoons produce 5 tokens of silk from 1 peson or 80 cocoons, and the worst kinds produce 2½ to 3 tokens of silk; the cocoons are sold at the rate of Rs. 10 to Rs. 12 per kahan (80 pesons) (80 x 20 = 1,600) in number for the best ones that produce 5 tokens of silk per each peson or 80 cocoons, and Rs. 5 or Rs. 6 per kahan that produce 2½ to 3 tokens of silk for every 80 cocoons.

"The hardest kind of silk known as locha, produced from the upper covering of the cocoons are made into a sort of coarse cloth known as kathia, and is used for various purposes amongst the people of the country.

"Caterpillars (silk) coming out of the cocoons do not spoil the silk so much as when a hole is made inside a cocoon by small red ants; so the cocoons require a great deal of protection from ants.

"During the rainy days and in cold weather the tasar silk remains in good form, and when woven during these months, nice cloth is prepared from tasar silk, while during the hot months the better kind of tasar cloth cannot be turned out.

"Tasar cocoons are at once put in boiled water, immediately after they are collected from the trees. This procedure only kills the insects inside the cocoons and protects the cocoon from being spoiled by the caterpillars (silk) coming out, and before the silk is reeled, the cocoons have again to be boiled in water mixed with Fuller's earth or some sort of alkaline matter prepared from vegetable ashes of all kinds; the silk is reeled off. While the cocoons are yet damp and softened by the boiling water, 3 to 10 cocoons are at a time taken to reeling, in accordance with the requirements of the weaver who prepares the cloth either thick or thin.

"Winding and warping.—This work is done by the women, who prepare a sort of paste from fried dhan (khali), and after putting two or three and sometimes four latais of raw silk loosely upon the floor, and then the ends of the skins of raw silk is attached to another latai which is held by the right hand, and the threads transferred to the right hand by turning it by the right hand, while the threads are made to pass between the thumb and the index-finger of the left hand. The paste made of parched dhan is at times taken in very small quantities between the thumb and the index-finger of the left hand, while the right hand latai is being turned. After this process the silk is again kept soaked in cold water and passed a second or a third time through the thumb and index-finger before it is ready for weaving, and the best weavers say that if the silk is prepared by a passing through the thumb and index-finger nine times, then it will produce really fine cloth. The clue is sometimes lost during the process. To get back the same and to join the ends together, some skill is necessary, and an unskilled person is sure to make the thread thick and heavy in many places if he is not well-skilled in this art.

"Loom.—The native looms are of one and the same kind, except the ones used in preparing figured or figured cloths. The process of making figured or figured cloths are well understood by experts in the work. For outsiders it is a difficult process, and cannot be understood by a mere description of the same by persons who are ignorant in the art of weaving; and although my informant gave me some idea of it, yet I could not exactly follow him, and I do not think that any layman will be able to understand the same without a proper drawing of the loom. All I can say is that experts, who prepare figured and figured cloths have to work both with their hands and legs, instead of by their hands alone.

"Bleaching and dyeing.—Tasar silk is hardly bleached with soap or alkaline matters. If necessary, the silk is only put in warm water for a few seconds and then washed in cold water. The weavers say that if the silk or cloths are put in boiling water for a long time they become rough and coarse, and are unsuitable for the textile products."

*This is incorrect. Hands and feet have both to be employed in ordinary weaving. The reference here is evidently to the Mawla-lem as I have stated in paragraph 302.
or any alkaline matter is mixed with the boiling water, the silk loses not only its gloss, but also its weight, and the cloth gets spoiled. So the best process used in washing is a little soap with cold water only.

"In this district the following dyes are generally used in preparing tasar cloths:—
(1) Red and high red, (2) yellow, (3) green, and (4) purple, besides mixtures of coloured tasar silk in preparing (5) mauvaranti and (6) pitambari cloths. The red is prepared from lac and a sort of bark called bhat chal by boiling both the substances, and while boiling a small quantity of Fuller's earth is sprinkled over the boiling water. The exact quantity of each material cannot be stated by the weavers, but the red colour is obtained from a particular caste of people known as sportis.

"Yellow is prepared from a sort of earth obtained in many places in Midnapore. It resembles something like yellow ochre, and can be obtained in large quantities near deep wells and beneath laterite blocks. This earth is mixed in water and a small quantity of bhat chal put in and boiled and afterwards strained through a piece of cloth. Turmeric and wood of jack-fruit trees are also used in the preparation of this colour.

"No fast green can be prepared by the weaver: it is prepared from turmeric and indigo, and though boiled with a little of alum, and the cloth dried three times to make the colour fast, yet it fades away very soon.

"Purple is prepared from the barks of peshur trees, boiled with alum and mixed with indigo. This colour is much faster than green.

"The mauvaranti cloth is prepared from a mixture, two sorts of coloured silk—one for the warp and the other for the weft. Generally the red prepared from lac is used for the warp and the green for the weft.

"Pitambari cloth is prepared by the use of red silk for the warp and yellow for the weft.

"Export and import of tasar silk and silk cloth.—Nobody can exactly say the quantity of the tasar silk that is manufactured in this district, but, roughly estimating, I think the export of cloth will be worth Rs. 40,000 to Rs. 60,000 with a manufacture of yarn prepared from the cocoons, worth Rs. 9,000 a year."

219. Birbhum.—The Birbhum monograph has the following account of the tasar silk industry of that district:—

"Besides silk as described above, tasar or wild silk industry is followed in many villages of the district, important of which are Karishna, Kalipur, and Tantipara. Some 200 or 300 families have taken up this business. It is principally centred in the western part of the district and at Illambasar. The cocoons are brought in from the western jungles, where they are either reared by the aboriginal or semi-aboriginal tribes or gathered from the forest trees. They are reeled off and woven in the villages.

"The quantity of cocoons gathered or reared in this district is not found sufficient to meet the demand of the quantity of tasar manufactured in the district. The manufacturers, therefore, get their supply from Manibhum and other districts in the vicinity, from which they manufacture tasar cloth into dhutis, saris, and thins of 10 yards. They are also coloured as per demand. Dhutis sell at Rs. 3 to Rs. 6; saris sell at Rs. 4 to Rs. 8; but thins of ordinary tasar sell at Rs. 7-8 to Rs. 10 and of pakeen thread at Rs. 12 to Rs. 18. These cloths are sold locally and exported to other parts of Bengal.

"The industry is carried on by 200 or 300 families in this district in about 20 or 25 villages belonging to the same caste as the silk manufacturers belong. In social and industrial position, the tasar manufacturers are exactly the same as of silk manufacturers. They come from the same caste, and it is found that the same man has taken up both the industries in his hand."

220. Bankura.—The tasar silk industry is in a fairly prosperous condition in the district of Bankura. The ketha or coarse cloths, made out of thread spun from pierced cocoons (answering to matka cloths), made in this district are well known, though the district monograph does not happen to mention this cloth. A piece of ketha sufficient for a complete suit of clothes can be had for Rs. 4 or Rs. 5. The whole of the account given of the tasar industry in the district monograph is quoted below:—

"The eggs of the silk-worm are gathered and put on the leaves of asa, sal, harakli and kedha trees in the jungle. The eggs are hatched on the leaves, and the worms feed upon the leaves. In due time the cocoons are formed, and they are gathered by cutting the small branches from which they are suspended. The cocoons are sold at Rs. 5 to Rs. 9 a kahan (=15-20). The cocoons are purchased wholesale by substantial merchants, such as Kedar Nath Kundi and Faquir Chandra Dutt, of Rajigram, and retailed to the weavers. The principal centres of industry in tasar silk are Birsinghpur, Gopinathpur, and Sonamukhi. The manufacturers are all of the Tanti caste, who generally prepare the silk themselves from the cocoons. The cocoons are first boiled in water mixed with wood ashes. They are then washed and cooled. Five cocoons are then taken at a time, and the silk from them is wound by a woman on a lota. The silk thus obtained is gummed and otherwise prepared for weaving as in the case of domesticated silk.

"The tasar silk is generally coloured violet and red with aniline dyes. The yellow colour on tasar silk is made from turmeric and komala powder.
The various kinds of tasar fabrics manufactured in this district and their prices are noted below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Rs. A</th>
<th>Rs. A</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Sari or cloth for women</td>
<td>3.0</td>
<td>8.0</td>
</tr>
<tr>
<td>(2) Dhuti or cloth for men</td>
<td>2.0</td>
<td>5.0</td>
</tr>
<tr>
<td>(3) Than or long pieces for making dress</td>
<td>0.12</td>
<td>1.0 per yard</td>
</tr>
<tr>
<td>(4) Bofta or a species of mixed cotton and tasar fabric</td>
<td>0.8 to 0.10</td>
<td></td>
</tr>
</tbody>
</table>

"The major portion of the tasar silk produced in this district is sold locally. A few brokers come annually to Birisinghpur from Jessore and other districts, and take away a considerable quantity of tasar fabric from the weavers for sale in those districts."

221. Bhagalpur.—As a cheap fabric, the bofta of Bhagalpur is far more widely known and appreciated than the keth of Bankura, and though the Bhagalpur tasar and bofta industries are perhaps not in such a flourishing condition as they were a few years ago, they are still of considerable importance. The following description of these industries has been supplied by Mr. L. C. Adam, c.s.:

"Silk fabrics take a very important place among the manufactures of the district of Bhagalpur. From enquiry it has been shown that in the Sadar subdivision alone is the industry carried on, and even there to no very great extent.

The chief woven silk fabric is tasar silk cloth. About two thousand weavers gain a livelihood by its manufacture—Tuntis, Dolas and Memins, the former classes being Hindus and the latter Mysalman. Most of them are poor and live in Champangar, Nathagar, Rampur, Kelaavi, Kutubganj, Khaungar, Lodipur, Poonam, Mustafpur, Radhanagar and Daripur. All these places lie round Bhagalpur. The cocoon have to be imported from the Southish Faragura, Hazarbhag and Manbhum. They are sold at Nathagar at rates varying from 80 to 250 to the rupee according to quality. Pissed cocoons, the fibres of which are broken, are sold at from 100 to 400 to the rupee.

To yield a tola of tasar silk 15 to 20 cocoons are necessary, and eight to ten tolas of tasar silk will bring in about a rupee.

The preparation of the silk is as follows:

The cocoons are first exposed to the heat of the sun, and then steamed in an earthen vessel and dried. The combination of heat and moisture makes the fibres loose and easy to reel. The silk is next wound off the cocoons by means of an instrument called pusa.

The loom used in this district consists of five parts:

1. The Gharp (warbeam), a piece of timber measuring about 6' long 2' broad and 2' high. Round this the warp threads are wound before the weaving commences.

2. Baitara (heads), pieces of split bamboo fasten together with thread so as to form a tread of comb. The heads separate the different sets of warp threads.

3. The Lom, consisting of two pieces of timber, 6' x 3' x 4'. Between these there is a framework of three reeds, like a comb, and through this the warp threads pass. This press the width thread when the loom is working.

4. Kapurthi (shuttle with spools) which introduces the wet thread through the warp thread horizontally.

5. Nanda. An octagonal piece of wood about 8 feet in length round which the woven fabric is rolled.

Bofta is another sort of fabric manufactured in the same villages. It differs from tasar in that the warp is all tasar and the woof cotton. Pieces of 6, 10 and 12 yards are made and dyed by the weavers. In one month a weaver can make three pieces of 15 yards each. Tassar as well as bofta is used for dhutis, sarees, coats, overcoats, chhapan, pakris, and wrappers.

The rates at which this silk is sold vary. It is taken by the piece and not by the yard, and the size and quality of a piece makes a difference.

A piece of tasar ten yards long to be used for a saree or dhuti will cost from Rs. 7 to Rs. 10. For coats measuring 10 to 15 yards are sold for from Rs. 5 to Rs. 15.

A piece of bofta—dunia sare—measuring 15 yards will bring from Rs. 3 to Rs. 5 for the making of clothes. For pakris seven yards are sold at from Rs. 1 to Rs. 3. A piece of twelve yards for a coat will cost as much as Rs. 10.

Bofta for wrappers (dhiha) will bring from Rs. 5 to Rs. 12 for pieces of seven yards, Rs. 3 to Rs. 8.5 for six yards, and Rs. 2 to Rs. 2.5 for five and a-half yards.

For colouring matter the Bhagalpur weavers depend almost entirely on English dyes. The chief native dyes used are flowers of hawam, sufali, and pelis, haldi (turmeric), hawam (sulphate of iron), rassar (a yellow powder) and indigo."
The English dyes have only to be mixed with water and also give a more brilliant colour than native dyes, and therefore are preferred.

In many cases two native dyes are mixed to form a third colour. The favourite mixture is khobi, made of habi and habi.

Very often one colour is used for the warp and another for the weft, for instance, in the so-called peacock-coloured pieces, where the warp is red and the weft green.

The trade in tasar is gradually diminishing, though Bhagalpur used to be famous for it, and in time it seems it will die altogether, and imported cloth alone will be used.

It is a great pity, but the hand-loom cannot compete with machinery."

222. Sonthal Parganas.—In the Sonthal Parganas tasar cocoons are reared throughout the district, for exportation chiefly to Murshidabad. There is some tasar-weaving also in the subdivision of Godda, and the following description of the industry has been compiled out of the monograph furnished by the Subdivisional Officer of Godda. With the exception of some of the vernacular terms used, the description of tasar weaving and its subsidiary processes will be found to be almost identical with the description of silk weaving, though the appliances used for tasar-weaving are of a ruder description:

The main class who carry on the industry are a class of people called Patwas. They are really residents of the Gaya district, but a few of them have come and settled in the northern part of the subdivision, and have taken up their hereditary occupation as tasar weavers. They appear to be the only class of people who manufacture silk cloth. Paharias, Sonthals, Bhuiyas and Khetoris also assist them in preparing the materials, but these classes take no active participation in the manufacture itself. Their work is again referred to later on.

The Patwas number only 40 in number and live all together in one village, called Mal Bhagaya just outside on the borders of the Government estate (Damin-i-koh). This class of people are found nowhere else in this subdivision. They also go in for some cultivation as an additional source of income.

Their social position is that of simple weavers and their industry is that of tasar silk manufacturers. They make the cloths and sell them in the local markets, occasionally disposing of their cloths in the hills.

The following are some of the names of the cloths they make with a short description of their size and use:

Duti.—The duti is a waist cloth made for males. They measure about 4 yards x 1 yard and are sold according to their texture. Coarse quality Rs. 2 per piece; a piece consists of 4 yards x 1 yard. Superior quality Rs. 5 per piece. They are sometimes coloured yellow and red. They are used at the time of marriages and on festive occasions.

Sari.—The sari is a chief cloth worn by women. It measures 6 yards x 1 yard. The pieces are sold according to their quality. Coarse quality at Rs. 3 per piece, and the superior quality at Rs. 7. They are of various kinds, white, yellow, red, purple, according to the demand. Sometimes they are made with coloured broad borders. These sares are also used by various classes at the time of marriages.

Grameha.—The grameha is a towel, worn by children round their bodies. They are made in pieces, measuring 3½ yards x 1 yard.

The coarse kind cost about Rs. 1, and the superior quality Rs. 2 per piece.

The cloth is also made into one continuous piece called thusa, measuring 8 yards x 1 yard, and costs Rs. 8. The various colours used are made from various dyes, some of which the weavers purchase, others of which they make themselves in their homes.

The red dye is purchased from local banias who bring it from elsewhere for sale. The materials for the dye (yellow) is also procured from the local banias.

It is said that they procure a kind of flower called komba which grows in the jungles. They bring this flower home and dry it and powder it. The powder or dust the weavers purchase from them taking it home and making a yellow dye. They put this dust into an earthen vessel boiling it for about an hour till it begins to simmer and bubble up, then, taking it off, they put the thread into it, and let it remain for some time; when the colour has soaked well into it they take them out and allow them to dry.

The other colours are purchased from the shops.

Process of manufacture.—The following class of people, viz., Paharias, Sonthals, Khetoris near the tasar worms on the Assa trees, either on the hills or plains.

There are four kinds of cocoons (kota).

1. Sartham.—No. 1.
2. Langa.—Produces less thread than No. 1.
3. Munga.—The best, bigger than (1) and (2).
4. Phaka.—Sold to Jogi or Bhairagi caste, who make a kind of thread with them for jalis (nets); they are used also for purposes of making beads.

The process for cultivation is as follows:

They take the seed of the munga for breeding purposes and enclose them in a covering of Assa leaves called (thong). Then they keep these for two days in their houses; when

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It is the dry capsule or fruit (not flower) of the Miltiopsis philippinica that is meant. A granular dust is found on these fruits which yields the valuable dye Assa or Assa-garvi. See the description of the preparation of this dye in paragraph 178.
the worm forms, they suspend it on to the twigs of the Asan trees. The worms (pila) of their own accord leave the (thonge) and spread about the tree making the cocoons (kow).

The men live close by and protect them from the kites and crows. This takes place in the month of Asan, i.e., towards the end of September and beginning of October.

Three months after (i.e., in the month of Agraahan), when the cocoons are ready, they take them down from the Asan trees. This process is called (kow kata). They cut it with a knife (hona). The worms make the cocoons on the twigs. After taking them down they dry them on the ground for two days. When the cocoons are first taken down from the trees they are raw and of various colours, white, blackish, yellow (ujia, kalé, and pelia). The colours do not affect the quality of the threads; when dried they are brought to the nearest market (hutia) for sale, and are sold at various prices.

The cocoons are sold for three pons (80 cocoons = 1 pon) per rupee, to Patwas; longa, five pons per rupee; munga, two pons per rupee, pukha, eight pons per rupee.

The prices sometimes go up owing to the number of marriages.

Then the cocoons sell as follow:—

Soriban for two pons per rupee.
Longo, three pons per rupee.
Munja, one and a-half pons per rupee.
Phuka, four to five pons per rupee.

The patwas or weaving class then bring them to their own houses and boil them in hot water (khapsa); they place about 80 to 100 at a time in a large earthen vessel (haria). This process is called (kow seyana).

In order to prepare them quickly and make them clean, they use (soji-matti) a kind of local soap and mix them (ghana). They keep the cocoons steeped for about eight hours, then they take them out from the haria and wash them in clean water and put them on the top of cow dung ashes (chole). This process is called (kow akkena). It is done for the purpose of absorbing the water. If they remain very wet, the thread is very liable to break when used. They then take one cocoon in the left hand, and with the right hand they slightly rub it in order to remove the rough coating over the shell (tasa phirya) and to get out the khorni or tasa.

After this is done they commence the process for manufacturing the thread itself.

They then take five different kinds of khori from five separate kinds of cocoons and place them in a small earthen pot (ateri).

The five threads are called taga. This process (called kow kata) is chiefly done by women, and in their private quarters. In the figure a man (No. 1, in fig. 23) is represented as spinning thread out of five cocoons.
The woman sits down on a low four-legged stool (masīs); the masīs is made with four wooden legs, the seat being interwoven with sabai grass strings, with her legs stretched, and she raises the thau on her left thigh, and one end of it is attached on to the reel (latai) which she holds in her right hand, and she keeps turning in her hand winding the thread into the latai.

Five gundas (i.e., 20 coccoons) yield one anti of thread. Its weight is about 14 bhori (tola). It takes about 18 anti of latai twist (taga) to prepare a piece of cloth 6 yards x 27 inches in length and width.

Then comes the preparation of the thread for the purpose of making the cloth.

The preliminary process called khewa latana has been described above. Now they take the anti from the latai and put them on to the charki one on each side. (Vide sketch No. 2 of fig. 24.) Then they attach them on to the latai and commence to reel. This process is called sarki karna. They then take this single thread (sarki) and place it in rice starch (mar) to make it stiff. This process is called patwari mukhanee. After this they put it on one side of the charki, and twist it again on the reel or latai. This process is called patwari ubharna.

The latai is then placed in the sun to dry. The thread is then taken off and placed under a stone, and well pressed. This process is called sarki chapna.

The thread is then put into a wet cloth in order to moisten it slightly. This is called dohri mahde. Threads (sarki) are again put on each side of the charki and twisted on the reel (latai). This is called dohri ubharna.

Warping process or Naritana process. Two latais are taken, one in the right hand and the other in the left, and the threads are attached on to the kilia post (vide fig. 23). The person then passes the latai in his right hand on the right side of mukhan or lath, and the latai in the left hand is passed to the left side of the mukhan and so on, forming a kind of figure (8) right round. The person keeps the whole time on the outside of the sticks; when he comes round to the next post a change occurs, the threads being kept on either side without being crossed, i.e., they do not intersect or form the figure (8). They run parallel from the second to the third post, as explained in fig. 10 and 12.

Then the threads are passed on to the fourth post forming again the figure (8), i.e., they are crossed. The above process is called naritana. In this way they complete Naritana process according to the size of the cloth they desire.

When a number of threads have been taken round, the person then with some silk ties the intersecting threads so as to prevent their being mixed or confused with other threads. The posts are then uprooted, except the first and last. This process is called naritana. The person then takes two sarai (pieces of bamboo about 3 feet in length, half an inch in width). They cut the thread off with a knife in two places at one end of the posts, and attach it on a sarai, placing the other sarai over the thread. This process is called bhanga laptna, and wrap it in order to form the head. The reed or sana is shown in fig. 24 (No. 4). It is a sort of a comb consisting of teeth made out of the outer covering of the common sar grass usually found on devar land.

The teeth are just far enough to admit of the passage of the thread. The interval between the teeth (gewa) varies according to the quality of the cloth.

They also differ in fineness as well as in length. The reed used in the Southal Parganas contains 702 teeth, and is 3 feet 9 inches in length. The teeth (gewa) are about 3 inches in length. The reed costs about 4 annas each. It is made by Rusmania or Odna Godna caste (Muhammadan sect) in the district of Gaya.

The frame enclosing the reed—It consists of two long flat wooden bars, each about 5 feet in length, 2 inches in width, and having a groove along one of the edges and a hole near each end, and passing breadthwise through it. The reed is placed between these two bars (vide No. 5 of fig. 24 and No. 21 fig. 25) and tied by string at the end, which passes through the hole. (Vernacular name of the bars is bhonri.) The two bars are pinned together by wooden pegs (kanata) which pass through the holes at two ends.

To insert the reed, the two pins are taken out, and the upper bar is lifted up, and the bottom edge of the reed is set to rest in the groove in the lower bar. The upper bar is again brought down, so that its groove fits on to the upper edge of the reed, and the two bars are again pinned within the reed is thus supported with its length horizontal and its breadth vertical. When this is done it is supported from the centre bar (chalan). The centre bars (chalan) are placed parallel and tied together and are placed across the two side arm bars (lahi). These bars are used for the purpose of suspending the lathni. The other (chalan) is used for suspending the main frame (lathni).

Lathni are made of bamboo, and each is about 4 feet 7 inches in length, and is attached to one of the bars (chalan) by string—vide fig. 25.

The reed frame is suspended by strings from the cross rod.

Proposition of looms—There are four posts usually made of bamboos, and these posts are fixed into the ground, so as to form a rectangle. They are about 3½ feet in length and 1½ inches in diameter. The posts are usually placed about 3 feet apart vertically. They are cylindrical. The two front posts are almost of the same length to the rear posts.

The yarn beam is tied loosely to the rear posts—vide No. 7, of fig. 25.
The cloth beam, however, rests on two posts, about 1 foot in length and 2 inches in diameter. These posts are driven in close to the two front posts on the inner side, and have their tops cut in the form of a ledge, shaped somewhat like the letter V; on this the cloth beam rests. These posts are called "bikarni."

The yarn beam (chapi) is a square bar, about 5 feet 4 inches in length. The faces are 3 inches wide. Along the inner face runs a groove (½ inch x ½ inch) which is called pattri. This groove runs along the face of the beam. At the left end of the beam at about 5 inches from its end there are two holes (chet). They are bored right through two opposite faces of the beam, and similarly two other holes on the other two faces at right angles to the others—side No. 8, of fig. 24.

The cloth beam (narrad) is very similar to the yarn beam, except that it is cylindrical, side No. 9, fig. 24.

The yarn beam is made of sali wood, and the cloth beam is made either out of the sali tree wood or palm wood. The warp is kept in a state of tension by the beams being rolled round and then fixed in position, each by means of rods which pass through the holes above-described till they touch the ground at right angles. The rods are made of ordinary bamboo, and are about 2 feet in length. The rod passing through the holes in the yarn beam is called the duna, the other which passes through the cloth beam is called the tuncha.

The posts support two bars, which are tied on by string to them. These are called bakus (No. 10, fig. 25). Across the centre of these two bars is placed two cross rods of bamboo (chalans) (No. 20, fig. 25). These two cross rods are tied together by means of string with their flat faces sticking to one another. One of these rods (chalan) is used for the purpose of suspending the (lachina) which will be described hereafter, and the other for suspending the reed frame.

The loom is enclosed in a frame which has been described.

The arrangement for working is rather a complicated one, and not easy to describe; however, the arrangement must be so adjusted that it can be pulled up and down, alternately the one shaft rising as the other falls.

The device is as follows:—

From one of the chalans is suspended three or four lachinas, No. 11, fig. 25. They are made out of pieces of bamboo, about 6 inches in length, with a hole through the centre. A thin round bamboo rod, about 3 feet in length (No. 19, fig. 25), passes through these holes. The brass rod is suspended from one of the two chalans or cross rods. These lachinas are placed at right angles to the bamboo rod which passes through the centre.

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Fig. 24.— Implements for tusser-weaving in the Sonthal Parganas.
No. 25.—The tusser-weaving loom of the Sonthal Parganas.

The *lachnis* thus lie parallel to the warp. At each end of these (*lachnis*) are attached strings which are connected to the *kanda* and *sit*, corresponding to *sir* and *dangi* of the Munsidabad silk loom. The *kanda* is a thin bamboo rod, about 4 feet in length. The *sit* is similar but a thinner rod. Both are suspended from the *lachnis*. Just below these two thin bamboo rods, another bamboo rod, somewhat thicker, is attached, which is called *pustawan* corresponding to *juthas* of the Munsidabad loom.

The *pustawan* has two holes at the ends, passing right through them. There is a stout string about the thickness of the small finger which passes through them, and is attached to the *kanda* and *sit* on the other side. There are four holes in the *pustawan*, about an equal distance from each other. Through the two inner ones are attached strings which are joined, and this forms the threadle—see No. 12, Fig. 25.

The two upper rods (*kanda* and *sit*) are intended to secure the upper *base* and the lower to secure the lower *base*.

The weaver by pressing one threadle pulls down the shaft of heads attached to it. This, in turn, pulls down the *lachni*, and consequently raises the back ends, which drop with them the other shaft of heads. The pressure of the other threadle pulls down the second shaft of heads, and draws up the first, and so on.

The shuttle (No. 13 of Fig. 24) is about 8 to 9 inches in length, and 1½ inches in width, and ½ inch in depth. It is made of cast-iron, and is shaped like a snuffing boat. At either end is fixed a piece of wood, 2½ inches in length, shaped like a cone. They are called *manji*. In the centre is a rectangular hollow, measuring 4 inches x 1½ inches x ½ inch.

In the centre of the hollow is a round small hole (*bir*); in one of the ends of the hollow is a small hole, and in the other end wall, exactly opposite, is a slit or notch. Those are to receive the spool pins, one end of which is inserted in the hole, and the other fits into the notch, and these secured by a small peg (*pakhhira*) which is passed through a hole drilled across the notch from one side of the shuttle. It is made out of the spinal of the worm (*musli*). The shuttles are made by local smiths who belong to the Muresia caste. The spool consists of a length of the silk thread wound in an iron pin. The thread is wound on to a hollow tube first, which is placed on to the iron pin.

The tube is made out of a kind of reed called *noi nurkut*. The iron pin is called *teri*, and the hollow tube *chussi*.

There is another instrument called the *chusch* (No. 14 of Fig. 24 and No. 18 of Fig. 26). It is used for the purpose of winding the thread on to the *chussi* or hollow tube described above. The hollow tube is placed on to a thin round iron rod or pin. The thread is wrapped round the *chusch*; one end of the thread is attached on to the hollow tube (*chushka*). The person then turns the handle, which sets the wheel in motion, and thus the thread is wound on the hollow tube.

Before weaving proper starts, four processes are gone through.
The first process is warping or naridana, already described.

The second is called sana. The weaver passes the threads one by one through this sana (reed), and attaches one end of the threads on to a bar by means of a stick. The stick (jaa) fits into a groove of the bar which is called the (narad).

The third process is called chapan charama, which consists in attaching the threads on to the narad and chapti.

The fourth process is the tying of the basa, which is done by some thick brown thread. Each thread is tied with this thick brown thread into loops.

Then the kandra and sik, which have been described above, pass through these loops, and are attached on to the loom above. Similarly, the lower threads are tied on to the kandra and sik to the postana below.

The fifth process is the weaving proper, which is as follows:

Weaving proper.—The weaver takes his seat in front of the cloth beam, facing the loom.

On the left-hand side of the weaver, within easy reach of him, a supply of spools are kept in an earthen pot (harski) or in a bamboo basket (mauni). On his right there is a small vessel containing oil. The oil is used for the sana (reed) and for the shuttle as well as the tube.

The weaver then starts his work. He sits on the ground with his legs in a hole (khad), as in Fig. 36. The weaver starts pressing one of the treads with his left foot raising the shaft of the healds, and lowering the other, thus making a gap between the upper and lower threads of the warp, and throwing the intersection against the cloth-beam. The weaver throws the shuttle through the gap with the spool of thread, holding the loose end of thread on the left of the warp (side Fig. 36).

After this is done, the weaver pulls the reed towards him. He then presses the other thread, making a fresh gap, and proceeds in the same way, with this difference, that the shuttle is passed from right to left. After they have woven about 6 inches of cloth, they put an instrument called a puni—side No. 18, fig. 24, which is intended for the purpose of keeping the cloth of a uniform width.

The puni consists of two bamboo rods, about 2 feet 6 inches in length, and string is attached on to the two ends. The other two ends contain a fine iron spike or needle made of iron and tied round with string.

When the weaver finds he cannot reach the gap beyond, the pegs are removed from the beams, and the cloth is wound round the cloth-beam, and the pegs again adjusted. It takes the weaver only two days for weaving; and in four days' time he will make a piece of cloth 6 yards long and 27 inches wide.

223. The above description of weaving tusser cloth can be very well understood on a reference to the description of silk-weaving in Bogra and Murshidabad. Though tasar—weaving is done chiefly in the Godda Subdivision of this district, it is also done by stray weavers living towards the Birbhum side of the Dumka sub-division.

224. Hazaribagh.—No tasar cloth is manufactured in the district of Hazaribagh, but tasar cocoons are grown, and reeling of the cocoons is also done on a
small scale. The following account has been furnished in the local monograph:

"There is no silk industry in this district properly so called. Tassar cocoons are cultivated to some extent in the jungles on asan trees by lower-class people, such as Bhuians, Bhokras, Southals and others. A very small portion of the cocoons is reeled by a class of people called Pathwaris, inhabiting the thanas of Gomia and Kasmar, whence the thread is exported to Azimgur, and sold to the mahajans at the rate of Rs. 380 per maund. No silk cloth is woven in this district.

Almost all the cocoons produced in this district are exported and sold at the rate of Rs. 10 to Rs. 30 per khari (a khari varies according to local custom, and is equal to 1,300 and sometimes to 2,300 cocoons). The cocoons are taken to Purulia, Khatras and Giritida and sold to the mahajans. The silk thread which is exported to Azimgur is sold at the rate of Rs. 8 per seer."

224. Ranchi.—In Ranchi also no tassar cloth is woven, nor is any spinning done; but about a thousand persons earn their livelihood by rearing tassar cocoons. The following account of this industry has been furnished by the district officer:

"Silk-growing is not a profitable occupation in the district of Ranchi; with the increase in cultivation, it is gradually dying out.

Its production is confined only to a small area of the district. It is reared within the jurisdiction of the police-stations of Tamar, Torpa, Palkotho and within some selected areas of the pargana Biru.

There are two kinds of tassar cocoons, viz., (1) jungle-bred cocoons; (2) domesticated cocoons. The latter class are more largely met with than the former.

The jungle cocoons are larger than the domesticated ones, and give much more silk. When the worms are on the trees they are carefully watched by the growers and protected from birds and insects. Cocoons are collected in considerable quantities from the jungle, and eggs are hatched either in the growers’ houses or in huts erected for the purpose in jungles.

There are two harvests or breeding seasons in the year, first of which begins in June and ends in August, while the second begins in September and ends in November. The mode of breeding followed in the district is this:

When the moths emerge from the cocoons kept for seed, the females are exposed or left to form their connexions whether with the males emerging from the same batch of cocoons or with jungle moths. Impregnation having taken place, the eggs which are immediately laid are collected in baskets or tubs of grass. When in about 8 or 10 days the worms begin to emerge, they are placed on asan or ad trees as they devour the foliage of their first position, till finally in about 60 days they spin their cocoons upon the trees.

These cocoons, when ready, are picked from the trees, packed in nets and slung to the roof. Twelve days later, they are taken down, the wood extracted, and they are stored.

The cocoons in their wild state feed upon the following trees—ad, kusumb, deota, sidha, kuki, benefit. The quality of the cocoon depends not only upon the species of the tree, but upon the soil on which the tree grows.

The rearing of tassar cocoons is not confined to any particular class. The following tribes are found employed in this work—Cheras, Kherwaras, Mundas, Urobas, Bhuians, Chamas, Dosadhars, Ghassas. All these tribes are not found exclusively to engage in this work. They are found to rear silk-worms in order to supplement their income from other sources, chiefly agriculture. It is difficult to give an idea of the number of people engaged in the silk-rearing industry. It is believed that the actual number would not exceed 1,100.

Cocoons are sold and counted by khari, which contains more than 1,100 or 1,200 cocoons. The cultivators generally receive advances from mahajans, chiefly banna. When the cocoons are ready, the creditor collects his dues, and the remainder is sold by the producer either to the mahajans or to the dhals, at prices varying from Rs. 5, Rs. 6 and Rs. 7 per khari. Cocoons are exported to Purulia, Birbhum, Mirzapur, Gyas and Patna.

The production of tassar cocoons is gradually diminishing. The falling-off is ascribed to (1) increase of cultivation, (2) greater demand for agricultural labour and higher wages, making the production of cocoons a less profitable employment. Collection of cocoons is no longer profitable. There is, it seems, no prospect of improvement of this branch of industry in the near future."

225. Palamu.—In this district also there is no manufacture, but cocoon farming for the manufacture of tassar, is carried on to a certain extent and as this is a branch of the industry, the following facts may be of interest:

"Cocoons are reared chiefly by Cheras, Mallahs, Bhuians and Dosadhars, numbering from 400 to 500 families. With the exception of the Cheras who have a certain position, these castes belong to the lower orders of the Hindu community. The process is as follows:

In the second fortnight of Karto a number of cocoons, generally about 100, are placed in a bag made of paddy straw and kept in a closed room, where they can get neither heat nor light. In the beginning of Adra Nachatra in Asera (about the beginning of July) the cocoons are taken out of the bag, strung on a rope and exposed to the cold. In from two to four days the moth emerges from the cocoons. The males, which are of a
reddish colour, are called phursa, the female, which is yellow, being called bir. They are mated in pairs and kept from morning till about 4 P.M., when they are separated. The females are then fastened together in pairs, their wings being fastened with their fibres, to prevent them from flying. The pairs are gently shaken and placed into a basket, where they lay their eggs. The laying of eggs is generally finished by 7 P.M. In the morning the eggs are gently rubbed with the wings of the moths, the object being to keep them carefully cleaned. In the evening the eggs are put in small cloth bags and exposed to cold during the night, being kept in a dark room during the day. The eggs are hatched by the eighth morning. The young silk-worms are then taken, still in the bags, to assu trees. Small cups are then made of leaves of the bar tree, in which the silk-worms are deposited. The cups are then closed and fastened to leaves of the assu tree, about three or four feet from the ground. The cups are most carefully made with the object of protecting the silk-worms from heat and rain. From now for 30 days the breeders follow a curious custom, the reason of which I am unable to ascertain. They observe the strictest abstinence, not drinking any wine, nor eating meat, onions, garlic, tamarind or turmeric. They will not shave nor allow any women to touch them, and sleep only on mats.

Three days after the cups have been fastened, they are opened again. About one-third of the young worms are generally found dead; the rest are allowed their freedom on assu trees. On the evening of the third day they become torpid, and after remaining 24 hours in this state, cast their skins (kencur). They again become torpid in the evening of the fifth day, and after 48 hours in this state, again cast their skin. The process is repeated in six days, the period of torpidity on this occasion being 60 hours. The three stages are called sejari, dojari, and tejari. The period of 20 days from the time when the worms were first shut up in the leaf cups is called basuni. In another day cocoons will be found all over the trees. By the 15th of Katri the cocoons are again collected; a sufficient quantity is left for breeding the next year, the rest being sold to mahajan.

The rate is from Rs. 6 to Rs. 10 per lot of 1,200. This lot is called khar or bajar (lit. 1,000) on the same principle, I suppose, as a “baker’s dozen.”

The jhanas, as the breeders are called locally, pay the owners of the assu tree Rs. 4-8 per sickle, viz., 5 annas as khukker and 4 annas as pithi—khukker and pithi being a royalty on branches and twigs and leaves, respectively. The rent is calculated, not according to the number of trees occupied, but according to the number of sickles employed; in another word, the number of labourers.

There is no particular centre of the industry, but it flourishes most in Tupaps, Kote, Pundag, Imli, Talleya and Goawal.

227. Singhbhum.—There are only a few Tanti (tasar-weavers) in the Political State of Seraikela in this district. The cocoons are reeled by hand by the weavers themselves and the thread gathered on to latas, the cloth being woven in the ordinary loom. The cloths are of yellow colour and are made to measure 5 yards by 44 inches, i.e., the size of dhuti or sari. The price of one of these is from Rs. 3 to Rs. 4. They are exported to Dacca and other parts of Lower Bengal, and are not much used locally. The trade in these saris and dhutis is not a very large one. The growing of tasar cocoons, which is an industry of considerable importance, may be thus described in the words of the Deputy Magistrate, Mr. P. Mecca:

“... The cultivation of tasar cocoons is not peculiar to any particular class of people, but members of most of the different tribes of the place engage in it in addition to their ordinary agricultural pursuits. The people who employ themselves in this work are mainly Hos and Santals, but Dhawas, Gonds, Bhuiyas, Gours or Gowals, and Kharias also carry on the business. The other occupations of all the above-mentioned classes are chiefly agricultural. It being as likely as not that people engaged in tasar work one year give it up entirely the next, it is almost impossible to form any correct ideas as to the numbers engaged in the trade. In the Kolhan Government estate the average number of cultivators of cocoons is about 4,000 annually. *

The tasar silk-worm is reared from eggs hatched artificially in sheds erected by the cultivators for the purpose, near the jungles or in their houses.

Three sorts of cocoons are known in the district; the nari, bagai, and dakhra. The two former are obtained from the jungle parent moth, the moths laying their eggs in August. The dakhra cocoons are reared wholly in captivity and are ready for sale in September, the silk derived from them commanding the highest prices.

The process of rearing in some of its stages requires great care on the part of the cultivators. The nari and bagai cocoons are sought by the cultivators in July and August. They are brought home by the cultivators, and hung up in their houses till the moth forms. The moths are then paired off and placed in small baskets, where they lay their eggs after a few days. The eggs are taken from the above-mentioned baskets and rubbed with sahes, turmeric, and some jungle roots called rau, which latter the natives of the place use for fermenting their rice-bear called haria. After being rubbed as above, the eggs are placed between leaves sewn together and hung up in the

* The Census tables for silk give no idea of the number of people engaged in Tussur rearing in this and other districts. The return both in 1891 and in 1901 is usually blank (see Table A Part III).
houses. The worms are hatched in from six to nine days, the length of time depending on the strength of the rasun. They are first discovered by their eating holes in the leaves containing them. The cultivators take the young worms and place them on small asun trees, where they are left for a fortnight or so to grow. On their becoming bigger they are placed on larger asun trees and left to themselves to form cocoons, which, as a rule, commence to be ready for collection in September. During the earlier stage a little rain is beneficial to the worm, but fatal when the worm grows bigger and commences to form cocoons. The dhaba cocoons, the home cocoons, a few being kept each year by the cultivators for the next year's cultivation. They are reared and brought up in the same way as the naria and bagai, and originally came from one of these two kinds, having derived their present superiority over the nariai and bagaii from the fact of their having been tended and kept by the people for several years.

Naria and bagaii cocoons are never now kept for a future crop of silk-worms.

Besides the above three kinds of cocoons, there is one more known among the natives as the manapoo. This latter is very rarely found, its peculiarities being that it is usually being found hanging from a twig by a circular stem, as is usual, it is formed between two or three leaves. Although it goes by a distinct name, the manapoo in reality belongs to one of the three classes mentioned, coming from one of their worms and the thread being the same in quality and quantity as of those of the kind to which it belongs.

The good or bad results of a tasar crop depend entirely on the weather. As has been said before, rain is beneficial to the worm in its earlier stage, though the reverse later on. Heavy winds also affect them by blowing the worms off the trees, they being unable to find their way back again.

Cocoons form in September, October, and November, when they are collected and sold off, being purchased by mahajans and baniyas in large quantities, the rates varying according to market competition and the state of the crop, from Rs. 8 to Rs. 12 a kahan, or 1,280 cocoons.

In a good season one cultivator might get between two or three kahans, and as in the Government estates of the district he would pay only one rupee for the privilege of being allowed to cultivate tasar, this would mean a sensible profit; the time taken in the whole business, that is to say, from the commencement of the rearing to the time of collecting, being about three months and other expenses nominal.

Good crops, however, are uncommon; such great care being necessary and the worms being so easily affected by the weather, that very often several cultivators in the same piece have been known to reap absolutely nothing.

The purchasers steam their cocoons after purchase. The method of steaming here is very simple in its arrangement: a perforated chatty with cocoons in it being placed over a chatty of water, which is kept boiling. The cocoons are thus steamed for a short time, till the worm inside dies. They are then dried in the sun, packed up in bags, and sent off to Bankura and other places.

228. Manbhum.—The tasar weaving industry of Manbhum is of considerable importance, and the following account has been compiled out of the report written by Babu Prasanna Kumar Dasa Gupta, Deputy Magistrate. The diagrams illustrating the tasar weaving industry of Sonthal Parganas will serve to explain this description also:

"Raw material.—Manbhum is one of the few districts in Bengal in which the silk-worm is reared. The worm is of the tasar species. The industry has, however, declined during the last ten years, as jungle has after years been cleared. Now the weavers of the district depend for the supply of cocoons chiefly on the neighbouring district of Sambalpur, where the industry is carried on, on a large scale by the Kola Chabilas. An important tasar mart from which cocoons are exported in large quantities, not only to this district, but to distance places more largely since the opening of the Bengal-Nagpur Railway. The facility of exportation afforded by the railway has raised the price of cocoons from Rs. 3 to Rs. 10 per kahan (1,280) within the last decade; and in consequence the price of silk goods has risen, which has again led to reduced sales. Silk-worms are reared in the thanas Barabazar, Manbazar, and Chandil, chiefly by the Sonthals, and to a small extent by the Kurmis, on jungle trees locally known as sat and asun and on plum (kut) trees. There is no special cultivation for the purpose. Worms are put on here and there on the trees scattered over the jungle likelsa-worms. Seeds have to be moved from tree to tree (grafted on as it were) without which cocoons do not grow properly. This process is locally known as chala. The period of rearing is from Brahan to Kartik. An early crop is gathered in Bhadra, which is poor in quality* and the cocoons are mostly pierced i.e., pierced through by the worms, and yield a small quantity of bad thread. Those gathered in Kartik are good cocoons. The price of cocoons varies from Rs. 4 to Rs. 10 per kahan (1,280) according to quality.

Classes of weavers and their social position.—The weavers in the district are Tuntis who belong to the class known as Nasakshas of the Hindu caste system which includes the kamars (blacksmiths), kamars (pottery), sankharis (makers of bangles of conch shell)—all artisans. A Brahmin would drink water touched by them and would accept personal service from them. In Lower Bengal a Tunti will not do menial service, but here the poor Tunti

* What is intended is evident: this. The cocoons of the first crop being the next generation to the few wild cocoons gathered from trees, give very bad results, and are therefore entirely used for feed. But worms cutting out of seed-cocoons spoil them for the purpose of reeling. Kutka cloth is made out of tasar thread spun out of pierced cocoons. The description of tasar silk worm rearing contained in the Handbook of Sericulture should be consulted.
do it. In these days of education the *Tantis* of this district, who are generally illiterate, occupy a much inferior position in society to that of their brethren in Lower Bengal.

**Industrial position.**—So far as the silk industry is concerned, the *Tantis* of the district are skilful weavers, and rank perhaps next to none in the country except in the matter of dyeing. They cannot make good fast colours as the people of Murshidabad can. Their looms turn out fine and strong textures of various qualities (vide samples Nos. 78 to 79). With more capital and improved method of work it would really be a rich industry.

**Number of weavers.**—According to the last census returns, *Tantis* number 12,911. The industry is confined to only two places in the district—Raghunathpur, a municipal town (about 3 miles from the Adra station on the Bengal-Nagpur Railway), and Singbazar (a village about 4 miles from Purulia) on the Purulia-Bankura road. In Raghunathpur there are about 100 families and in Singbazar about 20. Thus the number of *Tantis* who actually engage in the trade is not perhaps more than 500.

**Process.**—The processes are all very simple and of the most primitive character. I arrange them in their order:

(a) Reeling cocoons are boiled for about half an hour in *nagri* (crude carbonate of soda) water, and then spread on a piece of cloth under which some ash is spread to enable the excess moisture to dry out; but the cocoons are never exposed to the sun for that purpose. The cocoons, as the local *Tantis* say, must be half moist when they are reeled, or the fibres do not come off easily. After boiling and drying begins the actual process of reeling with the help of an instrument called *latus* or *natai*, to which the ends of the four fibres (of four cocoons) are fastened, and the winding of the *natai* makes the cocoons give up the thread. Four cocoons are worked at once for two reasons; (1) to economise labour, and (2) to give the thread the requisite strength. Silk obtained from the upper surface of cocoons is waste silk under which is the good fibre yielding a continuous thread. Waste silk is locally known as *Latha*, which is cheap, being sold at 2 seers per rupee, while the price of good silk thread is Rs. 8 to Rs. 9 a seer. Silk thread is rarely exported from the district; what is made is used by local weavers. Reeling is specially the women's province. Women of the family engage in it in their spare hours. They are said to work hard for about three hours from early dawn, and for another three hours after the mid-day meal. One woman takes 15 to 16 days in drawing out a seer of thread. One *kahan* (1,280) of cocoons yields about a seer of thread. A woman gets a rupee for reeling a *kahan* of cocoons, i.e., a seer of thread.

(b) Next to reeling is the spreading of threads of the requisite length for the texture to be woven side by side supported on two vertical posts to which the ends of the threads are tied. Some strips of bamboo are made to pass through the lines of threads laterally so that they may not entangle. This process is known as *parans* (warping).

(c) Then comes brushing with *rice-water*. The brush or *kuchi* is made of the grass locally known as *khes khat*.

(d) The product is then taken to the loom and folded round a wooden roller in the loom, one end being tied above round another wooden roller. The lines of threads are made to pass through a comb-like instrument called *sana*, each line being thus separated from the other.

(e) A spinning wheel is used in order to fold round some sticks (spools) the thread which is to be used in making the warp; this is known as *nali*, and is placed inside a socket called *matu* (shuttle), which the weaver passes constantly from one end of the wool to the other laterally; this is the actual weaving.

(f) **Dyeing.**—As I have already stated, the district is deficient in the art of dyeing; ordinary imported dyes are used. But a kind of fast yellow is obtained from the dust over the skin of a kind of jungle fruit known as *kumalgarhi*.

**Labour.**—I have already referred to the labour necessary for the reeling of thread. The other processes require the services of one man for 30 days to turn out a texture of 20 yards. The man's wages are 5 to 6 annas a day. The cost of 20 yards of texture (of the best kind) may be calculated thus:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of two <em>kahans</em> of cocoons yielding two seers of thread</td>
<td>16</td>
</tr>
<tr>
<td>Labour for reeling</td>
<td>...</td>
</tr>
<tr>
<td>Ditto weaving, &amp;c.</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>

The cost per yard is therefore Rs. 1.6. There are cheaper stuffs at prices varying from 8 annas to Rs. 1 per yard.

**Centres.**—Raghunathpur is the only important place in this district in regard to silk industry.

**Diagnosis of product.**—A portion of the product is sold in local markets and a portion is exported to Calcutta and Dacca by traders from those places. The weavers of this district are not enterprising speculators, and do not know how to carry their own goods to distant places themselves, and very few of them carry on an external trade. I believe there are not more than three or four men who send their goods out of the district.

**Weaver's plant and tools.**—I described in detail the plant and tools of the weaver in my monograph on cotton industry, submitted with No. 1705 R., of 20th March 1897. That portion of the monograph may be regarded as a part of this as well.
Conclusion.—Want of capital and enterprise seems to be the chief cause of the decline in the trade. Exportation of cocoons has, as I have stated, largely enhanced the price of silk goods and led to reduced sales. No protective measure is of course possible; but the Twists, notwithstanding may with advantage be helped with capital, the formation of joint-stock companies may be encouraged by advances. This may help in keeping up a useful and rich industry of the district and add to its material prosperity.

229. The appliances used by the tusser weaver are:

(A) Charkha or the spinning wheel. Only one person is necessary to work this tool.

(B) The natai, the reel and (C) the charki which is only a broader natai (with a larger circumference). These are sometimes worked together. The man is engaged in transferring ready-made yarn from the charki to the natai. The natai is a simple instrument made of a few strips of bamboo or wood, the upper ends of which meet at a point and the lower are supported on a wooden or bamboo circular base through which an axle (of bamboo strip) passes to the top, which serves the purpose of a handle by which the instrument is turned for rolling up thread. The charki consists of two arched pieces of bamboo strips crossing one another and forming four arches on four sides. The circumference must be the same as that of a skein of the tusser yarn, so that the latter may exactly fit on it. The instrument mires on an axle which may be loosely posted on the ground, as the thread is rolled up on the natai to which one end of the twist is fastened before the operation commences.

For (nari-kata) making the warp (D) certain bamboo sticks about two cubits long are posted on the ground about three cubits apart. Each post is composed of two sticks meeting at the bottom with the upper ends about two cubits apart, thus forming a triangle with the vertex on the ground. A man goes from the first to the last post and back again with two reels on his hands briskly arranging the threads in two layers on two sides of the posts from below, when the texture is of a low density, for the sake of convenience, when the ends are shortened by arranging the posts on parallel lines, leaving a passage for the movements of the workman. The number of posts varies according to the length of the texture. Bithari kara, or arranging the lines of threads is only a continuation of the above process. The posts are taken up, and the warp (with the sticks through) is made to occupy a horizontal position. Each line of thread is carefully arranged one after another and the breadth of the texture is obtained. A man brushes the warp after it has been drenched with boiled rice-water (mar). The brush or buki consists of a bamboo or a wooden handle attached to a brush made of khar khas (Andropogon Muricatus).

(E) The tunt or the weaving loom.—The warp is first attached to the loom. There is a pit just below the centre of the lower end of the loom, where the weaver keeps his feet and draws and releases thereby the paaisa by pressing on the wooden knob affixed to two strings suspended from the paaisa. The arrangement contains the moving principle of the loom. It is known as as tunt gareh (the hollow of the loom).

(F) The naraj is a circular-shaped wooden base to which one end of the texture is fastened by means of a thin stick which is made to pass through the texture over one line and below the next, and is affixed to the naraj on a hollow cut on its surface. This stick is known as bindu. It is round the naraj that the texture is gradually rolled up as the weaving proceeds by winding it by a handle, and thus drawing the texture towards the weaver. The naraj is supported on two posts about half cubit high fixed vertically on the ground.

(G) The tanu consists of two pieces of timber suspended from the roof. There is a comb of reed known as tanas between these two pieces of timber. The tanu keeps each line of thread in the warp apart. The tanu is pulled towards the weaver's side till the time as the main (shuttle) made to pass and repass over and below the two layers of thread in the warp in alternation. The process tightens the upper part of the texture by pressing it towards the naraj and giving each line of the warp its proper position.

(H) The baiaras and the paaisa form together one apparatus in the loom, the object of which is to keep apart the two layers of thread and also the lines of thread; the baiaras are two comb-like substances made of two sticks, each with stout strands laterally arranged between them, so as to give them a comb-like appearance; the paaisa are two sticks below the warp suspended from the paaisa by strings; the paaisa have again two strings suspended from them with two wooden balls at their ends. Each of these balls is pressed between two toes of the weaver's each foot, and the action raises and depresses the paaisa and the baiaras which enables the shuttle containing the thread of which the woof is made to pass and repass over or below a layer of thread of the warp. The rising and the depression of the apparatus in alternation separate the two layers of threads of the warp and leaves a passage for the shuttle to be passed by the weaver's hand.

(I) Panthkata.—It consists of two wooden or bamboo sticks placed across each other with two nails at the ends to keep the texture straight. It is moved forward as the weaving proceeds.

(J) Atrams.—These are plain bamboo sticks placed across the warp over some lines of thread below others just to keep the texture tight and preventing the lines of thread from mixing up.

(K) Randakati.—It is a small stick dividing the lines of thread into two parts, perhaps for convenience sake.

(L) Siru.—It is the tied-up ends of the collected threads, and is kept lying on the ground or fastened somewhere on the roof.

(M) There is a rope tied to two pegs. The rope is gradually drawn towards the weaver as weaving proceeds and the woven texture is rolled up on the naraj.
(N) Tungnath.—The beam supported on two vertical posts from which tanka, soma keiseri, patasa are supported by means of ropes passing through sockets (made of wood) or wheels (like punchka-wheels) to enable the parts named to be raised or depressed alternately; the kapna is sometimes suspended from a permanent beam of the house, so that the whole apparatus may be removed out of doors and worked there with the assistance of two vertical posts fixed on the ground to support the tanka.

(0) The make or the shuttle. This is a handy iron or wooden frame with an iron rod in the middle to which is affixed the tube with the yarn at which the woof is made rolled round it.

The loom described above is that used by the Jolhas. The Tantis' loom is slightly different. At the end of the texture is rolled up, round a second noriy just beyond the banara and, as weaving proceeds, it is moved round giving up the necessary portion of the warp which again (as soon as woven) is rolled up on the first noriy. This economizes space and keeps the texture tight at both ends.

230. Gaya.—The tasaar weaving industry of Gaya is also of considerable importance, although cocoons are no longer reared in this district. It will be refreshing to read the following somewhat hopeful monograph furnished by Mr. L. S. S. O’Malley, C.S., when so many of the district monographs look upon the silk-weaving industry as a decaying or a dying industry.

"Extent of the Industry.—The silk industry is carried on to a very small extent in the Gaya district, being confined to a few particular localities named below:—

(1) In the Sadar Division—
   In Buniaoganj, Manipur and Gayawalbiha, all within the limits of the Gaya Municipality, and at Chakund, some five miles north of Gaya.

(2) In the Nawada subdivision—
   At Kadirganj and Akbarpur.

(3) In the Aurangabad subdivision—
   At Daudnagar.

The silk cocoon itself is not produced in this district now. Some ten years ago the silk-worm was reared to some extent in the jungly country south of Sheghati, close to the Palamau border, where asan trees, which were once cultivated for the purpose, are still found, but latterly the cocoons have been imported from the Hazaribagh and Palamau districts.

Importance of the industry.—Owing to this limited extent of the industry, the total amount of production is necessarily equally small.

In the villages of Buniaoganj and Manipur there are about two hundred and fifty looms: one loom turns out a good piece in three days, and a piece of inferior silk in two or one and a-half days. If we take two days as the average time, it will be seen that these two villages produce one hundred and twenty-five pieces a day, or to make a rough estimate, allowing for the slack season of suspended labour, 30,000 pieces in the year, for in the Gaya district silk-weaving is essentially one which is liable to slack periods, and in which continuous and consistent labour throughout the year is not prevalent.

The highest value of these pieces is Rs. 8, the lowest price obtained for basta (mixed tasaar and cotton) is 10 or 12 annas. As a matter of fact, pieces of the best silk are not usually woven, and are generally made only for special orders. On the average, pieces, the value of which is between Rs. 1 to Rs. 5, are common from Rs. 1 to Rs. 5. If we take the average as Rs. 2-8 per piece, the annual output may be roughly estimated at Rs. 75,000 annually.

The outturn for Kadirganj and Akbarpur is estimated at 6,000 yards, valued at Rs. 5,000 for the year just past; that of 1897-98 at 6,890 yards, valued at Rs. 5,100, so that Rs. 5,000 may be taken under present conditions as the average value of the products for the year; this silk, however, is extremely coarse and of poor quality. The report for this year from the subdivision on the subject of the total supply of silk fabrics has not yet been submitted: for 1897-98 it was 200 thousand pieces, each of eight yards, calculated to be worth Rs. 600, allowing Rs. 3 per yard.

It is difficult to make anything but a rough calculation of the amount and value of the cloth woven in Gayawalbiha, where there are only five families of weavers, and at Chakund, where there are 14 families. Perhaps Rs. 500 might be taken as the maximum value of the products of these two places. The total annual output of the district might be valued at a rough estimate at Rs. 81,100.

Present condition of the industry.—The present state, however, of the industry cannot be regarded as bad. Its prospects are gloomy. The value of the outturn for 1896-97 (to take a period of some considerable duration, in order to facilitate a comprehensive view) was valued at about Rs. 18,000 at Gaya and at Nawada at Rs. 7,500, i.e., for the whole district, at Rs. 25,500 in all. The year before the total outturn was estimated at only Rs. 22,000, so that in the last decade the industry may be said to have made very great strides. At that time the centres of silk-weaving were the same as now, but at Daudnagar the patasa were reduced to such a low pitch, and the silk industry had so far declined, that the Subdivisional Officer at Aurangabad made no reference to it in his report. The patasa there had taken to weaving only cotton and many of them had had recourse to ordinary labour to eke their living.

At Buniaoganj and Manipur there were nearly 200 families of patasa, but silk-weaving was in the hands of only 40 families, employing about 170 hands. Most of the patasa had given up silk for the weaving of cotton cloth, and many families were obliged during the off season to work as labourers.
At the present time, out of nearly 300 families, about 100 work on silk and *bosta* regularly, and the proportion of those who have to work as ordinary labourers has largely decreased.

In Kadigangan and Akbarpur there were only about 30 families working in silk ten years ago, where there are now about 60 families weaving. In recent years there has been a great advance in the amount produced here. They produced:

<table>
<thead>
<tr>
<th>Year</th>
<th>Yards</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1895-96</td>
<td>3,000</td>
<td>1,500</td>
</tr>
<tr>
<td>1896-97</td>
<td>3,100</td>
<td>1,600</td>
</tr>
<tr>
<td>1897-98</td>
<td>6,800</td>
<td>5,100</td>
</tr>
<tr>
<td>1898-99</td>
<td>6,900</td>
<td>5,900</td>
</tr>
</tbody>
</table>

The last year saw a slight decrease, which may not be permanent.

The quality of the silk woven here has not improved, as it is seen by a comparison of the values of the years 1897-98 and of 1893-94. At the same time it must be admitted that in spite of this recent improvement, the industry has declined since 1890-91, when the outturn was valued at Rs. 7,500. At Daudnagar, where the silk has recovered something of its old vitality, we find that the outturn for 1893-94 was estimated at 292 pieces of 8 yards each, the value per piece being between Rs. 2-8 and Rs. 3. The total value of 1,616 yards was estimated at about Rs. 600.

In 1896-97, it fell to 900 yards, valued at about Rs. 300, but this was probably due to the prevailing scarcity, in 1897-98 the supply rose again to 1,690 yards at Rs. 500.

At present it is reported that fifteen families carry on the industry, which is considered to be flourishing in comparison with past years.

**Future Prospects.**—The silk produced by the *patua* in the Gaya district is generally of a coarse description. The silk produced is *tussar*, the cocoon from which it is woven being the *waxa poppgi*; much of it is remarkable neither for durability nor beauty. The class rich enough to use it is necessarily rather small, and generally able to purchase a better kind of silk cloth, such as that of Murshidabad, which greater cheapness of carriage puts upon the market at a reduced rate; such competition naturally tells against the home-made stuffs. The result is that the cloth woven tends to deteriorate in quality; the best kinds are now rarely woven, and the quantity of *bosta* (mix of *tussar* and cotton) increases.

The weavers also complain that they can only produce slowly and in small quantities, while their want of capital prevents their being able to tide over a bad year, so that in a way they may be said to live from hand to mouth. At the same time, however, there appears to be no reasonable grounds for apprehension, at least for some time, that this industry will decline. The town of Gaya supplies a market for their goods; it is to Gaya and to the vicinity of Nawada that all the silk woven in the Nawada subdivision is sent; coarse as is the material made at Chakhand, it has a sale in Gaya, while the *patua* of Gayawaligha wear good *shonts*, which are bought by Gayawals and those connected with them.

The cloth of the Daudnagar weavers likewise obtains a local sale, which does not extend beyond the district, but they produce practically no pure silk cloth, but only *bosta*.

The cloth woven at Buniaganj and Manipur is sold at their doors in Gaya town, though this village differs very largely from the other centres of the industry, as it exports largely to Azimgarh, and has *butes* who export to many parts of India. The best cloth is sold in Gaya itself, though this is not of any high merit; the ordinary cloth is generally sent away. Gaya itself offers a good market, owing to the great number of pilgrims who are glad to take away a piece of the silk made here.

For the most part *thins* or pieces are woven for angas, chapkans, kurtsas, and also saris and chuddars. The weavers themselves are proud of the fact that the Manipur silk is used for *marugs*, in which to wind the thread, and that these are exported all over India.

The weavers, their social and industrial condition. The families of the weavers (*patua*) themselves on the whole manage to earn a competence by weaving alone, in spite of the evils of intermittent labour, for the busy season, beginning in December, after the best crop of cocoons, lasts for four months, in which nearly half of the total outturn is produced, and the rest of the year is more or less a slack time for work.

Most of them have only one loom, but some have as many as four or five. In the villages of Buniaganj and Manipur, out of the 100 families of regular weavers, no less than 14 families are assessed for income-tax from Rs. 10 to Rs. 20, sums which represent an income of Rs. 500 to Rs. 1,000. The maximum daily wage of a family with four or five looms is Rs. 4. But in the last two years the number of these more prosperous families has decreased from 18 to 14, in itself probably an economical advantage, caused by the levelling up of wages. The ordinary *patua* gets only two annas a day. The great merit of the industry is that it gives employment to men, women and children; the first weave, the second spin, and the third set the warp. Labourers are not employed by the *patua* at all.

A man who weaves *bosta* will work three yards at the most a day, and gets four annas per yard, or else works about two and-a-half yards of coarse *tussar* for eight annas per yard. The price, in fact, of the cloth naturally varies according to its quality from four annas to two rupees; but of this best cloth only one and-a-half yards at the utmost can be woven in a day. A woman gets five Gorakhpuri pieces of cloth per day's spinning, i.e., for one *chilkat* of spun silk. For waste silk, they get one rupee for six seers; formerly the rate used to be two rupees per seer.

The small profit derived from this is compensated for by the small expense of materials, as even a loom with all its parts only costs about Rs. 2-4, and the Daudnagar weavers
are reported to pay one rupee only for their set of instruments (pata, narai, rach, chapla, charaki). These instruments are all made by local carpenters and last for 25 years, the karigars being said to last even longer.

Besides this main source of profit, a small quantity of surplus silk is made up for children's charms, which are sold in the village, and not exported like the pieces. This is made in a very rough-and-ready fashion, the only instruments necessary being a wooden reel and an iron hook with a ring which goes round the toe.

The cocoons (kova) are all imported from Palamau, and also from Hazaribagh. The rate is eight rupees for a kurti (further east called a kohtari), i.e., an aggregate of 1,046 cocoons.

In the town there is a monopoly in the hands of two brothers who act as middlemen; they get a commission of one per cent. on the sales from their principals in Palamau.

The patrician resident in the villages of Buniadganj and Manpur do not appear to be natives of this part of the country; their own account is that the village was founded by Raja Man Singh and named after him. They were brought here by him "from the direction of the Right hills," and their dialect lends colour to the idea that they came from Central India. Moreover, out of the twelve banias who deal in silk, no less than eight are not natives of the place, but come from Mobarakpur in Azimgarh district. The practice is for them to come here for nine or ten months in the year and superintend the manufacture; they find wages and work cheaper here, though the finer qualities of silk are not manufactured here for them, but in Azimgarh. They only take woven pieces and not spun silk, and are the means by which these cloths are sent over other parts of India.

The process of manufacture, beginning with the raw material, the cocoon, and ending in the finished fabric, may be divided into the following stages:

(1) The preparation of the cocoon.  
(2) Spinning.  
(3) Warping.  
(4) Weaving.

The preparation of the cocoon.—The first step in this evolution is indispensable for the purpose of extracting silk from the cocoon. For this purpose, the number of cocoons required for use are put into gharas; in some cases saumutti is placed, and then water is poured in, the object of the former being to soften the water.

This is heated for three hours; after this the vessel is taken from the fire, and, when sufficiently cool, the cocoons are taken out; the chrysals (pulu) inside is dead, and the outer husk of silk has been softened sufficiently to enable the spinner to manipulate it. It only remains to clean it. In order to effect this, the cocoons are placed in baskets, and cold water poured over them, by the percolation of which the cocoon is properly cleaned and ready for spinning.

Spinning.—This is done entirely by women. The spinner sits down with a spindle in her right hand, and two pots by her left side, in one of which she has put as many cocoons as there are to be filaments in the thread of silk which she spins, while the other is filled with water. Generally she spins from four cocoons simultaneously, the strand being composed of four filaments.

She first draws out a thread with her thumb and index finger and spins off waste silk upon a separate spindle kept for this purpose. This waste silk (phet) is sent to Calcutta to be worked up by more expert weavers, as here the weavers are not skilled enough to deal with it. When it has been spun off, she draws out a filament of the saur silk proper from each cocoon after first wetting the cocoon itself, her left leg just above the knee, and her winding reel, which is generally called natari (though the word charaki is also used). This is done in order to get a hold of the silk, and attach it to the natari, when she begins to spin. This is a cone-shaped reel, which revolves round a spindle. The framework of this cone consists of four pieces of bamboo set at an equal distance from each other, and with a base of four slips of bamboo set diagonally. When ready to work, the spinner lays the four filaments already attached to the natari across her wetted leg, and moves her left hand backwards and forwards, so as to twist them into one strand, while her left hand is busy turning the natari, which receives and winds the thread.

This spinning requires an extremely delicate hand and light touch, not only for twisting the silky, but also for joining, when one or more of the filaments break; this seems to be done without any effort: as a matter of fact, this technical skill is only acquired by learning to spin in early childhood; not infrequently a spinner spins from as many as twelve cocoons. This is the maximum number of filaments used, and this thicker thread is only employed when the best cloth has to be produced; the minimum appears to be four cocoons.

An ordinary spinner will spin from as many as eighty or ninety cocoons in the day, producing one kanama or chitak of silk; she receives five Gorkhput piace for her day's work, but it is doubtful if this means very continuous labour.

After the silk has been spun on the natari, it is left to dry. When it is dry and glossy, it is taken off and made into small "knots" or skeins about three inches long, called khariki; the silks in these are subsequently joined together in larger skeins, and put once more on to natari for the purpose of setting the warp.

Warping: setting the warp.—The process of setting the warp is, for practical purposes, uniform, though where the length of the warp is small, slight modifications are introduced. For the larger warps, pairs of sticks (sar) are fastened in the ground at equal distances, in two parallel straight lines; the number of pairs varies according to length: at the end of each line a large post is fixed, and close to each of these is a smaller post.

As a general rule the women of the family perform this work, and they walk outside the lines holding in each hand a natari, on which the silk is wound: the reel revolves and pay
out silk as they walk, and the two lines are passed between each pair of sticks (sar) in opposite directions. The result is that at each pair of sticks (sar) the threads interface, and the threads at this point of intersection are kept separate, the thread of one sar passing from right to left, and that of the other from left to right. Where the warp to be set is smaller, the process is somewhat different. In this case there are also two parallel lines with two stout posts, about 2 feet high, but at one end there is another post standing a foot or so beyond the lines and at an equal distance from each.

Taking a length of, say, twenty to thirty feet, there will be four sars altogether in each parallel line, but these are of different character, as they are not sticks or posts fastened in the ground: the two middle sars consist in each case of a solid base of dried mitti (clay) broad enough at the bottom to stand firmly. In this there are four bamboo splints about 2½ feet high; the two sars which flank these on either side have only two splints of bamboo fastened in this base.

The reel also is different: it is long and straight, consisting of two parts, one the iron axle, kunda, about 1½ feet long, which is held in the hand, and the other the wooden reel, about 6 inches long, on which the silk is wound, and which revolves, and pays out the silk.

In this case the operator walks up and down, on one side of, and not round, the posts. In this case also she has two reels, which she passes in and out of two of the bamboo splints of the central sars, and through those of their next.

In each case, the crossing of the thread helps to keep them distinct and separate.

When all the thread has been set upon these sars, the thread on the post at the end of the two lines is cut, and the thread removed; it is then made up into a big hank called haurhi, and afterwards set upon the loom.

This process obtains in the case of cotton no less than silk, but with silk the process essential to wetting and brushing with a preparation of mustard oil is not resorted to. The silk is naturally so smooth and glossy as to preclude any necessity of smoothing and brushing out irregularities. However, before transferring the warp to the loom, it is stretched and spread horizontally at a height of 2½ feet from the ground; the upper and lower sets of thread are quite distinct and separate; they only interface at each end, where there are three bamboo sticks at the crossing of the threads; except at the ends, the threads lie smoothly and evenly.

The warp is suspended in mid-air by means of the support of a trestle-shaped stand (dhowri); the bar bamboo keeping the threads crossed is called dhowri, the next two chauka; the stand itself is secured by a rope, fastened to a peg in the ground, which is tight enough to keep the warp straight and firm, till it is transferred to the loom.

Weaving proper.—The loom itself is worked by one patua, who sits with the loom before him, and with his legs in a small niche, in which are placed the treadles (puwari), with which he works the loom. His method of weaving is as follows:

In front of him stretches the warp, with its upper and lower layers of threads: separated between them he slides his shuttle (karpahini), which is a cane-shaped iron instrument hollowed to contain the needle (tir), on which the silk thread is wound, and on which the tube (chauka) revolves, the whole being called sar; the latter is kept in its place by a small peg made of a big sort of feather (pakhrari), and pays out thread as it revolves inside the shuttle, which is pushed into and slides between the two sets of threads.

When it has passed through, the patua pulls forward a wooden frame (hatha) suspended from a bamboo bar above his head.

This hatha consists of three parts: the upper, a heavy bar, the lower, a light bit of bamboo with a comb of fine reeds, keeping apart the threads of the warp, each of which is set between two of these reeds, and separated thereby from the next. This sar (as it is called in Gaya, besides a variant word rauki) hangs from an upper bamboo (parkhi), from which the naukri are also suspended.

At the same time the patua works his treadles with the feet, the result of which is to move the heads (sar), and thereby alterately raise and depress each set of threads of the warp; they are connected with the naukri already mentioned, a small lever about 6 inches long, so called because its movements, which correspond to the working of the treadles, suggest the motions of dancing.

It must not be forgotten that behind these treadles are two sets of reeds (hau) separating the two sets of thread, and that the intersection of the threads not yet worked upon by the weaver is still preserved.

The patua is not only busy with the weaving of fresh cloth, but he is obliged, at the same time, to secure the web already woven; this he does by means of two elastic bows, consisting of two arches (kauthi), connected by strings; these strings are pushed along the bow to tighten it; by this means he regulates their tension, and adjusts their lengths exactly to the width of the cloth. At the end of each arm is a spike, which is fastened at either side of the cloth, and keeps them in their places.

The cloth itself is fastened to a roller immediately in front of the weaver (champal), which is also used for winding up the cloth when woven. This is supported by two short posts about 1½ feet high (khanta); it rests upon the left-hand one (bavacaria), and passes through the right-hand one, which in shape recalls a tongue, and is consequently called jhikala. The portion of the warp which has still to be woven is tied up by a piece of wood (dunhur), which is itself supported by pillars, or rather wooden posts; there is no loose end to it, but it ends off just as the cloth will when woven: it is kept tight by a string which is
brought back close to the wearer's left hand, and which enables him to tighten or relax the warp as necessary. From the above account it will be easily gathered that the means of ornamentation of the cloth can be readily supplied by changing the shuttle with the different coloured silks required; in this way the cloth may be shot with various coloured threads if the different colours may be introduced into the plain background of the silk.

This is the method also in which the bhar (mixed tasar and cotton) is introduced. The warp is composed entirely of silk, and the shuttle introduces the woof of sut (cotton).

Where, as is generally the case, the piece is left in the natural colour, nothing remains when it has been woven and removed from the loom, but to stiffen it with a preparation of rice water (marrh).

If bright colours are considered desirable, it is handed over to the dyer. It is noticeable that in this district the cheap English aniline dyes are not used for silk, as they always are nowadays for cotton. Native dyes, carmine and yellow by preference, are exclusively employed, but this is a subject which does not legitimately belong to the province of silk-weaving proper."

231. Patna.—In the Bihar subdivision of the district of Patna, potia or tasar silk cloth is manufactured to a certain extent. The extent and nature of the industry are detailed in the following extract from the district monograph:

"Patia is silk cloth as manufactured by Bihar weavers. The process is as follows:—

Tasar cocoons are imported into the Bihar subdivision from the Bhagulpur and Hasaribagh districts by Bani Shah and Jhanda Shah, of Allagarh, in Bihar town, who sell them to other dealers. Cocoons are purchased in batches of 325 gundas, called locally hari. The price varies from Rs. 5 to Rs. 8 per hari. Cocoons should be hard. Soft cocoons are of little value, their price being fixed according to their quality.

Spinning.—A class of Hindus called puticas purchase the cocoons and boil them in earthen pots in a solution of crude carbonate of soda, soli, for about two hours. After this as soon as cool, they are washed in cold water and are then kept under shade so that they may remain damp. They are then taken, one by one, and strand of thread is drawn out of the cocoon, with thumb and index finger of the right hand, and attached to a spindle, on which it is wrapped by the revolutions of the spindle. From this thread is afterwards transferred to a latami (pyramidal bobbin made of bamboo lathies). About 1 or 1½ chitaks of thread are wound in the latami in a day. Each latami contains thread of about 20 cocoons. This is removed and made into a bundle, which is called sut. The bundles are then dried and stored for use, when the thread can be reeled, which can now be processed for purposes of reeling, and, having been reeled, dry for purposes of weaving.

The wage of the person who does the reeling is generally Re. 1 per seer of thread. One hari, i.e., 325 gundas of cocoons, is said to yield a seer of tasar thread.

Winding and weaving.—Before warping, the weavers soak the bundles of thread in a mixture of rice flour and water. Each seer of thread is wetted in half a seer of flour mixed with five seers of water. When coloured tasar cloth is required, the thread is coloured before being wetted with the above mixture. When the skeins are saturated they are loosened and wound in a thin bamboo wheel called charkhi. The end of the skein is then attached to a latan, and the thread is transferred to the latan by keeping it turning with the right hand, while the thread is made to pass between the thumb and index finger of the left hand. After making the thread into convenient bundles and skeins, they are ready for warping.

Warping.—The warping is commenced by placing the skeins again round the charkhis. Two at a time are held in both hands and laid alternately against the two side of the bamboo lathi, called terai, which are supported by kits or pegs on both sides. The warps are made from 0 to 100 yards long, according to the capital of the weavers. During warping, bamboo lathies are placed at convenient distances to keep the thread separate, and also to help at the time of weaving flowers or checks on the cloth. Bleaching is done on the warp.

Setting of loom.—When warping is finished, the loom is set and the warp is tied to it and is wrapped round the warp beam, called chapati, at one end; the other end is fixed to the cloth beam, called sarri. As the weaving proceeds, the cloth is wrapped round the beam, and the warp is set free from time to time from the other beam.

Weaving.—The skein of waste thread is transferred to a little piece of reed, called sari or charkhi, and are placed in shuttles called dharis. The weavers of Bihar work single-handed. Introducing the spools, weaving of the loom, &c., are done by one man. The looms and the working of them are similar to those used in weaving cotton cloth.
One man can weave about 21 yards of cloth in a day. For weaving a thin of 10 yards long the weaver gets Re. 1 as wages.

Coloured dhuus and soris are also manufactured in Bihar, and are used by bridegrooms and brides at time of marriages. The colours liked best by the people are yellow and red. The thin or pieces of 10 yards length are usually of the natural colour of tasar.

Thaas in pieces of 10 yards length are seldom sent to other parts of the country for sale, as they generally obtain ready sale in Bihar.

No reliable statistics can be obtained about the actual output, as looms do not work the whole year in weaving tasar cloth. Cotton cloth and cloth of a mixture of cotton and silk are also woven during the greater part of the year. There are approximately 200 looms in the Bihar subdivision. The estimated output of each loom, according to the weaver, is 30 thaas a year. Tasar cloth made in Bihar is sold to mahajans, who visit the villages periodically. These people take the cloth to Calcutta and elsewhere. Tasar cloth is also sold to residents of Bihar. The weavers allege that they do not keep any account.

The price of a thaas or piece of tasar cloth varies from Rs. 4 to Rs. 9.

The following persons are reported to be local experts in the making of tasar cloth:

- Sukul Patwa, of Nipura
- Chamari Patwa, of Siska
- Gopal Patwa, of Alisagar
- Kirti Patwa, of dito

While tasar cloth is made by Tantwas, a few Jolahas also make very fine muslins, in imitation of Decca muslin, in Assagogore within Bihar town. The warp of this cloth is of cotton thread and the bhares (woof) is of tasar silk. The process is similar to that followed in the making of tasar cloth. The weavers also make flowers of different patterns on the muslin. This is done while the cloth is on the loom.

The Tantwas who make tasar cloth are Hindus, and Jolahas are Muhammadans: the former consider themselves higher socially than Jolahas, and they are also better off than them. Jolahas, who have been successful in business and have means, are usually ashamed to call themselves Jolahas and use the word “Sheikh” before their names. The number of Tantwas and Jolahas is not known.

232. Balsore.—The following short account of the industry has been furnished from Balsore:

Six industries are not carried on on an extensive scale in this district. Among important industries it has no place. Of its various branches the only kind of silk manufactured here is tasar silk. The article manufactured is not of superior quality. The industry, such as it is, is carried on by some 200 persons altogether in the whole district. By far the greater number of people live in the northern part of the district, in the villages of Patpur and Rabwab; the rest are inhabitants of the village of Purusanda, within the Bhardak subdivision. The manufacturers of the northern part are not confined to any particular caste. They are real natives of the soil, and a Brahmin is as much at liberty in this part of the country to engage himself in the manufacture of tasar silk as a Kapudia, a Bania, a Baju, a Jola, or a man of any other caste. This manufacture is not, however, their sole occupation. They follow their respective avocations, and consider the industry as only a supplementary means of augmenting their limited income. They perform the same religious rites and are governed by the same social customs as are obligatory upon those of their castes who have no concern with this particular industry. Such is, however, not the case with those men who dwell within the jurisdiction of the Bhardak subdivision. They are known as Bengali Tantus (weavers), and not original natives of the soil, from whom, however, they are at present hardly distinguishable, inasmuch as having migrated from Bengal and settled down in this district years ago, they now speak the language of the country of their adoption, and have, more or less, accommodated themselves to the conditions of their environs. They number about 50 men, all told, but silk manufacture is their sole occupation. A man is excommunicated for ploughing land with his own hand.

Among both these classes of men, the rearing of silk-worms or cocoons does not form any part in the process of manufacture. They purchase cocoons from the Sonthals and the Bhumijas of the Garjat (Mourbhaj and Keonja) at the rate of about 200 per rapee, then boil them in hot water, rest them and gradually draw out all thread out of them. Afterwards they knead the thread with a paste of boiled potatoes, dye them, weave them by using ordinary looms, and thus manufacture cloths both for males and females. The article thus manufactured, after meeting the demand of the local consumers, mostly Hindus, who have to use such cloths for the various religious ordinances, goes to the merchants of the towns of Balsore and Cuttack and at Mahomed Nagar, Patna, within the Jellasa thana. Silk thread is not sold. It has been roughly calculated that altogether cloths to the value of Rs. 5,000 are sold by the manufacturers of this district annually. The local name of the cloth is katis.

It has been already mentioned that silk-worms and cocoons are reared by the Sonthals and Bhumijas of Mourbhaj and Keonja. The worms are black in colour and feed upon the leaves of sawo trees. The months intervening between the end of the rainy season and the beginning of the cold weather are chosen for the rearing of cocoons. Hundreds of men are engaged in this pursuit. Each man takes charge of 100 insects and places them on the leaves of the sawo trees, himself living in a temporary hut hard by, on one meal a day and strictly on vegetable diet. He believes that the least deviation from this practice
would cause death among the insects or induce them either to fly away or refuse to feed upon the leaves. He watches the insects anxiously every day, and finds them gradually weaving the cocoons within which they would at last shut themselves. As soon as the cocoons are completely formed, the man puts them in hot water and kills the insects within; for otherwise, they would cut their way out through the shells and spoil them, for pierced cocoons are not purchased by the manufacturers of tasar cloth in this district."

233. Puri.—In Puri tasar silk weaving is confined only to a few families in the subdivision of Khurda. The following description of the industry has been furnished by the Subdivisional Officer of Khurda:

"The only kind of silk industry in the subdivision consists of tasar cloths, and the only castes who weave them are the Gouria Patras and the Asani Patras.

The Gouria Patras consist of 16 families with a population of only 32, and the Asani Patras consist of 25 families with a population of 60. The social position of the two weaving classes noted above ranks just above that of the Uriya Tantis, who stand 24th in the general social scale of the Hindus, comprising of 68 castes.

Subjoined is a description of the process of weaving. Matha bhopala, panchi, and kantia are the different kinds of silk fabrics prepared within the subdivision.

The Patras sell their cloths to consumers of neighbouring villages and towns and to bopari or traders at their house and their neighbouring huts, which are chiefly the following:

<table>
<thead>
<tr>
<th>Names of Hats</th>
<th>Elsewhere</th>
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<tbody>
<tr>
<td>Lingipur</td>
<td>Pargana Lembai, zilla Puri, Sadar subdivision—</td>
</tr>
<tr>
<td>Sarkantar</td>
<td>Ghororia</td>
</tr>
<tr>
<td>Khallaburi</td>
<td>Atharbhaga</td>
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<tr>
<td>Narangar</td>
<td>In Banki, district Cuttack—</td>
</tr>
<tr>
<td>Chhangiri</td>
<td>Tulsipur</td>
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<td>Tangy</td>
<td>Charakika</td>
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<tr>
<td>Bengi Tangy</td>
<td>Kalapathar</td>
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<tr>
<td>Banpur Bazar</td>
<td>In zilla Raipur—</td>
</tr>
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<td>Raipur.</td>
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</tbody>
</table>

The tasar cloths made in this subdivision are chiefly consumed locally, and are only partially taken by bopari or traders to neighbouring places in the Puri Sadar subdivision, the Cuttack district, killa Raipur, Nayaagar, Narsengpur, Daspalla, and Tigriria.

The Patras like all the middle classes of Orissa also partially cultivate Lands.

The Patras or the weaving class procure the raw silk from killa Kocnijhar. They boil the raw silk with hot water, which process separates the silk (or tasar) from the husk, or the covers protecting the silk within it.

After the silk is separated from the husk it is dyed* and made into bundles, and the process of kanda, or the preparation of the thread for the use of the weaver, follows.

The use of arda and sana charki is required for the preparation of the kanda.

The arda consists of a wooden base, both ends of which are fixed to two sticks. To these two sticks at the top is fixed another stick. A heavy block of wood in the shape of a globe is attached to the horizontal stick, at the top of which also a bundle is attached. The globe revolves when the handle is turned round. There is a piece of iron splinter called takuri which is attached to the globe and revolves with it. Sana charki is composed of a small stick, 12 or 15 inches long, thrust into a hole of a circular piece of stone, which serves as the base, and from the top of this main stick four or five other slender pieces diverge out inclined in an acute angle to the main stick. Some threads are twisted round this instrument, and of this single thread is attached to the takuri. One end of the takuri is thrust into a piece of tube. The bundles of silk are presented to the machine, the bundle is worked out, the takuri and arda whirl in opposite directions, and the silk is spun into thread. The threads are first twisted round the sana charki and then all round the tube. This completes the process of kanda.

The thread is moistened with chuda or flattened rice water. Half the quantity of the thread is kept wet for the weaver's shuttle, while the other half is twisted round the nati.

The weavers fix into the ground (in a rectangular form according to dimensions of the piece of cloth) four pieces of wood, each 6 inches long, and keeping the threads in the ukuni take the shuttle in one hand and ukuni in the other and then twist the threads all round the aforesaid pieces of wood. This part of the work is called hundaira.

Construction of base.—It is composed of two pieces of well polished, round and split bamboos, attached to each other by means of firm strings. Both on and below this machine threads are fastened and meshes are formed of them. This is the chief instrument of weaving.

A piece of bamboo stick is thrust into one end of the kandi, and this stick is fastened at its middle point with a firm string which again is fastened tight to a pole fixed on the ground at a distance. Now another piece of stick is thrust into the other end of the

* The weavers procure European chemical powders, and with them they dye the tasar threads before they are used for weaving purposes. Formerly the weavers used to dye the same with dyes prepared by themselves.
lundi and two pieces of strings are tied at both the ends of the stick, and these strings are
again tied to two ghora. The ghora is a pair of splinters of bamboo fastened crosswise.
The strings mentioned above are tied just at the point of intersection of the two splinters
which the ghora consists of. These two cross-pieces are attached tight to two other sticks
fixed firmly to the ground. Now the lundi is stretched quite tight, and the weaver separates
the several threads and makes them quite apart from each other and here and there thrusts
some other bamboo splinters into the lundi. These bamboo splinters are called turiath.
Now, if the single threads are found to be torn, then the weaver joins them. Then the threads
are cleared by means of a brush called kanche, which is made of a kind of grass. The
brush is wetted with rice gruel before it works. This process is called tasar in preparation of
the thread for weaving.

Now the lundi thread is taken into the loom. Here the lundi is called ponch. By
certain contrivances, one set of threads are laid in one direction and another in the
opposite, so that when the weaver by means of his legs sets in motion some part of the loom,
where the lundi has been fixed, the threads are entwined round across each other, and thus
make a fabric. Along with this fabrication goes on the process of varan, i.e., the kanda is
kept in a small canoe-shaped instrument called nali, which is very skillfully and rapidly made
to pass across the abovementioned threads breadthwise. This completes the process of
weaving.”

234. As the diagrams illustrating the description of the tasar weaving
industry of Soathal Parganas serve also to illustrate the descriptions of the
same industry in the districts of Bihar and Chota Nagpur, so also would one set
of illustrations (figures 27 and 28) serve to illustrate the industry for all the
districts of Orissa. The resemblances between the different silk-weaving
appliances used all over Bengal are indeed quite obvious, though the Bengal
Bihar and Orissa types are quite distinct, and the vernacular names also differ
somewhat for the three provinces, though some of the names such as bow and
maku are pretty universal.

**Fig. 27.—Tasar reeling and weaving appliances of Jajpur (Outtack.)**

**Bengal type.**

(a) Reeling of Tasar cocoons.

(b) Doubling of Tasar thread (only one charki being shown).
(c) Warping of Tasar.

(d) Another process of warping.

(e) Setting the reed.
(f) Attachment of heald to treadle.

(g) The Tasar loom of Cuttack.

Fig. 28.—Tasar-weaving appliances of Khurda (Puri).

Orissa type.

Cloth-beam (Pauza).
Qomb (Talow) and Charki.

Healds (Baw).
Reed (Shana).

The Tasar loom of Puri.

1. Spinning wheel (areta).
2. Spool (takuri).
3. Shuttle (maku).
4. Healds (bow).
5. Comb (tulone).
6. Cloth-beam (pausa).
7. Reed (phinda).
235. Cuttack.—The following fully illustrated and interesting report on
the tasar silk-weaving industry which is carried on only in the village of
Gopalpur (thana Dharamsala, Jaipur subdivision) in this district, has been
furnished by Babu Braja Durlabha Hajara, Subdivisional Officer of Jaipur:—

"(i) The classes who carry on the industry.—Only tasar silk industry is carried on on a
very small scale, at the village of Gopalpur, which lies partly in pargana Olas and partly in
kils Madhupur, thana Dharamsala, by a class of weavers who are called Bangali Tantis (or
Tantis, i.e., weavers, of Bengal). The weavers are so called as they are not of Uriya origin.
They have settled here from time of which no accurate account is available. Their ancestors
came to Orissa from Burdwan or Chandrakona in Midnapore on pilgrimage, and for some
reason or other settled here. There has been addition to their number from time to time
owing to people coming to Orissa on a similar object, and ultimately settling to live with
their brethren of the same stock. They have formed a class by themselves, and are not
socially connected with any class of Uriyas.

(ii) Their number.—There are about 200 houses or families of these weavers at the village.
Almost every family owns a loom, and carries on the industry independently by the labour
of its own members, including that of females and girls, who have parts assigned to them
as hereinafter described.

(iii) Their social and industrial position.—As stated above, these weavers form a class
by themselves. Their social intercourses are confined to their own circle. They may be
said to belong to the middle class in position. Other people do not have anything to do with
them except in the dealings of their proper profession. These weavers weave tasar as well
as cotton cloth. They do not engage in any other industry or business or hold or cultivate
any land. Somehow they have kept on their industry and get on in life with the earnings
from it. By this I do not mean to say that they are poor or in stringent circumstances.
Indeed, some of them are well off and have money enough to carry on a small money-lending
business in their own humble circle, as anyone who can save anything does at almost every
rural village.

(iv) The process they follow.—The process that these weavers follow is as simple
as the scale of their business is small. They maintain no extensive flattery or possess any
intricate or improved form of machinery, or own any forests to rear cocoons. They use only
tasar cocoons, which they purchase from those who rear them in the jungles of Keonjhar,
Murbhaj and other places.

Rearing cocoons.—The account that these weavers give of how cocoons are reared
is somewhat interesting and is, therefore, given below in brief, although I have personally
made no enquiry.

The bhana (or seed) cocoons are purchased at 10 to 12 gandas (ganda=4 in number)
by a class of men called Bhannyas and Sahara. These men get the bhana to their house
in the month of Shravan (August), and keep them in earthen pots, which are kept covered
during the day. The man who goes to rear cocoons must observe strict and religious
cleanliness. He must have only alap rice for his meal, i.e., observe habitulga and will not
see his wife during the time he is engaged in the business. The pot in which the parent
worms are placed, is kept in a clean room, and is uncovered at night, when they are said
to be joined by worms of the opposite sex who find their own to the place, and thus they lay eggs, each laying about 1. poun (1 poun = 80 in number). The eggs are collected in the morning, wrapped in a piece of clean cloth, and placed in the same pot with the parent worms. This goes on for about a week, during which all the parent worms die, leaving their eggs. After this the eggs are taken out and spread on a piece of clean cloth and fanned. They grow in about 15 days, and are then put on assan and dha trees, on the leaves of which they make cocoons.

(b) Collecting and selling cocoons.—These cocoons are collected about the month of Pous and Magha (December and January), and sold either at the place where they are reared or at the market. They are also taken to the houses of the weavers for sale. Cocoons are sometimes sold raw as they are taken down from the tree, or after being boiled and killed, for if they are kept raw for many days the worms will pierce through them. The bigger cocoons sell at 3 pouns, and the smaller ones at 6 pouns to the rupee (1 poun = 80 in number).

The raw cocoons are cheaper by 10 to 15 pandus to the rupee than the killed ones. The weavers purchase either kind; but they generally purchase the raw ones for the sake of cheapness.

(c) Killing worms by boiling.—It is, however, with great reluctance and pang of the heart that they boil and kill the cocoons. This part of the work is left to the females. It is almost with tears in their eyes that these weavers of Gopalpur complain that as a consequence of this cruel and sinful business (of killing the worms) their women lose their husbands, and have to live the miserable life of widows from their very youth. The shimmering of the cocoons in the boiling pot is interpreted to be the plaintive utterances of the worms appealing to “Siva, Siva.” The weavers also say that those who are engaged in killing cocoons are in time struck with some sort of loathsome skin disease, which, when aggravated, brings on their end. They could not, however, show me anyone who was so suffering. Those families that are comparatively better off, do not, on account of this business, by their own hand do that part of the work which consists in killing cocoons. They hire labour for this from among their own class, and men or women, as have no domestic ties, are readily available for the purpose, and the charge is about 3 annas for boiling one kikan (16 pouns) of cocoons.

And this is how the worms are killed: a large handi, with pure water in it, is placed on a fire. The cocoons are put in another, the mouth of which is covered by a piece of cloth tied to it. The latter is then placed on the former, upside down, mouth to mouth, so as to allow the hot steam from the boiling water to pass through the covering cloth into the upper pot to kill the worms. The worms when they feel the heat are said to make a noise and when this ceases, the killing business is done, and the cocoons are kept away for cooling.

(d) Preparing the cocoons for finishing by a second boiling.—After this the cocoons are prepared for drawing out the thread from them. This is done by boiling the killed cocoons a second time in water which has been passed through ashes obtained by burning the leaves and bark of plantain trees; about half a seer (a pound) of the ashes is taken and put into an earthen pot, with a hole at the bottom on which there has been spread some coconuts husked or similar substance, to prevent ash from passing out. Then about 2¾ seers (2¾ pounds) of water is poured on the ashes. The water drops through the ashes, and the hole at the bottom then collects in another pan on the top of which the perforated pot is placed. This water is then poured into an atika (cooking pot) and 1 poun (80 in number) of killed cocoons is put into the water and boiled. The above-mentioned quantity of water (1 seer) is generally sufficient for one poun of cocoons. Sometimes, however, the quantity is insufficient for the number, and more water (water which has been passed through ashes as described above) has to be added till the cocoons are soft enough for reeling. This part of the work is done usually at night, by the females.

(e) Separating waste silk.—In the morning after they have cooled, the cocoons are taken out one by one, and the loose and coarse fibres that adhere to them are separated by the females with their hand. This waste tasar, it will not be out of place to note here, is not used by the weavers of Gopalpur, but they keep it apart for sale. The Patrus take it for making pendants and strings attached to ornaments. This waste silk is locally called arma tasar, and is sold at about two pious per chatar (i.e., 5 tolas). A rupee worth of cocoons gives about 2½ chatars of arma tasar and 3 chatars of good tasar fit for weaving.

(f) Reeling or khus katun.—After the waste tasar has been separated, the cocoons are ready for reeling or khus katun (drawing out the threads). This part of the work is done by the females and little girls. Figure 37(c) illustrates how this is done. Seven or sometimes 8 cocoons are taken at a time. The end of the thread is taken out of each, and they are all joined together and tied to a nata made of bamboo sticks (N in figure 37). This is called the katun nata after the purpose for which it is used. It is altogether about 2 feet long; about 8 inches from a to b one oot from b to c, and 5 inches from c to d. The diameter of the lower part of the frame, e to f, is about 6 inches. The woman holds this in her right hand, and puts the cocoons in a pan (d) to her left. She takes off her cloth to a little above the knee, and the threads pass over the uncovered part of her thigh. She goes on twisting, with a light pressure of her left hand, the 7 or 8 threads coming out of the cocoons and passing between her hand and thigh, and revolving the acts with her right hand to wind the single thread on it. And thus the reeling goes on drawing out the threads, twisting them into one, and winding them on the nata, all simultaneously. Particular care is not taken to join the ends of threads when one lot of cocoons is exhausted,
and another taken up or when they happen to break. An attempt is made at first to join them by the pressure of the hand, but if that fails, the ends are joined by knots. The thread is taken out of the katuni nata when one skein is drawn. About 24 cocoons yield one skein, and it takes about three hours to draw this quantity. One rupee worth of 6 poms of cocoons yield about 3 charaks of good quality, the price of which is Rs. 1.8.

This part of the work is sometimes done by hired labour, and the cost of it is 10 pice for drawing from Rs. 1 worth of cocoons. This would show that about 60 hours' labour fetches only 10 pice.

(g) Khandi bhangi.—The next process is called khandi bhangi, i.e., dividing the skeins obtained from the katuni nata into two, and to enlarge the short skeins. This is required to allow the hand to be put into the skein more conveniently to apply paste to the thread. The skein obtained from the katuni nata is put on a charki called the po-charki, the girth of which is equal to that of the katuni nata. The shape of the charki is different from that of the nata, as will appear from the illustration, and the ribs of it are of string instead of bamboo sticks. The charki is loosely fixed to a hole in a block of wood, and the thread is unwound as it is wound on a nata of larger girth (called the bulani nata, marked N in the illustration) which is revolved by the right hand, while the thread passes between the thumb and the index finger of the left hand at P (vide figure 27b.)

(g) Colouring the thread.—After this process the threads are coloured, if required. The method of colouring is not at all elaborate. The skeins are simply dipped in water in which are warm, and the powdered dyes are dissolved. Orange and red colours are chiefly used. The powders used are of European manufacture purchased from the bazar. Some use also a decoction of mohan sum seeds. The colour produced is not fast.

(i) Basuni.—The next process is called basuni. The skein is taken from the bulani nata. Paste (made from boiled rice) is applied to it with the hand, and the skein is put on another charki of the same girth as the bulani nata. From this the thread is wound on another nata called the basuni nata by a process exactly similar to that of khandi bhangi. Two charaks are sometimes used when the Tonti is able enough to manage, two skeins being thus collected on the nata at the same time. By this process the excess paste gets off from the thread, and the threads are freed and separated from each other, as they got confused in the application of the paste. Oil is applied to the ribs of the nata to prevent the pasted thread from getting attached to them, and the girth of the basuni nata is a little larger than that of the bulani nata, as the skein taken from the basuni nata becomes shorter when it dries up. This work—basuni—must be done early in the morning, i.e., before the sun's heat can render the pasted thread too stiff for working. When the thread has been rolled on the basuni nata, the nata with the thread on it is exposed to dry in the sun. At evening the skeins are taken off the nata (little water being applied to the thread on the ribs of it to moisten the paste in order to be easily taken off), wrapped in a piece of wet cloth and exposed to the dew of night to procure softness.

(i) Kaken buli.—The next process is to transfer the skeins again to the bulani nata through the po-charki. This is done to have the skeins on a nata as well as to finally separate the threads should any have got attached to each other on account of the paste.

(1) Warping or wandi-making and dhalo-making.—The threads are now ready for warping. This consists of two distinct processes (1) laying the threads sufficient in number for the required breadth of the cloth to the required length, and (2) rolling this thread on the warp-beam. There are two methods of laying the threads to the required length and thickness. These methods are not really different; but one is an improvement on the other. The two methods are illustrated by figures 27(c) and (d), respectively. The method illustrated by figure 27d is gradually replacing the other, though the latter is more common, being simpler and less expensive. After the kaken buli, the last described process, the skeins are put on charaks. This charki C is of the same size and shape as the po-charki, with this difference, that there is attached to its handle a rod with a ring, at the end through which the thread passes in order that it may not get out of the line. Two such charkis are generally used at the same time. Two rows of bamboo lathis are planted on the ground at an open place—which is generally selected under the shade of trees—at sufficient distances so as to give the desired length. A man (women also do it sometimes) takes two charaks, one in each hand, on which skeins have been put as stated above. The cutter ends of the two threads are taken out through the iron ring and tied to one of the lathis and the man, with the other charak is held in his hands, walks along the lathis, the charaks turn and the threads are unwound as he walks, and the threads are laid along the lathis as shown in the illustration (figure 27c).

The method illustrated by figure 27d is only somewhat more complex. Twenty charaks being used at once, instead of two, and a small reed—called halachanguri (A in Fig. 27d) being used, instead of a ring to guide the thread. This need has as many dentations as there are charaks, through which the threads are passed. The charaks are not held in the hands, but loosely planted on rows on a frame of bamboo sticks. In the illustration only one charak is shown as planted. Nineteen more are similarly planted at the places marked G, instead of lathis fixed to the ground, there are two posts (B. E. in the illustration) on either side with 8 to 10 pegs on each. Behind the frame on which the charaks are planted, there is another row of horizontal bars (X in the figure 27d) passing one behind each row of charaks. The outer end of the thread is taken out of each charak and passed over the bar behind it, and the twenty ends are passed on through each dentation of the halachanguri. The ends are then tied to one of the pegs (see P.G. in Fig. 27),
and the man holding the halichanguri walks in front of the frame, which is called the chariki ard to and fro, and as he walks all the charkis turn at once, the threads are unwound and laid lengthwise along the pegs. The weavers say they have introduced this chariki ard from Bengal. The advantages of this frame over the other method are (1) that it can be worked inside the house, as on account of the pegs much space is not required; and (2) that twenty instead of two charkis are unwound at the same time, and thus one-tenth of the time is required.

The nunali (as the length of the threads so laid is called) is generally made long enough for 10 pieces of cloth, and is about 2,400 threads thick—the number required for a cloth of ordinary width (32 canvas).

The next process is called disha or warping proper. The ends of the threads are passed two and two through each indentation (punni) of a long reed called the san (see figure 27e) with the help of the pointed end of a porcupine quill. The ends that are thus passed are secured with a string to a beam and rolled on it (B of figure 27c). This beam is supported and turned on two posts fixed to the ground. When the whole length has been nearly rolled up, the threads of the warp are crossed with the help of two rods (P1, P2), called pachhaini. Each alternate thread is taken up one by one with the finger and one bar passed through it. The other bar is similarly introduced, the threads crossing in the middle, i.e., the thread which passes above one of the rods, passes below the other. This is called jua-making, an intricate arrangement, which gives much trouble, and an error in which spoils the whole warping, and to which the Bengali word jua chor (a cheat) owes its derivation. This jua-making is a preparation for the bow or heads in the loom.

(6) Weaving.—The warp is now ready for the loom. The warp-beam is placed on short posts and makes the back-beam of the loom (B in figure 27g). The pachhaini is replaced by thinner rods which are called chalanis. The reed is pushed off to the end of the threads. The upper threads are taken one by one and passed between two short cotton threads (L1, L2, figure 27f), each of which is doubled, the ends of one downwards and those of the other upwards; the former ends are fastened and tied to two rods below the warp, (R1, R2), and the latter are similarly tied to rods (R3, R4). The warp threads (T1, T2) can play through the head eyes (Y1, Y2). Similar eyes are made by similarly doubled threads arranged in parallel sets, fastened and tied to the rods, above and below. Two more rods are placed between the doubled threads. These rods serve to keep the threads in position. The upper warp-threads pass through one heddle or head. The lower threads pass through another heddle. Two heddles are required, and they appear on the warp as shown in the figure 27p (H1, H2). The threads which pass above the off-charani (P1), are held by the off-hedda, and those which pass below it by the other heddle. Five strings are then tied to the upper edge of each heddle at corresponding points. The free ends of these threads of one heddle are tied to as many cooks (K1, K2, K3, K4, K5), which are hung from a cross-beam overhead (V). The strings from the other heddle are tied to the other ends of the cooks. These cooks turn on a rod (W) passing through holes in them, as one heddle mounts, and the other goes down. This is effected by working a treadle, (G), which is actuated by each heddle by strings as shown in the figure.

The free end of the warp is now tied to the cloth beam A. The weaver sits near it at M, works the treadle, so that while one heddle goes down, the other mounts, making an opening between the warp-threads as shown in the illustration through which he shoots the shuttle, which is charged with the weft-thread. The shuttle is shot first, say from the right-hand side. The next time when the shuttle has come to the left-hand side, the other heddle which worked first, goes down, and that which went down mounts, i.e., the lower threads come up and the upper go down, making a similar opening between. The shuttle is now shot back to the right-hand side, and thus the weaving goes on. Z is the shuttle in the illustration. Before the cloth is woven, thick pieces of wood (called dodiki) are fixed to either edge, top, and bottom, of the reed or sana. So some weft-threads are given, the reed is pushed towards the cloth beam to press the weft-threads closer. Two bows, called kasterni, are pinned to the woven part to prevent the warp from collecting. The bow are marked O1, O2, in the figure.) As the woven cloth is wound on the beam A, the warp beam (B) unrolls and sets free the thread at the off-end.

The maku and the nali or the shuttle and the spool.—I must now say something about the shuttle. It is a thing made of buffalo horn (I speak of the thing that the Gopalpur weavers use; others use iron things also) of an elongated egg-shape, the two sides enclosing an open space. These are procured from Amanapur in Keonjhar. There is a needle lengthwise at one end inside (Z1) and another (Z2) crosswise joined to the side at the other end. The weft-thread is rolled on small reeds (nalis or spools) from charana with the help of a wheel called the arat. Two threads are ordinarily rolled on one nali by planting two charana on a block of wood and turning the handle of the wheel. The threads are not twisted, sometimes threads are taken. Several such spools are kept ready with the thread wound on them. One of these is put into the shuttle at a time being fixed on the lengthwise needle; and the outer end of the thread is passed below the crossing-needle, so that it unwinds from the spool as the shuttle is shot. The thread, which is wound on the shuttle, does not pass through any of the processes subsequent to the kasterni described above. If it has to be coloured, that is done when the skins are taken out of the kautusi nata. Paste is not applied to the weft-thread.

* This kind of warping frame with spools is supplied with fly-shuttle looms by Mr. F. N. De of Chisapurah.
The method of weaving described above is no special method of weaving tasar. Cotton cloth is woven in the same loom. The loom that these Bengalis use differs somewhat in construction from the loom that weavers of other classes use, but that is not on account of weaving tasar. Different classes of weavers in this country have differently constructed looms, which probably shows that they have come from different places.

(c) The manner in which the products are disposed of.—The tasar cloth and these weavers of Gopalpur turn out is of a coarse and inferior quality. The bulk of the products is taken away by people coming from Madras, Berhampore and other places in South India. These people come to the village, advance money to the weavers and take away the fabrics when they are produced. They are said to take about Rs. 12,000 worth of tasar cloth in the year. The weavers also sell about Rs. 500 worth at the Cuttack market.

One pair of tasar cloths of ordinary size is sold for about Rs. 5-8. It would take a man about 10 days if he has to finish a cloth from killing the cocoons to taking it out of the loom. About 18 poms or Rs. 3 worth of cocoons are required for one pair of cloths. The colouring costs about 4 pice, the rice-paste two pice, and fuel two pice per pair. The materials thus altogether cost Rs. 2-2. The weaver's net profit comes out to be Re. 1-14 per pair, the proceeds of ten days' labour, i.e., 3 annas per day. As females and children take part in the work, the average daily earnings of a man may be estimated roughly at 4 annas per day.

A pair of ordinary tasar cloths weighs about 13 chataks. Allowing for the weight of the paste applied to the threads, the net weight of the tasar would be about 9 chataks or 45 tolas.

Besides cloth, the Kantis sell skeins of tasar thread also, which are used in the borders or para of cotton cloth by the weavers of Balipatna. The thread is sold at about 11 tolas per rupee.

(n) Influence of import.—The industry does not appear to have been affected by imports. From the account given by the weavers, the industry appears to have remained stationary so far. Only in the present year, they complain that their mahajans from the south have not yet made their appearance, although they have left behind an advance to the extent of five to seven hundred rupees.
ends of six or four fine threads of the cocoons are mixed together into one which is drawn and folded up until the whole stuff of the cocoons is entirely exhausted. With these threads which may be doubled or tripled, as the case may be, the Patras (a class of people) weave tasar cloth. The better the cloth the greater the folding of thread. As for instance, chowtari cloth is the best, having twelve folded threads lengthwise and the same breadthwise. It sells at Rs 7-8 to Rs 11 for a cloth of 16 cubits long and 2\frac{1}{2}\ to 2\frac{3}{4}\ cubits breadth. Titari cloth, twelve folded thread, lengthwise and eight folded threads breadthwise. It sells at Rs 5-8 to Rs 8 for a cloth of the aforesaid dimension.

The cocoons are reared in the following places of this State, viz:—

Bassai, Manikmar, Kulai, Brahmanbedia, Kuvalo, Kolda, Barharoa of Parjang Biso.
Guth Palasuni, Jerada, Dastipur, Birbhabal, Bhejia, Pangaitra, Asanabahali and Kh死角, of Palasuni Biso.
Koi, Dhalpa, Rahai, Bresaal, and Marnabil of Sourika Biso.
Rekula of Jenadesh Biso.
Kalang of Chhadesh Biso.

Tasar cloth is manufactured in the following places:—

Indipur and Sariapada in Balarampur Biso.
Bhubon in Ganpur Biso.
Pangaitra in Palasuni Biso.
Banabipura in Parjang Biso.

Fifty persons know how to manufacture the tasar cloth, and they are Patras by caste. They are weavers and cultivators. These Patras buy the cocoons reared throughout the State, and occasionally the reared cocoons of Dhankon are bought by the weavers of Nuspatra in Tigris and Manilabund in Baramba."

CHAPTER XIX.

THE ENDI SILK INDUSTRY.

The endi, eri, or eria (Attacus ricini) cocoons are reared in the districts of Bogra, Rangpur, Jalpaiguri and Mymensingh. Being more easily reared and less subject to epidemics than mulberry silk-worms, it is easier to introduce the mulberry silk industry into a new locality, through the means of the eri silk industry. But the eri silk industry is not so lucrative as the mulberry silk industry, the product of the eri cocoon being a spun-silk and not reeled silk.

All attempts to reel the eri cocoon have hitherto failed, and although the ultimate fibre of the eri cocoon is a stronger and more lasting fibre than either the mulberry or the tasar silk fibre, the thread spun from this cocoon is a coarse kind of thread adapted only for weaving cheap and coarse fabrics, which correspond to matka and katha fabrics made out of pierced mulberry and tasar cocoons respectively. Eri silk cloth is, however, much more valuable than either matka or ketha cloth, as these are less lasting. In course of time eri cloth also gets softer and more silky looking than either matka or ketha. The demand for eri cloths is greater than the supply, and the demand is now being largely met by the imitation eri silk made out of waste mulberry silk, which has been introduced in the district of Murshidabad by the writer of this Monograph. From the specimens of silk fabrics appended to this monograph (Specimens Nos. 19 to 31) it will be seen to what diverse and beautiful uses these imitation eri silks might be put. They also indicate the line in which improvement might be effected in the genuine article also (Cf. Nos. 26 and 31 with Nos. 32 and 33). At present little skill is brought to bear on the production of eri silks either in Assam or in Eastern and Northern Bengal. The spinning might be more uniform in imitation of the spinning of the Rajshahi matka, and the weaving might be more varied and artistic. As epidemics do not seem to prevail among the eri silk-worms in Bengal (though they do in Assam), it is unnecessary to introduce the system of grainage, i.e., organise seed-rearing nurseries for the supply of healthy seed. But improvement in another direction is feasible and desirable. The eri cocoons reared in Bengal are not so select as some of the eri cocoons of Assam, which are beautiful and white. Eri cocoons reared in Bengal are of mixed colour and rather small. A large proportion of brick-coloured cocoons being mixed up among them, it makes the colour of the eri silk fabrics woven in Bengal less pleasing to the eye than that of the high class eri silk fabrics woven in Assam. The Rampur Boalia
Sericultural School may do a very useful work by popularising the beautiful white *eri* cocoons reared in this school in the neighbouring districts of Bogra, Rangpur and Jalpaiguri.

**Bogra.—** The following account of the *eri* silk industry of Bogra is compiled out of the district monograph. The account should be read in connection with that given for the silk-weaving industry of this district, most of the appliances and method used being common to both industries:

"Cultivation of the worms and preparation of the thread.—The cultivation of the bond or *eri* worms is done by the same class of people as cultivate silk-worms. A cultivator may be found rearing both silk-worms and *eri* worms simultaneously. The cultivation of *eri* is now more widespread than that of the silk-worm, although both industries have dwindled away during the last thirty years. The decline is said to have begun even before the abolition of the factories owing to the fall in prices. As I have already stated, the cultivation of *eri* is more common in the eastern or *poli* tract of the district. At a time when certain tracts wore nothing but bond cloth. The bond industry is mostly domestic. Women rear the worms by feeding and cleaning them. It is the women who boil the cocoons, arrange them in a lump, spin out the thread, and so on. The thread, when manufactured in a sufficient quantity, is made over to a Jola or Muhammadan weaver, who weaves the cloth and brings it back, charging a small amount for every cubit of the cloth woven. As the cultivators of *eri* worms are scattered over the district, and as this industry is not, and cannot be, the only source of their income, it is not possible to give an accurate estimate of their number at present. In a family of such cultivators the women are often found to possess more information about the ways, &c., of the worms than the men. This is due to the fact that they are more interested in the affair. A bond cloth may form an article of everyday wear by a woman, whereas a man wears bond fabric as a wrapper, only in the winter.

The *eri* worms feed on the leaves of the castor-oil plant, locally called *bhelna*. The plant is grown on homestead lands, or here and there among other crops. Cultivation of castor plants as the sole crop in big areas is not very common. They are sown in small patches. The leaves are liable to destruction by various sorts of caterpillars, &c.

In the absence of *bhelna* leaves the worms eat leaves of the *puppu* also. But this food does not seem to be liked by the worms. The worms are certainly more hardy than silk-worms. They have been found to go about in the room in search of food when the food given them was exhausted.

The following cycle is given for the *eri* worm:

<table>
<thead>
<tr>
<th></th>
<th>Summer</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lay eggs</td>
<td>9 days</td>
<td>Same day</td>
</tr>
<tr>
<td>Eggs hatch</td>
<td>9 days</td>
<td>16 days</td>
</tr>
<tr>
<td>First moult</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Second</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Third</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Fourth</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Spinning begins</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Spinning</td>
<td>1 day</td>
<td>2</td>
</tr>
</tbody>
</table>

Total           | 40 days | 74 days |

"An empty cocoon from which the worm has cut out weighs 3/4th of a tola. The length of a cocoon is about 1½ inches.

The *eri* cocoon is bigger than the silk-worm, and the cocoon spun is also bigger. The cocoons generally have a reddish appearance, white cocoons being rare. *Eri* cocoons cannot be reeled. They have a fibrous, sticky appearance. When the worms cut out, the female ones are known by their larger appearance. They are tied by threads with a string, formed by putting four or five paddy straws together. The male worms are left free to choose their mates. Eggs are laid on the above string, and then the process of hatching, &c., goes on in the case of *eri*-worms.

"In the case of *eri* cocoons there is not much hurry for killing them, for it does not matter much if the worms cut out. The cocoons may be killed by exposure to the sun. For the purpose of spinning the cocoons are boiled in an earthen vessel closed with an earthen lid and hermetically sealed with clay. The boiling goes on for two hours or more. Then the vessel is taken off and allowed to cool. The whole thing is then kept in the same state for three or four days; after which the lid is removed and the cocoons are taken out. They give out a very nasty smell. Then the cocoons are opened at one end and the chrysalids are taken off. The cocoons are then thoroughly washed with water. Then a cocoon is turned inside out and put like a cap at the end of a small wooden stick called *kathi*. Then another cocoon is placed in the same manner and capped over the first and so on. This forms something like a knob at the end of the *kathi*. The spinning begins when the cocoons are still wet. For this purpose the woman holds the *kathi* in her left hand with the knob upwards. Some fibres are then pinched and drawn out of the knob and twisted by the instrument called *tanka*. This *tanka* consists simply of a bamboo rod fixed at the centre of
a circular piece of stone or broken pot. The bamboo rod has a catch at the other extremity and is fixed firmly to the stone piece. The end of the thread to be spun is tied with the rod and wound round it a number of times. Then the whole thing is given a vigorous turn by the two fingers of the right hand. The tanka being suspended by the thread goes on twisting it, the heavy thing below serving the purpose of a fly-wheel. More fibres are pinched up and added on to the thread which is drawn out and the twisting goes on.

From the tanka the thread is transferred to a nata or of peculiar construction. It consists of a forked branch of a tree across which is tied a bamboo rod. The thread is now ready for use.

The thread so spun is far from smooth and is not of uniform thickness. So the fabrics woven out of this thread are not at all fine. They are coarse and thick. The woman goes on collecting her produce, till she has sufficient thread in stock for weaving a cloth. Then the thread is made over to a Jola (Muhammadan weaver) for weaving the cloth. The Jola charges for the cloth at one anna per cubit of length if the width of the cloth woven be 2 cubits. The charge is higher when the cloth is wider. As I have already said, thread is spun mostly for home consumption. But when the quantity spun is too small for a cloth or larger than the quantity required for home consumption, the thread is sold to the weavers. The present price of thread is Rs. 2 per seer. A higher price may be paid for thread that is finer.

Besides the thread required for the looms of the district some thread is sent out by the Marwar merchants.

This may come to 10 mounds in the year. Taking the price Rs. 2 per seer, the price of this quantity comes to Rs. 800. The cultivators themselves bring the thread to the Marwaris for sale. Those who have to sell only very small quantities take the produce to the idris and purchase vegetables or other articles of food with the sale proceeds.

Weaving—The weaving of bond silk is done by people called Jolas, and also to some extent by Jogis. The Jolas are Muhammadan weavers. They are the lowest caste of Muhammadans in this part of the country. Ordinary Muhammadans do not intermarrv with them, and they are looked down upon as low people. In fact the very name of Jola is used as a term of reproach by other people. The people of this class are found generally to be inferior to their neighbours in common sense. These Muhammadan weavers, in order to avoid the epithet of Jola style themselves kariyars. The people are generally poor. They weave both bond cloths and cotton fabrics. But the profit from these is far from adequate, and a Jola cannot support himself by weaving only. The Jolas also keep lands and cattle and cultivate the fields. The weavers do not prepare the threads from cocoons.

The other class of weavers who weave bond cloths are Jogis. These men style themselves Hindus but are not recognised by Hindus as such. The number of such men weaving bond cloths is comparatively small. These men are also looked down upon by others. They also take to cultivation as weaving alone is not enough for maintaining a man.

The loom employed for weaving bond cloths is very like the looms employed by Tanties, but it is generally smaller. The threads obtained from the spinner or from the idris are transferred to a charkhi and the warping can begin at once. For this purpose two posts are planted in the ground at a distance equal to the length of the cloth to be woven. Between these posts bamboo rods are planted in the ground at intervals of 1 cubit only, in a straight line with the extreme posts. The operator then knits the end of the thread from the charkhi to one of the two posts, and proceeds with the charkhi in his left hand towards the other post. He is provided with a bamboo rod in his right hand. This rod is split into two at one extremity and between these two halves of the rod a segment of a broken smooth churi (or glass bangle) is introduced instead of the ring mentioned in the case of the Tanties. The thread is passed over the concave side of this churi. It is drawn out as the operator walks, and he puts the thread, with the help of this instrument called hata, to the right of one rod and to the left of the next consecutive one and so on. After reaching the extreme rod and turning the thread round it, he proceeds back towards the first post, the second turn of the thread intersecting the first thread between every two consecutive rods, so that these two threads enclose every one of the rods and posts. The operator goes on in the same manner till the warping is completed. The difference between the warping of the Jolas and that of the garni weavers is this—

They use only one charkhi, while the Tanties use two. The hata is separate from the charkhi in the case of Jolas instead of being fixed to it perpendicular to the axle. So it is evident that the process of the Tanties is more economical as regards time. The next process is that of starching the threads. This is done by applying the rice gruel to the warp, which is kept stretched for the purpose. The gruel is applied to the warp and when the threads are still wet a brush is applied to the warp and the superfluous gruel taken off. The brush is of peculiar construction. It is made of roots of the khon-khus (bains bushes). It costs Rs. 2 or so and lasts for 10 or 12 years. It is said that these brushes used to be imported from other districts. They cannot be locally prepared. In putting threads through the brush the process is simpler than that of the Tanties. Instead of cutting loops at one end of the warp for the purpose the Jolas introduce the loops themselves through the aditi. One loop is introduced through each interval in the aditi or reed. So in this case each interval contains two threads and no more. The process of forming the healds is very similar to the process of the Tanties with the following exceptions:

(i) The famli is not rounded off at one end, and it is longer.
(ii) The thin rod for knotting the loops called mouri by Tanties is dispensed with.
Instead of this a rod with a hole on one end is used for forming the knots. A thick string is tied with this rod through the hole. The rod is drawn out and the thick string takes the place of this rod and serves the same purpose as the moori in gamd looms.

There is no difference in the fitting up or working of the loom. The Jolas use only one mantri or bow instead of two for keeping the width of the cloth uniform.

A wooden shuttle is used instead of a metallic one.

No rods are used as treadles. Two strings tied with the rods below the healds are provided with two small square pieces of wood or bamboo at the other extremities. These squares have a hole each at the centre, and the strings passing through the holes are knotted at the ends, so that they may not run out. The operator puts each of his feet on one of these squares, the strings passing through the first two toes of each foot. These squares serve the purpose of treadles.

In bond cloths no ornamented borders are woven, and so there is no additional healds. For making the cloth strong at the borders, the only precaution taken is to pass two loops together through the extreme interstices in the portion of the reed to be used.

The weaving is done in the same way as by the Tantis. The Jola uses rice gruel (or water in which cooked rice has been thrown and formed into a paste) instead of khadi, for application to the cloth woven.

The looms used by Jolas are much smaller than those used by the Tantis. They cannot prepare bond cloths wider than 2 cubits. This is due to the fact that they use short reeds (sundas). They purchase the sundas at 8 or 12 annas each. When a broader bond cloth is required, they weave the cloth of half the width, but of double the length. Then they sew up the cloth to make it of the required width. For instance, men require bond cloth 3 cubits wide and 12 cubits long for using it as a double glass wrapper, for use in the winter. This demand is met by weaving a cloth 1½ cubits wide and 24 cubits long and cutting and sewing it to make it of the required dimensions. There are only a few weavers who can weave bond cloth 3 cubits wide. They reside at and near Chandonbasia in a part of the district bordering on Mymensingh.

The industry of bond weaving is rapidly declining. The consumers find it more economical to purchase European cotton fabrics which are very cheap, instead of using bond cloths which, though very lasting, are too costly, considering everything. No bond cloth is exported from this district to other districts. All the fabrics woven are consumed in this district. On the other hand, gentlemen requiring endi cloth of better workmanship bring it from Assam by private arrangement. But the import is very small and hardly worth mentioning.

Fabrics.—The two kinds of bond cloths woven are glassa and dhutis. No other variety is known, although it is possible to have a required length of cloth woven to order. Bond cloth is not dyed. No ornamentation is done in the cloth. There is practically no border; the only precaution taken for making the cloth stronger at the edges is to use a double pair of warp threads at each of them.

Dhutis.—Dhutis are said to be 2 cubits wide × 5 cubits long. But practically the width is less than 2 cubits.

<table>
<thead>
<tr>
<th></th>
<th>Rs.</th>
<th>A. P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of thread required (half a seer) is</td>
<td>...</td>
<td>1 0 0</td>
</tr>
<tr>
<td>The wages of the weaver</td>
<td>...</td>
<td>0 5 0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1 5 0</td>
</tr>
</tbody>
</table>

Two such cloths are woven together by a woman. One for covering the upper part of the body and the other for covering the lower part. Generally three dhutis are warped at a time. The time required by the weaver for weaving them is shown below (according to the estimate of a weaver):

- Preparing the warp and brushing the threads ... 1 day.
- Passing the threads through the reed ... 4"
- Making the healds ... 1"
- Weaving ... 2½ days.
- **Total** ... 6 days.

The wages for these dhutis will be 15 annas. I think the time given for the whole operation is not much over-estimated. So the remuneration of the weaver is very small.

Glassa.—A piece, 1½ cubits wide and 24 cubits long, is woven and then sewn into a double wrapper 3 cubits wide and 6 cubits long, price Rs. 6 to Rs. 7. A bond double wrapper, which is woven 3 cubits wide, will fetch Rs. 8 or more.

No bond cloth is exported from this district to other district. All the fabrics woven are consumed in this district. On the other hand, gentlemen requiring endi cloth of better workmanship bring it from Assam by private management. But this import is very small and hardly worth mentioning.

Rangpur.—The following account of this industry has been furnished by the Collector of Rangpur:

"No silk industry is carried on in this district; but a rough kind of silk called endi is manufactured in this district by the low class Muhammadans and Bajbasias and Koeris
It is not exported, but is used by the poorer classes as wrappers. Females of well-to-do cultivators also use them as sars. The processes of rearing the cocoons and spinning the thread are described shortly in the annexed note prepared by Babu Sashi Bhushan Makerjee, a Deputy Collector of this district.

Rearing and spinning of endi cocoons.—Ordinarily a family would use at the most four straw-made sticks (called bhundias by the people) for the purpose of getting cocoons, the process adopted for which is as follows:—Eight or ten pairs of moth or endi flies called chitts are placed on each stick, bound with strings, where they are kept without food for four or five days, during which they lay eggs and die. Then the eggs are taken off the stick and kept covered in a piece of cloth for five or six days, after which larvae issue from the eggs. They are then placed inside a basket on that cloth with redi leaves over it, the basket being changed twice a day, that used in day-time being changed for a fresh one at night; so also the leaves. This continues for four or five days, after which the larvae fast and fall into a state of sleep for one day. When the sleep is over they resume activity, and in this state four or five days pass. Then come two days of sleep, after which they are again active for four or five days. Then again come three days of sleep, and inactivity for the larvae, which are then removed to a room and placed on a machan. This continues for five or six days, after which comes a day of fasting and sleep. Subsequently they are removed to bamboo bars within the room with the machans underneath. On these bars they hang for ten or twelve days on redi leaves on which they live. Then they spin cocoons, some on the machans, on which they drop down. This spinning is over in three or four days, after which they are sunned for three or four days. I may note here that the rearing of cocoons in summer takes as described above one month and a half, while in winter it would take double the time, the growth and development of the eggs being delayed in the latter season. Two or three per cent. (moths come out piercing through these seed-cocoons, and are utilised by being placed on the stick called bhundia, as described in the beginning of this report) are kept for seed, which, however, are not sunned like others. As regards those which are sunned, they are boiled with ashes of plantain trees for an hour or two. They are then pressed against a bamboo stick, one foot high and half an inch in diameter, in order that they may expand. When this is over, they are washed, kneaded and dried. Fibres are separated, spun and twisted by means of a takus, (a) the cocoons being moistened in water all the while, then the yarns are reeled on a jhila (b) and sunned. Then they are made over to a weaver.

One bhundia would yield 1,300 caterpillars and one poosh of thread (one-fourth of a seer); two bhundias would yield yarn enough for a wearing cloth named fota 5 cubits by 2½ cubits; three bhundias would yield three poosh of thread, from which one sheet (chadar) 6 by 2½ cubits, might be made. To make one guji of 12 by 2½ cubits, 6 poosh of thread will be required. Guji is seldom made. Fota is used by women, and would last for two or two and a half years. Chadar is used by males, and lasts for eight or ten years.

To maintain one bhundia of insects (moths) it would cost one rupee if redi leaves are to be purchased from the hdt or villagers. Consequently one fota would cost Rs. 2 as well as annas 9 or 10 as cost for weaving. But it appears that people do not generally purchase redi leaves, the trees being grown by them in their own fields or houses, so that they have only to pay annas 9 or 10 per fota that women wear. A fota would sell for Rs. 2 to Rs. 2.8. One chadar would cost Rs. 1 only (as cost for weaving) if redi leaves worth Rs. 3 can be supplied from home. One chadar would sell for Rs. 5 or Rs. 6 in the bazar. To carry on a regular transaction, the cost of spinning as well as other costs are to be considered. The cost of spinning is charged at 2 or 3 annas per bhundia or per poosh of thread; consequently one fota would cost—

| (e) For redi leaves | ... | ... | ... | 2 0 |
| (f) For spinning | ... | ... | ... | 0 6 |
| (g) For weaving | ... | ... | ... | 0 9 |
| (h) For colouring the fringes | ... | ... | ... | 0 1 |
| (i) Two bhundias | ... | ... | ... | 0 2 |
| Total cost | ... | ... | ... | 3 2 |

Similarly, one chadar would cost—

| (e) Redi leaves | ... | ... | ... | 3 0 |
| (f) Spinning | ... | ... | ... | 0 9 |
| (g) Weaving | ... | ... | ... | 1 0 |
| (h) Colouring, no fringes or border being used | ... | ... | ... | 0 3 |
| Total | ... | ... | ... | 4 12 |
Now it will be seen that the making of joda is not profitable, the selling price being Rs. 2.8 against Rs. 3.2, the total cost incurred. But the making of chadar may be profitable, the total cost being Rs. 4.12 against Rs. 6, the selling price. The introduction of markin cloth, which is much less costly, has brought ruin on such petty industries. People no longer care to invest capital on the making of endi cloths, which cost more.

Low class Muhammadans and poor Rajbansis, especially the widows, still engage in the making of endi cloths on a small scale for their private use. The chadars made in Rangpur are of very coarse kind and look of earth colour; they are not liked by the genteel classes, and consequently the business is dying a natural death. It is said that endi cloths are not held as sacred cloths both by the Hindus and Muhammadans, and this is probably one of the causes that have diminished the use of endi cloths in this country. The Assam endi is liked by the people, as it is not so coarse as Rangpur endi and as it is looks better. No trade as reported before is carried on here.

**Jalpaiguri:** The following account of this industry has been compiled from the report furnished by Mr. H. J. S. Forrest, C.S., Deputy Commissioner of Jalpaiguri:—

"No silk industry is carried on in this district except the manufacture of endi cloth, and that, too, on a very small scale and by a certain section of the people. It is only some of the women of the Mechies and Garos inhabiting parts of the Duars that manufacture endi cloths from a coarse kind of silk obtained from endi worms reared by themselves at home. The manufacturing of endi cloth is not followed as an industry, nor are fabrics made to any extent for purposes of trade. The women manufacture a few pieces of this cloth in a year for their personal use.

The number of the women who manufacture the fabrics may be about 400. These people are the aborigines of the Duars, who hitherto followed a nomadic life, but are gradually settling down in places. Their industrial position is that of cultivators.

The following is a description as to how the worms are reared, silk extracted and of the process followed in the manufacture of endi cloths.

The endi worms are like ordinary silk-worms, and are called endi, because they are fed with endi (viz. castor) plant leaves. They would not eat mulberry or any other leaves.

When very small, they are kept in a quiet place inside a house, and are every day supplied with fresh leaves, the remains of the leaves given on the previous day being carefully removed. They attain full size in about a month or a little more and then form cocoons. These cocoons are boiled for an hour or so in water in which khar, viz., some vegetable ash, is mixed. They are then taken out and washed well in cold water. The silk is then spun from these cocoons by means of the instrument called takuri (Fig. 29, No. 1). The thread is transferred from takuri to the instrument called natai (Fig. 29, No. 2) and then taken out and made into small skeins. The skeins are besmeared with mar (which is the milky liquid substance obtained by boiling rice in water, washed in water and dried in the sun). The thread is then arranged on chorki (Fig. 29, No. 3). Split bamboo sticks are planted on the ground at equal distances, the entire length being the same as of the cloth to be woven. The two end sticks are flat, being about 8 inches broad; the middle ones are round—about 1 inch in diameter. The lengthwise thread of the cloth to be made is then drawn horizontally and consecutively round the entire line of the sticks and to the breadth of a little more than that of the cloth to be manufactured. This drawing of the thread is called tana, which means the lengthwise thread of the cloth and when fully laid looks like No. 4 of Fig. 29. The sticks with the tana thread on them are taken up and spread flat some height from the ground, supported by posts, to which the ends are tied. The tana thread is brushed by means of the instrument called tana (Fig. 29, No. 5), the tana which is a brush being at intervals dipped in mar. The tana thread is put through the rath (Fig. 29, No. 6) which is a kind of comb; each thread of the tana passing through each two teeth of the rath. The tana is secured at each end by a piece of wood by means of which it can be rolled up. This roller is called gonda (Fig. 29, No. 7). The rath is secured between two pieces of wood called sal (Fig. 29, No. 8).

The tana when so arranged is fitted up on the loom. Figure 30, represents a loom fitted up in plan, section and elevation.

The cross-thread is called poron. The poron thread is wound on pieces of small tubes, and one of these tubes at a time is placed into the instrument called nako (Fig. 29, No. 9) and the cloth is woven on the loom by passing and repassing the nako through the tana threads by means of both the hands. The weaver works the loom all the time with his feet while he drives the nako from right to left and left to right with his hands. The cloth when being woven is kept stretched to its proper breadth by means of a contrivance represented by diagram No. 10, Fig. 29.

The colours used are red, black and yellow, obtained from dyes prepared by the people themselves:

1. The red colour is prepared by dissolving raw saic in a liquid and obtained by boiling thantheling or metia in water.
2. Indigo plants, with leaves, are cut into pieces and put in water to which khus, salt extracted from the ash of plantain tree barks, is mixed and left to decoct for two days. This decoction gives a black colour.
3. Daru-haridra plants cut into pieces and nako fruit boiled together in water give a yellow colour.
Fig. 29.—Endi spinning appliances.

No. 1.—Takuri.

No. 2.—Natai.

No. 3.—Charki.

No. 4.—Warping of Endi thread.

No. 5.—Tasa or brush.

No. 6.—Rash or reed.

No. 7.—Gonda or beam.

No. 8.—Sal or reed protector.
No. 9.—Wooden shuttle (maku).

No. 10.—Bow for keeping web tight.

Fig. 30.—Endi weaving loom.
It has already been noted that the eri cloths are not manufactured for trade. They are prepared for the personal use of the families of the people themselves, though a few pieces can now and then be obtained from them by purchase.

Mymensingh.—The eri silk industry of Mymensingh is of still less importance, and the following short account of it has been furnished of it by Babu Ashutosh Dutt, Deputy Collector:—

"Strictly speaking, there is no silk industry in this district. Only within the jurisdiction of the police-stations of Dewanganj and Madarganj, in the Jamalpur subdivision, an industry in a coarse kind of cloth, locally known as endi, but which is far different in quality from the well-known endi of Assam, is carried on. These cloths are extensively used as wrappers by the lower class of people in that subdivision. They are used as warm clothing. When used singly, they are called tati, and when used in pairs they are known as muts. They are also used as waist-cloth by the women of the cultivating people. They sell ordinarily at Rs. 3-8 to Rs. 4 per piece when single, and at Rs. 7 or Rs. 8 when in pair.

These cloths are prepared from a kind of worm which are fed by leaves of endi or Bherandas (Ricinus Communis). These worms are reared in the house of Muhammadan cultivators by their women throughout the year. The mother worm is kept in a kind of straw, where it lays eggs. The worms, got from these eggs, are nursed for 10 days or so. They become gradually covered with a coating of oval shape, about 1½ inches long and about an inch in circumference. These egg-shaped coatings are then soaked in water for five or six days. These, when fully wet, become soft like a lump of clay. This lump is then twined round a bamboo piece called kuli. Threads are spun from this lump with a takua, a diagram of which is given in the margin. Threads are spun mostly by women. The head of the takua is like that of a hook: the hooked portion is thrust in the lump and then drawn: the thread comes out with it, and it is spun, and twined round the takua. A seer of this thread is sold for a rupee. These threads are sold to Rayhanus and Tantis who weave clothes popularly known as endi from this thread.

The number of women engaged in this industry in Dewanganj is about 1,000, and that in Madarganj is about half that number. They belong to low class Muhammadan families. They carry on the work of rearing the worms at home in the midst of their household duties. The threads, when ready, are sold by the male members of the family in the local markets. These cloth are sold at Char Pakardas and Golabari. About 300 men are engaged in weaving these cloths. They are men of no education, and weaving cloth is their profession. These cloths cannot be ordinarily had at bazar, but can be got prepared to order.

No silk industry is carried on in the Sedar, Tangail and Netrokona subdivisions."
MURSHIDABAD CHECKS AND STRIPED SILKS.

27. Plain Chárháná
28. Double-lined blue plain Chárháná
29. Double-lined red plain Chárháná
30. Double-lined twill Chárháná
40. Double-lined plain Chárháná
42. Single-line twill Chárháná
43. Twill Chárháná
44. Twill Chárháná
45. Twill Chárháná
MURSHIDABAD CHECK SILKS.

60. WHITE CHECK
61. WHITE CHECK
52. MIRJAPUR CHECK
46. TWILL CHARKHANA
49. TWILL CHARKHANA
47. TWILL CHARKHANA

MURSHIDABAD BANDANAS.

89. OHURI
70. BANDANNA OR BAHNU
71 a, b. Two styles of Murshidabad printed silk handkerchiefs.

Murshidabad Silk Namabali
SILK WEAVING IN BENGAL TECHNICAL SCHOOLS.

N.B.—Samples Nos. 84 to 89 are from cloths woven by the pupils of the Rampur Boalia Sericicultural School, and sample No. 83 is from a piece of Tussar woven by Southal children at the Pokharia Industrial School (Manbhum).
93. BALUCHAR BUTEDAR SARI (New Style)
BIG CHECKS MADE BY MRITUNJAY SARKAR OF MIRJAPUR
BALUCHAR ORNAMENTAL TABLE COVER WOVEN BY DUBRAJ
MURSHIDABAD SILK DYEING.
WOOLLEN FABRICS OF BENGAL.

I.—INTRODUCTORY REMARKS.

The woollen industry, like the cotton industry, is made mention of by many of the earliest classical writers of India. In the Institutes of Manu, wool is mentioned in connection with the sacrificial thread of the Vaisya. But centuries before this, wool was known to and used by Indians for both religious and domestic purposes. Weaving, spinning, and platting were known to the primitive Aryans, and furs, skins, and woollen fabrics were made into garments by them. From the Rig Veda, for instance, it will appear that a woollen strainer was used in the ceremony of preparing the soma juice. The following translation of two verses of a Vedic hymn, describing the process by which soma juice is prepared, is taken from Mr. R. C. Dutt's Ancient India to illustrate the use of wool in ancient religious rites:

"You (i.e., soma) mix with water with a pleasing sound; and the fingers stir you over a woollen strainer, and filter you. Your particles are thrown up then, and a sound arises from the woollen strainer."

"The woollen strainer is placed on a vessel, and the fingers repeatedly stir the soma, which sends out a sweet stream into the vessel."

2. From other passages also in the Rig Veda, it would appear that the manufacture of woollen fabrics formed a regular industry during the Vedic period, e.g., in passage X, 26, 6, the weaving and bleaching of sheep's wool is attributed to the god Pushan, who was the god of shepherds.

3. Proceeding to a later period of Indian history, the great Chinese traveller, Houen Tsang, in his remarks about the people of India, states that they wore garments (kambala, i.e., blankets) woven from the hair of animals. In the Puranic period also, Yajnavalkya speaks of woollen and cotton fabrics, of skilfully woven fabrics, and fabrics covered with wool, as also of silken stuffs and fabrics made of fibres” (II, 182, 183). The art of felting also appears to have been known and practised in ancient times.

II.—SHEEP.

(a) Breed.

4. Little is known of the different breeds of sheep in these Provinces. The district reports now received do not throw any light on the matter, but from what the writer has been able to gather from his own observations, it may be stated that the sheep of Bengal hardly differ in their form, size, coating, or height. They are, with the exception of the Patna
Woollen Fabrics of Bengal.

breed, a diminutive class of animals covered more with what may be called short coarse hair than wool. The Patna sheep, on the other hand, are larger and yield wool of a fair quality, but even their staple appears to be too coarse and short to be of much use in the manufacture of high-class goods. They measure on the average a little over 2 feet in height and about the same in length, while the sheep of Lower Bengal measure under 2 feet in height and about 2 feet in length.

5. The prevailing colours are brown and black. Different vernacular names are given to the animals in different parts of the country according to their colour and markings, e.g., in Bihar an all-black sheep is called chowsa; an all-tan-coloured sheep balla; a piebald sheep kabri; a sheep with a brown face and tan body is known as lati; one with a black face and tan body is known as bori, and so on.

(c) Number and outturn.

6. In a Province like Bengal, where statistics of live-stock are not available except for districts or parts of districts which have been cadastrally surveyed, it is not possible to make an estimate of the number of sheep or of the quantity and value of the wool obtained from them.

(c) Mode of rearing and tending.

7. Little or no care is taken of sheep in these Provinces. Owing to the contraction, or rather disappearance, of grazing grounds in the neighbourhood of villages—a result brought about by the gradual extension of cultivation, the Gareries (proprietors of sheep) generally send away their flocks for a short time for grazing far away from their own homes. As a rule, they take them to the nearest jungles, where they find grazing for about three months. In some cases, the sheep are taken away in October or November. They are brought back in January or February, and are then fed on the stubble left on the rabi field. During the rest of the year, they feed on the grass that may be available on waste lands in the vicinity of villages. In other cases, from December to June, the sheep are put to graze on fields where the crops have been already cut, chiefly on chur lands, and during the rains they eat wherever they can find food. Artificial food is rarely given, and no shepherd ever thinks of growing green fodder for his sheep. Gram is said to make the wool coarse, but it is not known how much truth there is in this statement. With such poor feeding, it is surprising to find sheep in these Provinces in the condition in which they are to be found. The owners have generally to pay for their grazing.
Woollen Fabrics of Bengal.

For a herd of 100 sheep or more, they generally pay Rs. 2 or Rs. 3 for the season to the person on whose lands the sheep are grazed. There is also a custom of giving one sheep from each herd as the fee for grazing, whether the herd be large or small. There are many raiyats, however, who are able to appreciate the manorial value of sheep-folding, and who would even give the shepherd a little fee to ensure their lands being grazed down periodically. When fodder becomes scarce in a dry season, the sheep die off in large numbers and entail very severe loss on the owners. As a rule, the members of the family tend the flock, but frequently, especially in the case of larger herds, shepherds are hired, getting as their wages their board and about 8 annas to 1 rupee per month.

8. As with feeding, so with breeding, no care at all is taken by the shepherd. The rams are never separated from the ewes, and no selection is made as regards the serving tup. No attempt is made to weed out deformed, barren and misshaped ewes, and lean and sickly rams. The good and bad animals are allowed to roam about together. Under such conditions, it cannot be wondered at, that the breed of Bengal sheep is, as a rule, most degenerate. It must, however, be remembered that the climate itself is unsuitable to sheep-breeding.

III. DISTRIBUTION OF THE WOOLLEN INDUSTRY.

(a) Numbers engaged in the woollen industry according to the Census of 1891.

9. The following table, extracted from the Census Report of 1891, will show the numbers engaged in the woollen industry in each district of these Provinces in 1891:

<table>
<thead>
<tr>
<th>DISTRICT</th>
<th>Carpet weavers and sellers</th>
<th>Shawl weavers and sellers</th>
<th>Blanket weavers and sellers</th>
<th>Woollen-cloth manufacturers and dealers</th>
<th>Woollen-yarn spinners and sellers</th>
<th>Fur dealers</th>
<th>Felt and paish workers and sellers</th>
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Woollen Fabrics of Bengal.

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<th>DISTRICT</th>
<th>Carpet weavers and sellers</th>
<th>Shawl weavers and sellers</th>
<th>Blanket weavers and sellers</th>
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<td></td>
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<tr>
<td>Total</td>
<td>371</td>
<td>864</td>
<td>35,660</td>
<td>8,423</td>
<td>93</td>
<td>81</td>
<td>40</td>
<td>44,932</td>
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</tbody>
</table>
Woollen Fabrics of Bengal.

10. It must be pointed out, that the numbers given above do not represent the actual workers only, but also all their dependants. The total number dependent on the woollen industry in these Provinces at the time of the last Census amounted to 24,158 males and 20,774 females, making a total of 44,932 souls altogether. On comparing these figures with the following figures, showing the numbers engaged in other industries, viz., 1,092,577 persons in the cotton industry, 462,483 persons in earthen pottery, 333,503 persons in carpentry, 322,708 persons in gold and silver work, 325,733 persons in iron works, 308,358 persons in cane, bamboo and matting work, and 345,766 persons in leather and hide work, it will be seen that the woollen industry occupies a very insignificant position as compared with the other industries of these Provinces, and falls very short of its languishing sister industry in cotton. The figures also show that in 1891, as now, the largest number were engaged in the manufacture of woollen blankets, the numbers engaged in other woollen manufactures being but nominal.

(b) Numbers engaged in the woollen industry as returned by District Officers.

11. Accurate information is not available regarding the number of persons engaged in the manufacture of woollen goods. Extracts from the reports of District Officers are, however, subjoined, which will give a general idea of the extent of the industry present:

12. "The manufacture of coarse blankets is carried on by a few low-class up-country people, called Ganderies or Bheruwallas."

13. "There are three families at Hushnabad in thana Suri, one family at Elambazar in thana Bolpur, and six persons within the jurisdiction of thana Maureswar,—in all about 15 persons who are engaged in this business. The women assist in preparing the twist."

14. "The industry in woollen fabrics is confined to about 60 families of the Bherial caste in Lokepur and to about 20 families of the same caste in Kendodee. These people were originally emigrants from the Gaya district, but they have now cut off all connection with their native district, and have made Bankura their permanent home. Each of these families has about 100 sheep."

15. "The Subdivisional Officers of Contai and Tamluk were asked to furnish necessary information as to whether any such industry was carried on in their jurisdictions, but in those subdivisions as well as in Ghatal, no form of the woollen industry exists. In the Sadar subdivision,
Woollen Fabrics of Bengal.

the woollen work is carried on only in Kharpael Bazar in the town station of Midnapore, and it is confined only to the manufacture of blankets by a limited number of people. Their number is estimated to be 80. They came from the North-Western Provinces, and have settled down in the town.

16. "From enquiries made it seems that the weaving of woolen materials plays a very small part among the local industries, there being only a few families who manufacture blankets at Krishnagar, Santipur, Kushtia, Moheshganj, Mateari, Bangaljee, and Hatra."

17. "The persons engaged in the industry number about 370. Of these, more than 300 reside in the Jangipur subdivision in the north of the district, and the trade centres round the town of that name."

18. "No woollen fabrics are manufactured in the Sadar, Narail, Magura, and Bongong subdivisions of this district. The woollen industry in subdivision Jhenida is located at Purahate Bazar on the Kumar river, 10 miles north-west of Jhenida, and is in the hands of a few families of the Ahiri Gowala caste, who came originally from Arrah and have been settled here for the last 40 years or thereabouts."

19. "There are only 34 houses of Gareries, and they reside close to the district courts. Of these 34 houses, containing a population of about 62 souls, only 9 devote their entire time to the manufacture of blankets. Twenty-seven others manufacture blankets in their spare moments, as they are mostly employed as chaparas, punkha-pullers, etc. The rest are infirm old people, or are children."

20. "The number of Gareries in the district is by no means large. They are scattered all over the district. There is no woollen industry carried on in Dinapore. The manufacture of kalins and asnis is carried on a small scale in the town of Patna."

21. "The manufacture of country blankets is carried on in all parts of the district, and the manufacture of kalins or galichas is practically confined to the villages of Obra and Koraipur and the town of Daudnagar in the Aurangabad subdivision."

22. "There are only 14 or 15 houses of blanket-weavers in Shahabad."

23. "The Gareries who weave blankets are a comparatively small class, amounting to about 600 persons, scattered throughout the district."
Woollen Fabrics of Bengal.

24. "The number of blanket-weavers, as ascertained at the census of 1891, was 559. About 306 families now do the work of weaving blankets, and the number of persons who are actually engaged in the trade is males 603, females 397—total 1,000. It should be remembered that as the trade is not a profitable one, the persons in a family of weavers, who are strong and fit for hard labour, do not weave but cultivate the soil or earn their livelihood by other manual labour. The weavers also are not engaged in the trade throughout the year."

25. "The total number of blanket workers may be approximately taken as 2,000. Muzaffarpur thana and Paru thana supply half this number."

26. "The number of Gareries engaged in the woollen industry, as given in the census of 1891, are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Male.</th>
<th>Female.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darbhanga</td>
<td>866</td>
<td>740</td>
</tr>
<tr>
<td>Bahera</td>
<td>965</td>
<td>1,007</td>
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<tr>
<td>Roserha</td>
<td>606</td>
<td>452</td>
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<tr>
<td>Madhubani</td>
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<td>...</td>
</tr>
<tr>
<td>Beniputti</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Khajauli</td>
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<td>...</td>
</tr>
<tr>
<td>Phulpars</td>
<td>...</td>
<td>...</td>
</tr>
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<td>Samastipur</td>
<td>731</td>
<td>1,037</td>
</tr>
<tr>
<td>Warisnagar</td>
<td>1,221</td>
<td>1,348</td>
</tr>
<tr>
<td>Dalsingserai</td>
<td>493</td>
<td>558</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,877</td>
</tr>
<tr>
<td>Female.</td>
<td>5,142</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>10,019</td>
</tr>
</tbody>
</table>

The population of the district for 1891 was 2,801,955. Hence the Gareries form 375 of the total population. It would appear, however, from recent enquiries that there are about 353 Gareries in the Madhubani subdivision also."

27. "With regard to the numbers employed in the industry in the Sadar subdivision, about 30 men find a livelihood thereby; in the Jamui subdivision the work is carried on by about 30 families in three or four villages; in the Beguserai subdivision by about 65 men in 11 villages. Of these villages, Bagdohb, Laldearah, and Sonuma alone absorb 50 men, who are distributed among 18 houses."
Woollen Fabrics of Bengal.

28. "The number of Gareries, i.e., shepherds, who both provide and spin the wool, is not given in the census of 1891 for the district of Bhagalpur, as apparently they do not constitute 1 per cent. of the district population. There are then less than 200 Gareries in the district of Bhagalpur. The reports, I have received, would confirm this view. The numbers are given approximately as follows:—

<table>
<thead>
<tr>
<th>Place</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sadar</td>
<td>136</td>
</tr>
<tr>
<td>Supaul</td>
<td>218</td>
</tr>
<tr>
<td>Madhipura</td>
<td>55</td>
</tr>
<tr>
<td>Banka</td>
<td>Nil</td>
</tr>
</tbody>
</table>

giving a total of about 400 for the whole district. This number would, however, seem to include both the actual proprietors of the sheep and the shepherds proper, as well as the artisan class, who are employed in the process of manufacture. The locality most favoured by the Gareri caste is the north of the district in the Supaul subdivision. This is due to the fact that the sheep, if necessary, are imported from Nipal and Tirhut; and also, no doubt, to the superior advantages for grazing."

29. "The woollen industry is a very small one. There are professional blanket-weavers in the Katihar, Araria, Motihari, and Raniganj thanas. The best blankets are made at Katihar, where there are more weavers than in the other three thanas. The total number in Araria, Motihari, and Raniganj is only 35."

30. "The manufacture of woollen articles in this district is carried on to a very limited extent. In fact, there may be said to be no woollen manufacture proper. It is confined to one class only, called Gareries, who carry on their business in not more than a dozen villages in the whole district."

31. "The number of families that make a living by the industry is only 13, 10 of whom live in the town of Cuttack and 3 about 5 miles to the north of it."

32. "The manufacture of woollen fabrics is carried on on a very limited scale. There are only about 30 families of Ganderies in this district. They reside in villages Khergaon, Nura, Losingna, Giridih, Pachumba, Sina, Sendwari, and Hisatoo."

33. "The total number of Gareries in this district, including Palamau, is put down in the last census report at 5,597, of whom 2,649 are males and 2,948 females. Gareries are found all over the district, except in
Woollen Fabrics of Bengal.

thanasa Chainpur, Kochedega, Bissenpur, Toto, Sesai, Palkot, and Bano.”

34. “The Gareeries are mostly to be met in the jurisdiction of
   thanasa Daltonganj, Garhwa, Patton, and
   Chhatterpur. Their number is roughly
   estimated at 400 persons.”

35. “Chaibassa, the district head-quarters, is the only place
   where the manufacture of woollen fabrics
   is carried on. There are altogether only 10
   or 11 houses of Gareeries here.”

36. From the above, it will be seen that the industry
   though fairly distributed over these Provinces is generally
   unimportant. The number of families engaged in the industry is
   insignificant.

IV.—MANUFACTURERS OF WOOLLEN FABRICS: THEIR
SOCIAL AND PROFESSIONAL STATUS.

(a) General remarks.

37. The woollen industries of these Provinces are practically
   confined to the manufacture of coarse country blankets.
   Woollen materials are not utilized for any other kind of cloth-
   ing. In only a few districts in Bihar, the manufacture of carpets
   and rugs (styled locally kalins or galchas) is also carried on
   on a limited scale. The former industry is carried on by Hindus
   and the latter by Muhammadans. Asnis or small cushion seats
   are also made in some districts. Namdas or blankets of unspun
   wool are made in Arrah in the district of Shahabad.

(b) Manufacturers of blankets: their caste and social position.

38. The manufacturers of blankets are chiefly a class called
   generally Gareeries or Bhericallas (terms which simply signify
   that they are shepherds). They are also known in different parts of the
   country as Gandarias, Goderues, Ganderyas, Garyas, Bherias, Bherials,
   and Bhuniyas. They are a comparatively low Hindu caste of
   about the same rank in social life as the Aehirs or Goallas. It is
   said, that the higher castes in Bihar drink water touched by them,
   but not from their earthen pots. It would appear, however, that in
   other parts of these Provinces, the Brahmans and other high castes
   would consider water touched by them as polluted. That they stand
   low in social estimation may be gathered from an adage prevalent
   in Bihar to the effect that the “Gareeri, the Aahir and the Pasi are
   all slayers of truth.” The Gareeries to be found in Lower Bengal
   have chiefly emigrated from Bihar and the North-Western Pro-
   vinces; those in Bihar are generally children of the soil, but they
   are not indispensable members of the village community. In
Bengal, they occupy even a lower position in the social scale than in Bihar. In the report received from Shahabad, it is stated that “they are strangely bonded in caste, as they have recognized chiefs for different local centres whom they call Rauts, and apparently a hierarchy exists amongst these chiefs.” From some of the reports received, it would appear that besides the Gareris, the Tanties (weavers), the Jugies (weavers), and Goallas (cowherds) also manufacture blankets. Men of the Koeri caste also sell blankets. The Tanties and Jugies are Hindu weavers, who are also low in the social scale. The Ahirs occupy a position very similar to the Gareris, though they consider it a degradation to intermarry with them. The Koeris, who are generally cultivators, occupy a degraded place in Hindu society.

39. The following extract taken from the Hon’ble H. H. Risley’s report on the “Tribes and Castes of Bengal” will further illustrate the place occupied in society by the Gareris. “Gareri, Godariya, Bhunrihar, the shepherd, goatherd, and blanket-weaver caste of Bihar.—Gareris appear to have no traditions, and cannot give any account of their origin beyond the vague statement that they came ‘from the west.’ It is possible that they may be an offshoot from the Goallas, differentiated by keeping sheep and taking to the comparatively degraded occupation of weaving, but I can offer no evidence in support of this conjecture, except the rather remarkable fact that Gareris will take both boiled rice (kachi) and sweetmeats, etc. (pakki), from members of the Goalla caste.”

40. “The Gareris of Bihar are divided into four sub-castes—Dhengar, Farakhabadi, Gangajali, and Nikhar.”

41. “The practice of infant-marriage is firmly established among the Gareris. Tilak, consisting of a loin-cloth (dhoti), some chupatties and two or three rupees, is paid to the bridegroom on an auspicious day by the parents of the bride. The marriage ceremony is of the standard type. Polygamy is permitted to the extent that a man may marry a second wife if his first wife is barren. A widow may marry again by the sagai form. It is considered right for her to marry her late husband’s younger brother if there is one, but she is not positively obliged to do so. Some say that divorce is not recognised. If a woman has an intrigue with a man of another caste, she is excommunicated and turned adrift, but indiscretions within the brotherhood admit of being atoned for by various modes of penalty awarded by the headman (manjan) and panchayat, and chiefly by a feast to the members of the caste. Others hold that divorce may be had on the oath of the husband, and that a divorced woman may marry again by sagai.”

42. “In respect of religious and ceremonial observances, the Gareris generally conform to the usages of the Vaisnava sect, and
Woollen Fabrics of Bengal.

comparatively few Saivas are found among them. Many are followers of Darya Das, a Gareri, who founded a corrupt Vaisnava sect distinguished by abstinence from fish, flesh, and spirits. His disciples do not worship him as a deity, but simply regard him as their guru or spiritual guide. The Purohits of the caste are Kananjia, or sometimes Jyoshi Brahmins; while Bairagi or Dasnami ascetics serve them as gurus. Their household worship, in which priests take no part, is addressed to Bandi, Goraiya, Dharam Raj, Narsingh, the Panch Pir, and Kali, to whom the males of the family offer cakes, rice boiled in milk, sweetmeats, and plantains on the 30th Sravan. The offerings are eaten afterwards by the members of the family, and the deori relations who can claim to participate in domestic worship. When a flock of sheep is sold, the Gareri keeps back a ram; and having assembled his brethren, sacrifices it to Banjari, after which its flesh is eaten by those who follow the Saiva ritual.”

43. “The large majority of the caste find employment as shepherds, goatherds, or blanket-weavers, and comparatively few have taken to cultivation.”

44. “According to Dr. Wise, the Gareri is reckoned higher in rank than the Ahir, and equal to the Majroti and Krishnaut Goallas, with whom, as has been mentioned above, Gareries will eat both kachi and pakkı food, and will smoke in the same hookah. It is not clear, however, that this intercourse is reciprocal, and that the Goallas will accept food on the same terms from a Gareri, while the fact that Gareries make wethers themselves must necessarily involve some measure of social degradation. In Bihar and Bengal, this caste is generally reckoned a clean one, from whose members a Brahman can take water; but in Purniya, says Buchanan, it is impure. The Gareri is often found working as a domestic servant, refusing, however, to carry bathing water for his master or to rinse his body clothes after bathing. He cannot, without incurring expulsion, serve as a shepherd with any but Gareri masters. He may, however, take household service with any class, even with Christians.”

(c) Manufacturers of blankets: their industrial position.

45. The blanket-weaving industry like the cotton-weaving industry is not a profitable one; and although there are some Gareries who depend absolutely on the profits obtained from the rearing of sheep and the manufacture of blankets, the greater number have recourse to supplementary callings. They own and cultivate land, and at the same time keep up their peculiar occupation as a hereditary tradition. Some take up menial service, and in their spare moments follow their class occupation. The
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women and children often do the greater part of the manufacturing work, while the men attend to other duties to supplement the small profits obtained from the woollen industry. There are some families who rear and tend their own flocks, cut and comb the wool themselves, weave it into blankets, and then dispose of the product in the local markets. These men are better off than those who have not sufficient capital to keep their own sheep, as the whole price of the cloth made by them is practically clear profit, the weaving instruments costing little or nothing. The weavers who buy the wool brought by dealers have to rest content with a smaller margin of profit. Rearer of sheep and weavers of blankets often supplement what they get by the manufacture of their cloth by selling their sheep. In this case, blanket-weaving really becomes merely a by-industry of the Gareries, whose chief means of livelihood is the breeding and sale of sheep. Such men are much more prosperous than those who confine themselves to the manufacture of cloth. It does not become necessary to betake themselves to other means of livelihood. As a rule, however, the Gareries as a class occupy but a low industrial position. There are some, as stated above, who are prosperous, and are even wealthy, owning large flocks of sheep. There is one Bherihar in Muzaffarpur who is reported to be worth Rs. 10,000, and there may be a few others as wealthy in Patna and Gaya and in some other Bihar districts. The generality, however, are poor. From many enquiries made personally and from the reports received, it does not appear that the ordinary profits of a Gareri much exceeds Rs. 5 per month. The low profits obtained from the indigenous industry are due no doubt to the small demand for the indigenous product. Woollen materials, as a rule, are not used for clothing by the great mass of the people, and those that can afford to don such materials prefer the cloth which is manufactured in Europe. Even with regard to blankets, the better classes much prefer the superior-made European article to the coarse home product, the sale of which is thus limited to poor villagers, who can ill afford to pay prices which will give a substantial margin of profit to the manufacturers.
Woollen Fabrics of Bengal.

(d) Distribution of the Gareries, the chief caste engaged in the manufacture of blankets.

46. The following statement shows the number and distribution of the Gareries in 1872, 1881, and 1891:

<table>
<thead>
<tr>
<th>District</th>
<th>1872</th>
<th>1881</th>
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<td>Bhagalpur</td>
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Woollen Fabrics of Bengal.

<table>
<thead>
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<th>District</th>
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<th>1891</th>
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<td>Singhbhum</td>
<td>...</td>
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</tr>
<tr>
<td>Manbhum</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

(e) Manufacturers of kalins, asnis and namdahs: their social and industrial position.

47. Muhammadans carry on the manufacture of kalins or galichas and asnis. They are often known as kalinbafs. They are of the Sunni class, and occupy a fairly good social position. They do not rear their own sheep, but generally buy the wool. Their industrial position is also very fair, as the goods turned out by them find a good sale in local fairs and markets, and are also often exported. Their profits are much more than those of the Gargories, and they are therefore not obliged to seek other occupations for their livelihood. The manufacture of namdahs is confined to a few Muhammadan butoher families in Arrah in the district of Shahabad, who are in fairly good circumstances.

V. CHIEF CENTRES OF THE INDUSTRY.

48. The higher form of the woollen industry, viz., the manufacture of carpets (i.e., kalins or galichas and asnis), is confined only to a few districts of Bihar, notably Gaya and Patna. In Gaya, the places specially noted for kalins or galichas are the villages of Obra and Koraipur and the town of Daudnagar in the Aurungabad subdivision. It is reported, that the industry used to be carried on in former years in many more villages in the same neighbourhood, but it is now practically confined to these three places. The best carpets are said to be made at Obra. These find their way to Calcutta, and are to be seen ordinarily in many of the local fairs at Bihar. In Patna, the manufacture is chiefly confined to the city itself. A large number of carpet shops may be seen in the Sultanganj mahalla of the city.

49. With regard to the manufacture of blankets, which forms the main woollen industry of these Provinces, it may be said, that the
industry is not centralized at all. In some district reports, names have been given of the villages and thanas in which blankets and other woollen goods are manufactured, and these will be found compiled in a statement appended to this report; but it is not correct to say that there are any places of manufacture which can be called special centres of the industry. Blankets are made in all parts of a district, i.e., wherever there are villages of shepherds. It may be noted in passing that in Bengal Proper, the industry does not appear to be indigenous either at present or in the near past. The woollen manufacturers of Bengal are entirely immigrants from Bihar and the North-Western Provinces, chiefly from Gaya and Patna, who seem to have settled down in different parts of Bengal about half a century ago. In Bihar itself, the industry would appear to extend over the Patna and Bhagalpur Divisions as far east as Purnea.

VI.—WOOLLEN FABRICS: THEIR PRICES.

50. The woollen goods manufactured in these Provinces may be considered under the following heads—

(a) Carpets, and
(b) Blankets.

51. Carpets are known in the vernacular as galichas or kalins. They are generally piled. Small carpets, not piled, are known as asmis or ashnas.

(a) Carpets.

52. Galichas or kalins.—Piled carpets are made in Bihar by a special sect of Muhammadans, known as Kalinbasis, who belong to the Sunni class. They are used exclusively by the well-to-do Hindus and Muhammadans, and the trade in the article is therefore comparatively small. The quality of the kalins of Bihar is pretty fair, but it is not equal to that of similar manufactures of Mirzapur and other places in the North-Western Provinces, where the carpets turned out are far superior. These carpets are often made of pure cotton, but frequently wool is mixed with cotton or else wool alone is used. They vary a great deal in their size, colour, texture and design. The prices also vary a great deal, ranging according to size, and quality from Rs. 2-8 to Rs. 500 or Rs. 600, and even more.

The usual size of a carpet used as a covering for beds is 7' x 4'. The price of such a carpet ranges from Rs. 6 to Rs. 30 according to texture.
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The designs ordinarily met with are:—

(a) Bird’s eye pattern (Juldor).
(b) Damask pattern (Phuldor).
(c) Persian carpet pattern (Irani).
(d) Mat pattern (Hauz Hassia).
(e) Shawl pattern (Kashmiri).
(f) Akbar Shahi.
(g) Ali Masjid.

All kinds of colours are used for these carpets.

53. Asnis or ashnas.—These are small carpets made generally in square pieces to serve as seats or cushions. Their prices vary from 8 annas upwards, and the patterns vary according to taste. Asni is the name given to the article in Bihar, and ashna in Bengal. These seats are generally used during meals and at the time of prayer. They are made of pure wool, or a mixture of wool and cotton, and often of cotton alone. One man working the whole day is able to finish one asni, costing about 8 annas, in one day. Such an asni would measure about two feet square.

(b) Blankets.

54. Blankets are known in the vernacular as kamals or kambals. They are made of all wool, and are always of a very coarse and rough texture, but they are well suited to the wants of the poorer classes, as they are warm and cheap and fairly durable also. The better-made ones are used by the middle classes. Blankets are also manufactured as coverings for horses and as warm body-cloths for bullocks. Blankets when made of unspun wool, are called namdas. Narrow strips of blankets are also made for the neck and used as mufflers. The latter manufactures are chiefly to be found in Bihar.

55. The wool is either purchased or obtained from the Gareri’s own flock. The wool of both rams and ewes is used, that of young sheep being considered the best. A female with young is said to give very coarse wool and almost unfit even for weaving blankets. It is stated by many Gareris that gram-feeding makes the wool of sheep very coarse.

56. As a rule, patterns are not attempted in making blankets; long strips are woven on the loom and then sewn together to form a complete blanket, which may be white, black or grey. There is no attempt made even at ornamentation, and the colour generally depends upon the colour of the wool, though the yarn is sometimes dyed. Occasionally black and white stripes and checks may be seen, which are produced from the natural black and white wool.
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57. The size of blankets varies. The following measurements have been given from different districts:—6' × 4', 6' × 4 1/4', 6 1/2' × 4', 6 1/4' × 4 1/2', 7' × 4', 7 1/2' × 6', 9' × 7 1/2':—From notes taken personally, it may be stated here that the usual size of a finished blanket is 6' × 4 1/2'.

58. The prices vary according to the size and quality of the blankets. Quotations have been received of figures ranging from 8 annas to Rs. 4. Ordinary blankets measuring 6' × 4 1/2' sell for Re. 1 to Re. 1-4. Such low prices leave little or no margin of profit to the manufacturer. An ordinary blanket of the kind mentioned above would take about 2 to 2 1/2 seers of wool, which, valued at 5 annas a seer, would cost about 12 annas. The average price of such a blanket being Re. 1-2, the profit to the manufacturer per blanket would amount to 6 annas. From local enquiries made by the writer, it would appear that 12 blankets may be correctly estimated as the usual outturn per month. Two men being employed on the work, the wages per man amounts to Rs. 2-4. It is therefore not surprising to find that the Garo people have to look to other means of support. Those that do not have to purchase wool, but use the produce of the sheep they rear themselves, get practically the whole price of the cloth manufactured by them as clear gain, as the cost of maintenance of the flock is generally covered by the sale of sheep, and the weaving appliances cost next to nothing. Such men, as has been stated in a preceding paragraph, earn ordinarily from Rs. 5 to Rs. 6 per mensem. Of course many with a large business earn much more, but these are exceptions.

VII.—PROCESSES FOLLOWED IN THE MANUFACTURE OF WOOLLEN GOODS: APPLIANCES USED AND THEIR COST.

(a) General Remarks.

59. The processes of manufacture of woollen fabrics are very simple. Even in the manufacture of the higher class kalins or galichas very primitive instruments are used, and no attempt is made at improvement of design or patterns of any kind. Consequently these carpets of Bihar are much inferior to those made by the weavers of the North-Western Provinces, and cannot compare with the ordinary jail-made manufactures of Bengal. In the matter of blankets, the processes are still more primitive. Ornamentation is seldom resorted to. Sometimes black and white wool may be found mixed together, several lengths of black thread being placed in the warp at regular intervals. A red dye is occasionally used, the woollen thread being dyed before use, and stripes or patterns of red are then inserted in the weaving; but the weavers as a class are altogether unacquainted with the higher forms of weaving.
Woollen Fabrics of Bengal.

(5) Mode of Manufacture.

(1) Blankets.

60. The different stages in the manufacture of blankets are so fully described in the report received from Gaya, that the writer cannot do better than reproduce that description in its entirety, supplementing it with information obtained personally and from reports received from other districts.

61. The whole process may be conveniently divided into the following stages, viz.—

First.—The shearing of the sheep;
Second.—The scutching of the wool;
Third.—The rolling of the wool;
Fourth.—The spinning of the woollen thread;
Fifth.—The weaving of the cloth; and
Sixth.—The manufacture of the blanket, &c., by sewing the pieces (patta or patti) of cloth together.

Shearing.

62. As a preliminary measure, the sheep are washed. No soap or soda, or chemicals of any other kind are used, and the washing is generally done in a very superficial way. The sheep are then exposed to the sun for about 4 or 5 hours and then sheared. Both the washing and shearing are done by the men. If the day be windy, the sheep are taken inside the house, but otherwise they are clipped in the open field. It takes only a single man to shear the sheep, and one man can shear 8, 10, or even 15 in a day. If the sheep are small sized, 20 may be sheared in a day. The animal is held between the shearer’s legs, and the wool cut by a hansul or hansuli, a small instrument like a sickle, which consists of a highly curved iron blade with a wooden handle. Shearing is also done with a pair of scissors, known in the vernacular as kanchi, which is about 8 to 10 inches in length. The latter is a very tedious process, as the wool can only be taken off in small pieces at a time.

63. Sheep in Gaya are sheared in three months of the year, viz., Chait, Sravan, and Kartik. In this district, Chait is said to be the best month for shearing and Sravan the next best. The produce of Chait is sold at 3½ to 3¾ seers per rupee; that of Sravan or Kartik at 4 seers (kuchi). These prices are those that prevail during the season. The price of Kartik wool at the time of enquiry (the middle of Phalgun) was 3½ seers to the rupee.

64. In other districts, the favourable months would appear to be Ashar, Kartik and Phalgun, i.e., really at the beginning of the rains, at the beginning of the cold weather, and at the beginning of the hot weather; and it is stated that in this case the heaviest
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fleeces are obtained in Ashar, though they are then the coarsest. The Phalgun shearing is said to give the softest quality, but the smallest quantity of wool. Shearing is reported to be done also in March, July and November, and in March, October and December.

65. An auspicious day is very often selected by the village pandit for the shearing. The flocks are then led out to the village common, when the whitest ewe is chosen for the first operation of the shearer. A portion of this wool is then set apart and dedicated to the god of shepherds, so that good luck may attend the shearing. The shearers are then fed at the expense of the owners of the flocks, the pandit coming in also for a large share of their liberality.

66. The wool thus shorn is generally very coarse and of a short staple, varying from 1 to about 3 inches in length. The weight of a fleece varies from 4 chitaks to 12 chitaks, but taking the average, the annual yield cannot be said to be much more than about 12 to 16 chitaks; the highest yield might run up to 2 seers; but this is very rare. The yield thus compares very unfavourably with the yield of an English or Australian sheep which ordinarily amounts to about 3 seers. It is said that the males yield more wool than the females. The average selling price of wool may, from the various prices quoted, be put down at 3 seers per rupee.

67. In shearing, some cut out different colours separately, but the usual process is to cut off the wool all mixed together, and then the sorting into different colours is done by the women afterwards, generally into the prevailing colours—white and black or brown. In some places, no sorting of colours is done at all. No attempt is made at sorting into different qualities according to length and texture. The coarse and soft wool, the short and long wool, are all mixed together. It is reported that in the case of sheep that are dead, the wool is plucked off instead of being cut. This wool is generally kept separate from that taken from live sheep.

68. Between shearing and scutching some other processes are followed in many places. Where the sheep have not been washed before shearing, washing and drying become necessary after shearing. Foreign bodies such as thorns, burrs, seeds, &c., are removed before scutching. This makes the subsequent process a much easier one. The hand-picking is generally done by women.

Scutching.

69. After the shearing of the sheep, the wool is collected together and taken to the house, where it is scutched, or bowed generally by the women or children. If, however, large quantities of wool have to be dealt with, the scutching is done by professional Dhuniyas (carders).
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70. As a rule, three-eighths or half a seer of wool is scutched at one time. A woman can do only 1 seer or 1½ seer in the day, as the work is tedious.

71. The scutching is done by means of a bow similar to that used by cotton-workers (Dhuniyas), but called by a different name, viz., piján.† It may be noted here that in nearly all cases where a similar instrument is used in the cotton and woollen industries, the name applied to it by the Gareries is peculiar to themselves, and the use of any other name is incorrect as applied to the woollen industry.

72. The piján consists of a thin bamboo rod, called simply bāns, rather over 4 feet long, and the string (tānt), which is made by Chamārs of gut, and costs two pice. The gut is doubled and then strung on the bow. The string is sometimes made of some other strong fibre such as sunn hemp.

73. The process of scutching is performed as follows:—

A mass of wool is placed upon the ground, and the operator (usually a woman) squats down by the heap, holding the bow in her left hand, and pulling the string into the mass of wool with her right, then lets it go. The string, when released, tears away with it part of the wool from the mass, and separates the fibres. As this process is continued, the heap of wool gets smaller and smaller, and the heap of fluff grows proportionately larger, till the scutching is complete. This fluff is now called pōnā. To separate the fibres thoroughly, the wool has again to be struck several times with the bow-string, and it is interesting to watch how cleverly the operator manipulates the bow, so as to throw this portion backwards and forwards from one heap to the other till its condition appears satisfactory. The portion thus finished is left, and the operator reverts to the main heap, till the whole is thoroughly separated.

74. In some districts, the scutch used for carding the wool is the same as the ordinary dhunait used for carding cotton. It is a wooden instrument about a yard in length, consisting of a bow of hard wood, to one end of which is attached a broad wooden board of the shape of a quadrant also made of wood. A bow-string passes over a bridge of wood attached to the other end of the bow, and is tied to the end of the board. A loop of string under which the left hand is passed to hold the instrument steady and a wooden mallet of the shape of a dumb-bell completes the apparatus. Holding the bow with the left hand under the loop, so that the string may just touch the wool, the scatcher with his mallet twangs the string, so that it vibrates and strikes the cotton at each twang. The fibre is thus separated, and its texture being loosened, it flies off in a soft fluffy condition, while at the same
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time a good deal of the dirt and dust fall out. The twanging is repeated and continued till the whole of the wool is reduced to a satisfactory fluffy condition. A diagram of the dhumälis has been already given by the writer in his "Monograph on Cotton Fabrics."

**Rolling or forming gorhis.**

75. The fluff (pond) is then rolled by the hand into little rolls. Generally both hands are used, and as much as they will conveniently cover deftly rolled lightly up, and the roll so formed pulled in two to make it of the proper size. These small rolls are called gorhis. They are very light in weight.

**Spinning.**

76. Then comes the spinning of the woollen thread. This operation is performed by a wheel like that used for spinning cotton known in the vernacular as the charkha.

77. From Gaya, it is reported that the spinning wheel is made by carpenters (barhais), and is sold by them for 2½ or 3 annas. It consists of two flat boards connected by a narrow plank, which form the stand. One board (the larger) holds the wheel itself, the other holds the spindle. The larger board is about 22 inches by 4½ inches, and the smaller 12½ inches by 3½ inches. The distance between the two is about 6 inches. In the larger board are fixed two vertical posts about 16 inches long and one foot apart. These support between them the axle of the wheel at a distance of 10 inches from the ground. On this axle is a block of wood shaped very much like a pineapple known as the muri or belna. It is about 15½ inches in circumference at the centre, and 10½ inches at the ends: it is symmetrical in shape. The wheel is formed by four pieces of wood threaded through the centre on the axle (and so forming 8 spokes) on each side of the centre piece. The ends of these spokes are connected by string, which passes from one spoke on the one side to one on the other round it and back to the next on the first side, then across again, and so on till the whole of the spokes on each side have been connected; it is then fastened. This string forms the circumference or surface of the wheel. The other board of the stand holds two similar but smaller upright posts (9 or 10 inches high) which support the spindle.

78. The spindle is a rod of iron sharply pointed at one end (the end used for spinning), thick in the centre, and tapering down to a blunt point at the other end. It projects some distance at the sharp pointed end and rather less at the other. It is supported not directly on the upright posts, but on two wooden
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arms which are fixed horizontally in the posts on the far side from
the wheel, and are two inches wide and project 4 inches from the
posts.

79. The wheel and spindle are connected by a string which
passes round both, and is sufficiently tight to transmit the rotatory
motion of the one to the other. This string is made of cotton thread
steeped in oil and dhīna and then dried in the sun. This steeping
strengthens it and dyes it black. To keep it in place, two beads
are threaded on the spindle, and one fixed near the centre, and the
other close inside the post near the spindle point. These beads are
made of bone or wood, called chachi or guriā. To further help in
keeping the string in place, a thin post, 9 inches high, is planted
horizontally in the spindle-stand midway between the supporting
posts. In some spinning wheels, there are two such extra posts.
The string lies between them (or it) and the supporting post
nearest the point.

80. To turn the wheel, a handle is affixed to the axle of the
wheel on that side of the instrument on which the spindle point is
found. This handle consists of a flat piece of wood or bamboo,
7 inches long, and is shaped thus:

![Diagram of a spinning wheel handle]

with a hole at each end. By one hole, this handle is fastened on
to the axle, and in the other is fitted a small wooden stick, by
which, the wheel is turned. This piece of stick is often dispensed
with, and the finger inserted in the hole instead.

81. The spinning wheel is worked by turning the handle
with the right hand, while with the left, one gorhi of fluff is
held loosely against the spindle point. The spindle catches a fibre
of the fluff, and twists it up. The arm of the spinner being
extended to its natural length, a twist is given and the arm is
again gradually lowered close to the spindle point. By this action,
a thread is twisted, drawn out, and then wound on the spindle.
A repetition of the motion spins fresh thread, till the gorhi
is finished. Then another gorhi is taken, and treated in the same
way, and another, till the spindle end is full. The ball of thread
so formed is rather less than a handful. It is slipped off the
spindle, and on to a thin slip of bamboo which is inserted in the
hole. The ball thus threaded on its stick is called the phirki.
The term phirki is also applied to the ball without the stick.
Usually ten or fifteen gorhis are used to make one ball of thread,
but the number varies considerably. The weight of the ball also
varies. An illustration of the charkha will be found in the
writer's "Monograph on Cotton Fabrics."
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Weaving.

82. (a) Warping (first stage).—The next stage is the warping, which is done as follows:

Seven small posts, about 6 inches long, are driven up right in the ground in the following positions:

\[ \text{A} \quad \text{B} \quad \text{C} \]
\[ \text{D} \quad \text{E} \quad \text{F} \quad \text{G} \]

The four posts A, C, E, G are posted so as to form a rectangle about two cubits long, and one span wide—two more are posted rather more than a span apart and in an intermediate position—the distance between A and B being the same as that between F and G, while the positions of F and G are symmetrical. These six points form on paper the outline of a coffin. The seventh peg (D) is situated on a straight line, intersecting the straight lines AG and CE at right angles, and its position depends on the length required for the warp. For a warp of eight cubits (the maximum length) it is posted almost midway between A and G, but slightly on one side—that on which the other posts lie. For a warp 7 cubits long, it is moved a span or so further away from the end posts A and G, and so falls on the other side of B and F, and so on. For a warp of 5 cubits the position of this peg is about a span from the line CE. The shortest warp woven is 3 cubits—the warp for making an ámsi. This eventually shrinks to two cubits or so in the process applied to the woven strips before they are sown together. For so small a warp, the end pegs must be closer together. To lay the warp, a phirki is taken, and the end of the thread tied into a loop which is slipped over post A; but before this is done, a small hollow bamboo tube is slipped on the thread. This tube is about 2 inches long and \(\frac{3}{4}\) inch in diameter. By means of it, the weaver draws the thread off the phirki with greater ease and rapidity. Holding the phirki in his left hand by one end of the stick which passes through it, and the tube in the other, he unwinds the thread, and passes it from A outside B and C, round C, up to D and round it back to E, and round it from inside to outside, outside F and inside G, round G and back outside F, round E from outside to inside, thence to D and round it, back to C and round it from inside to outside, then inside B and outside A, round A and back outside B, and on as before as shown in the following diagram:
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Diagram showing the course of the threads in warping.

Thick line = First half of cycle forward.
Thin line = Second half backward.

This process is repeated till sufficient thread has been wound round the posts to form the warp. The width of one strip of cloth varies from 14 to 16 fingers (say, 9 to 11 inches). The former requires 56 and the latter 60 complete cycles of thread, a cycle being the whole amount laid round the posts from A to G and back again to A.

By the process described above, an intersection of the thread is formed between the posts A and B, and another between the
posts F and G. The former is the main intersection required for weaving.

83. (b) Warping (second stage).—When 56 or 60 cycles have been laid, the thread is broken off, and the loose end passed once round post A in the usual way and left unfastened. The operator then carefully runs his hand down post A, so as to insert it in the loop, lifts the thread off the post, and presses back the intersection to a convenient distance, i.e., enlarges the loop. He then twists the threads forming this loop round each other, so that the loop may be preserved. He next takes hold of the threads at the other end, viz., at post G, and treats them in exactly the same way. Holding one end in each hand, he lifts the thread off posts E and F and straightens it out till the warp is simply doubled round post D. He then puts the two ends in one hand and picks up the warp at post D with the other, and lifts this double skein off that peg, and doubles it over again. He then takes this skein and treats it as a scullery maid treats her scouring cloth when she wants to wring the water out, i.e., he twists it round and round till it is shaped like a rope, and then he ties it in a loose knot, when it is ready to be sized.

Owing to the nearness of the posts to each other, it requires only one person to lay the warp, and this is done by squatting down near post A. To lay the threads for the warp of a cloth 3 yards by 9 inches takes about a quarter of an hour.

84. The sizing is done by immersing the knotted skein of thread in a caldron of water, oilseed cake and rice. When the skein has become thoroughly saturated with the size, it is taken out and squeezed to free it from excess of moisture.

85. (c) Warping (third stage).—When the sizing is finished, the thread is dried and then opened out and stretched on the sticks to form the loom. First, a round wooden rod is carefully inserted in the loop, which was originally at post G and then a thin iron rod is inserted in the other end, but in such a way that the intersection at that end is lost.

The iron rod is attached to a wooden bar like the leg of a four-poster bed, with one end thick and pierced by two poles which pass entirely through it at right angles to one another. By one of these holes the beam is fitted on to a small upright peg driven upright in the ground. The other end is fixed in position by two similar pegs, which do not, however, pass through the beam, but lie one in front and one behind it. A brick or some such thing is often put under the post at this end to keep it off the ground. The iron rod is fastened to this beam by two strings one at each end, to receive which, the beam has two holes bored in it at a distance equal to the length of this rod, which corresponds to the width of the cloth.
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The wooden bar (okhar) corresponds to the cloth beam in many respects.

The wooden rod at the other end is similarly fastened to another bar, which is also of wood but smaller and usually shaped as follows:

\[\text{Diagram}\]

Other shapes are also to be met with.

To this bar is fastened a stout piece of rope which passes round a peg (driven in the ground about nine cubits from the okhar), and thence passes back along the ground to the cloth beam and where the weaver pulls it tight and holds it with his toe as he squats to weave.

The thread is then opened out along the rods at either end till it is of the required width. A hollow bamboo tube is then carefully inserted between the upper and lower threads next the wooden rod, so that the intersection remains between it and the iron rod. A flat bamboo stick, called chapni, is then inserted in a similar way, but on the opposite side of the intersection. This is made of split bamboo.

86. (d) Formation of the healds or heddles.—The weaver now sits on the ground near the cloth beam facing the warp. To make the healds, he pulls the flat stick towards him and turns it on edge, so making a gap between the upper and lower threads. Through this gap, he passes a thin bamboo rod from right to left, across the warp. To the end of this stick is tied a piece of string, which passes with the rod through the warp, the loose end remaining on the ground, to the right of the warp. When the stick has passed through, the weaver places it above the warp, at right angles to the thread. Then, dipping his finger in between the first and second upper threads (starting from the left), he pulls up a loop of the string and passes it on the rod. He next dips his finger in between the second and third threads and picks up a loop, and so on across the warp, till he reaches the right hand edge, when he loosely fastens the string to the rod. This string, therefore, now consists of a series of loops, each of which encloses one of the upper warp threads. By raising this rod, all these upper threads are pulled up, and thus the function of the healds is performed.

The chapni is now removed and placed above and across the warp, beyond the healds between them and the tube.

87. (e) Weaving proper, (first stage).—The weaving is now commenced. The shuttle variously known as the serenga, kaparbuni, serangi, serang consists of a short slip of bamboo (about one foot long) round which the thread for the weft has been wound. The loose
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end of this thread being held on one side, the healds are raised and the shuttle thrown through the gap across the warp. The healds are then let go, and a flat stick, called bead or beon and shaped like a knife blade, is inserted carefully between the upper and lower threads and passed through the warp. This, the weaver pulls towards him, and so shoots home the intersection. The blade is then turned on edge, and another gap is so formed; but, in this case, the threads which were formerly underneath are now above, as the intersection lies between the blade and the first shot of the weft. A second weft is now shot in the opposite direction, and the healds raised, and so the bottom threads pulled up and two intersections formed. The blade which has meanwhile been removed is inserted beyond the first intersection and the second shot of the weft with this intersection driven home. The process is repeated for the weaving of the cloth. The tube and the stick above the warp have to be manipulated to help the forming of the gaps and the moving of the intersections towards the weaver as required.

88. When a short length of cloth has been woven, a thin flat bamboo stick with a projecting (bamboo) point at each end is fastened beneath the cloth by one point being stuck into each edge. This stick, called the ternd, is of the same width as the cloth, and so serves to keep the breadth of the warp uniform throughout. As the weaving proceeds, the cloth is rolled round the okhar or wooden bar.

89. (f) Weaving proper (second stage).—The weaving is continued in this way till about a span of warp is left unwoven. The hollow tube is then removed, and a flat stick like the chapni, but larger, is used in place of it, as it requires less space. This stick is called patutarni, the chapni being called baichapni, when it is necessary to discriminate between the two.

90. (g) Weaving proper (third stage).—When about half the remainder is woven, the baichapni is substituted for the patutarni, and by means of this, the weaving can go on till only a few inches (the width of 3 fingers) of warp are left. This is wasted as no more weaving can be done. The waste portion is twisted into knots as soon as the wooden rod is removed. The healds, the sticks and the rod at the other end are then removed, and the weaving is complete.

91. (h) Felting or shrinking.—The cloth so made is steeped in chalk and water and pressed by being trodden under foot. This process, which is called malna, makes the weaving more compact. In this process, the loops left by the iron rod at the cloth-beam end of the weft are lost, and the whole fabric shrinks considerably—a cloth eight cubits long is said to be reduced to six cubits. The width is similarly affected.
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92. In one day, the weaver can make three or four of these strips of cloth (or *pattis*, as they are called) of the best quality, the length of each being six cubits.

93. The above processes of scutching, spinning, preparing the warp, setting it in the loom and weaving are also thus described in the report received from Shahabad:

"The stages of manufacture of blankets are as follows:—Beating and carding the wool; spinning, preparing the warp and setting it in the loom; then the weaving.

"The wool is beaten with a stick called *pitaura*; it is then carded.

"The instrument used for this purpose consists of a flexible piece of wood (*danti*) having at one end a flat wooden board attached (*pharebra*) and at the other a sort of bridge (*mangi*). A leather string, stretched round the *mangi*, goes over the *pharebra* along the edge of which is a thick strip of leather forming a sort of sound-board, and is tied to another string of leather at both ends of the *danti*. A sketch is given in the margin of the implement.

94. "The operator sits with a heap of wool before him, grasps the *danti* with his left hand through a loop called the *hathkar*, and strikes the leathern string with a mallet (*dastu*). The string vibrates with a loud swinging noise produced upon the sound-board, and tears up the flocks of wool, producing a soft fluffy mass, which is made up into rolls called "*pini*," which are ready to be spun into thread.

95. "The spinning is done by women in their houses. On this account, I did not see the process, which is performed by turning with one hand a driving wheel round which a driving hand passes and goes twice round the spinning axle which revolves at a great rate. A small length of thread attached to this catches the ball wool held in the other hand, and draws it out with thread winding it upon the spinning axle, from which is again wound off into small rolls of single thread (*phirki*), which may then be wound into longer rolls of double thread (*bhigrowra*)."
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96. "The next process is the preparation of the warp for which double thread is used. This is stretched out round an arrangement of pegs stuck in the ground and well soaked with boiled oil-cakes of nim and laid in the sun to dry, after which it is set in the loom.

97. "The loom used for blanket-making is a horizontal one, and is very easily set up by inserting a few pegs in the ground to which the weaving apparatus is attached. These are three in number: two at the end where the weaver sits, called respectively gali and barni; upon this is stuck a beam called the "okhar" which is the principal beam at this end of the loom. At the other end is a single peg called "dhura" round which passes a rope attached to the right-hand peg at the other end (through gali) and which is fastened to the centre of another stout beam (ohari), which is the principal beam at the top end.

98. "Between C and E is stretched the warp in the following manner:—The threads of the
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Warp are set at both extremities upon light beams called dantis. These are attached to the okhar and charti, respectively, by leathern strings called jhotis.

"When the rope is passing round the peg at the top of the loom, it is tightened until the loom is ready for weaving.

99. "This work is done as follows:—Across the warp is placed a stick having a number of loops beneath it, which are fastened to alternate threads. When this is held by the weaver and turned, the warp is separated into two sections, an upper and a lower, between which is inserted a flat wooden stick called saurat, which separates the sections, to allow of the passing of the shuttle (stringa). The saurat is then withdrawn, and the upper threads allowed to fall into their place, and are then in their turn depressed below the upper section by a small stick which keeps the sections of the web permanently apart; the saurat is then re-inserted and the shuttle repassed.

"After each passing of the shuttle, the web is compressed, and made compact by being struck with an implement pressed upon it between the strings called khilorna.

"As the work goes on, the woven portion is wound upon the okhar at the bottom end of the loom where the weaver sits, so that he always keeps the portion on which he is working just beneath his hand.

"When the warp is filled, a strip, about 18 inches wide, has been woven; then other similar pieces are made and stitched together until a blanket of the required size has been put together.

100. Simple patterns of straight lines are produced by using lines of black and white threads, and also by sewing in upon the edges."

101. It will be seen that there is practically very little difference in the processes employed in Shahabad and Gaya, and these are the processes that are found all over Bengal and Bihar in the manufacture of blankets.

(2) Kalns or galichas.

102. Greater skill is required for the manufacture of kalns than of blankets. The wool is not prepared by the manufacturers
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themselves, but purchased from Garories. 'It is then boiled in sajī water, washed and then coloured with European dyes. For the weaving, a vertical loom is used (the looms used for the manufacture of blankets is horizontal). The workman (weaver) sits at the foot of the loom. The kalān is wound as it is woven on two horizontal revolving thick beams which are called kāthās. The bundles of differently coloured woollen thread are slung over a horizontal piece of bamboo which goes by the name of kābli. No shuttle is used, but bits of the coloured thread are cut with a knife and stuck on with the hand between the different threads of the web. A comb-like iron implement which goes by the name of pānija is used to press these bits of coloured wool on the warp. Then three horizontal lines of thread (called āhārni) are placed over the bits of coloured wool to keep them tight in their places A pair of scissors are used for making the surface of the kalān even. Two round pieces of bamboo called goolas are used for keeping the threads of the warp tight. The goolas are made alternately tight by an implement called hāmnān (in the shape of a bow which moves up and down vertically) over a horizontal piece of bamboo.'

The above description has been taken from the Patna report and agrees with what the writer has himself seen.

(3) Asnis or ashnas.

103. Asnis are woven in the same way as gālichas, the only difference being that they are not piled.

Cost of appliances.

104. It has already been remarked in a preceding paragraph that the appliances used ordinarily for the manufacture of woollen goods cost little or nothing. Prices vary according to the different materials used in the construction of the weaver's plant. The following prices may, however, be noted:—

1. Sickle (hansua) for shearing 2 annas to 8 annas.
2. Scissors—12 annas to Re. 1.
3. Seutch—
   a) bamboo rod and string—1 to 2 pice.
   b) dhunetti—Rs. 1.8 to Rs. 3.
4. Spindle (charkha)—Four annas to Rs. 2.
5. Hand loom—Re. 1 to Rs. 10.
7. A prong—Eight annas.
8. A sickle-shaped knife—Four annas.

VIII.—EXTERNAL AND INTERNAL TRADE: DISPOSAL OF GOODS:

105. The information received under this head from the different districts of these Provinces is given below:—
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106. "The blankets made in this district are of the ordinary quality and are sold in the local hâts and markets. They are very seldom exported to Calcutta or other places for sale."

107. "Blankets are manufactured in small number, and are locally disposed of at a low price."

108. "Most of the blankets turned out are sold locally; but, occasionally wholesale dealers come from Midnapore and Calcutta and purchase the blankets that the weavers have in stock."

109. "The Gareries sell the blankets in their houses as well as in the bazars. As the industry is not an extensive one, their products are not exported to other places, but are disposed of locally."

110. "The blankets manufactured locally are not exported out of the district, as the supply barely keeps up with the demand. In the north of the district, there is a large export trade from Murshidabad. The weavers bring in their goods from Azimganj and dispose of them at hâts during the cold weather, and have quite cut out the local producers, who have given up manufacturing for some time."

111. "Blankets are sold direct to villagers, who are the only buyers."

112. "The trade being confined to a few families of a particular caste, originally non-indigenous, cannot be said to be on the increase."

113. "Blankets are sold only locally."

114. "All woollen articles, including blankets, used in this district are imported from other places."

115. "The woollen articles exposed for sale in the bazar are imported from Calcutta, and there is not a trace of local woollen manufacture."

116. "Blankets are generally sold in local markets for varying prices according to size and quality. The profits made are generally small, and Gareries not unfrequently supplement such profits by taking to cultivation. There does not appear to be any export trade in country blankets. The produce is sold in the local markets, and also to wholesale dealers, who export to Calcutta and other places the kâlins so purchased from the manufacturers."

117. "Country blankets are exported to a small extent to Calcutta and to the neighbouring districts. The head-constable of Obra reports that during the past year some 500 kâlins were sold in the local markets, and also to wholesale dealers, who export to Calcutta and other places the kâlins manufactured in this district. The profits made are generally small, and Gareries not unfrequently supplement such profits by taking to cultivation."

118. "The trade being confined to a few families of a particular caste, originally non-indigenous, cannot be said to be on the increase."

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125. "Blankets are sold only locally."
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about Rs. 250 were produced. The manufacture is said to be on the decline, but during the past few years, the trade has been more or less the same. These carpets are exported to a small extent to Calcutta, and may often be seen in the booths at fairs in Gaya and neighbouring districts. The number of blankets made in the Pakri Barawan thana in 1897 was 225, value Rs. 225; less than usual. The number made is not sufficient to supply local wants. No European woollen goods are imported. No middlemen exist. The blankets are sold direct to the consumers. There is no demand by Europeans for them."

118. "Blankets are sold in the local bazars, and are also disposed of to merchants, who take them to Calcutta to sell. As the local demand would be small in the hot weather, it is to be presumed that the worker's income would be realised chiefly in the cold weather, as the only way of disposing of his wares would be to the merchants who would keep them, though in that case there would be risk of damage by insects and decay during the hot weather and rains."

119. "The number of blankets made by each man is small. Some, however, make more, and these sell to dealers who send them to other parts of the country. As to the number thus exported, I have been unable to obtain any certain data, but it appears to be small."

120. "The blankets woven in the district are used by the weavers themselves, as well as sold in country markets and fairs, and also hawked in the towns by itinerant dealers. They do not find a ready market in the towns, where superior fabrics imported from Gaya, Saran and Patna are preferred. The district of Champaran was never famous for the manufacture or export of woollen fabrics in the years past."

121. "The products are generally disposed of in markets, which are held twice a week in various large villages. There is a large godown at Bishunpore near Muzaffarpur, where they can always be obtained. They are also sent to Darbhanga from villages in the Mahuar outpost."

122. "The Bherihars dispose of the blankets in the local market. I have not been able to find any case where exportation takes place, except in the case of a village called Chanauli in Tajpur thana, from which some blankets are sent to Muzaffarpur and Patna. I tried to get some figures from the Railway Traffic Superintendent, Samastipur, but I regret to say, that after repeated efforts to try to get figures; I had to desist, as no further time remained."

123. "There is no special market for the sale of blankets either within the district or outside it. Those not kept by the Gareeries for their own use are
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disposed of locally, and seem to find a ready sale at a price of about a rupee each. They are not manufactured in sufficient quantities to leave any surplus for export; there is evidently no active demand for them beyond the small and immediate local one, and it is more than doubtful whether such a demand could be stimulated by any artificial means. The wool at present available for manufacture, from whatever part of the Division it comes, is of too coarse a staple to permit of the production of any fabric for which there could be a general demand."

124. "The enquiries I have personally instituted, as well as the report from the subdivisions, show that blankets are supplied merely to meet a local demand. The blankets are disposed of locally at the various melas."

125. In the Araria subdivision, the blankets made at the village of Bairak, in thana Raniganj, are considered the best of their kind, and command a ready sale in the local markets. They are all sold in the locality. The blankets do not sell for so high a price as those of Katihar, of which a sufficient number are made to admit of exportation, though this is necessarily on a very small scale."

126. "The quantity of the material produced in the district per annum is approximately 20 maunds. There is no export or import of it. The import of European woollen goods in the shape of wrappers, flannels, etc., is large. But very few European blankets are imported. Large quantities of blankets known as "dakhina kammal" are, however, imported from tracts to the south of Orissa. These exceed in number those locally made."

127. "The Gareries find a ready market for their products in the several bazars of the district. They also supply the coolie depôts with cheap blankets for the use of the coolies at rates varying from fourteen annas to one rupee per piece. It takes a Gareri a whole day to make a blanket five cubits long and three wide. The blankets are sold in the district, and are never exported. The poorest classes use them during the winter. The comparatively well-to-do classes use blankets imported from the Bihar districts, which are much superior in point of fineness and softness."

128. "No outside trade is done in blankets, but they are disposed of locally."

129. From the above extracts, it will be seen, that the trade in indigenous woollen goods is most insignificant. In most districts, the supply is generally small, and the products are disposed of locally. From a few districts only have reports been received of the existence of any trade at all in indigenous products. In the
Woollen Fabrics of Bengal.

north of the district of Nadia, there is a fairly large export trade with Murshidabad, which is said to be competing severely with the native industry of the district. In Patna, there does not appear to be any export trade in country blankets, but kalins, and dünsis are sold to wholesale dealers who export to Calcutta and other places the articles purchased from the local manufacturers. From Gaya, country blankets are exported to a small extent to Calcutta and the neighbouring districts. Kalins and dünsis are also similarly exported. A slight export trade is also reported from the districts of Saran, Shahabad, Muzaffarpur, Darbhanga and Purnea. It will be evident from the above, that there is practically no demand for country-made woollen articles beyond the small and inadequate local one. Kalins and dünsis find a fairly good market among the more well-to-do classes and permit of exportation, but the quality of the blankets manufactured is as a rule too coarse to produce any general demand for them. The European machine-made blankets are much more closely woven, and are softer to the touch and more durable, and commend themselves to most people who can afford to indulge in woollen clothing, and it is only the cheapness of the indigenous product that ensures its retention even among the poorest classes, with whom in the cold weather a blanket is almost a necessity. Jail-made blankets are also much preferred by the middle classes to the coarse indigenous article. Blankets, which form the chief woollen manufacture of these Provinces, are made by the weavers both for their own use and for sale. They are sometimes sold from the weavers’ own houses, but the general mode of disposal is to sell them at the local fairs or bâts, where there is generally sufficient demand to consume the whole of the supply. Woollen articles of all kinds are also disposed of to wholesale dealers who take them to Calcutta, and other important trade centres. In some sadar stations and in other large towns in the districts, there are regular shops where such articles may be purchased at all times of the year. It is not unusual to find woollen articles also hawked about by itinerant dealers. As a rule, no middlemen are engaged in the sale and purchase of these goods.

IX.—SUGGESTIONS FOR IMPROVEMENT.

130. It is a well-known fact, that the sheep of these Provinces are very poor wool-producers, the wool produced in most cases being more like hair than wool. That an improvement, therefore, in the breed is necessary before any improvement can be effected in the woollen industry is quite obvious; but this is an oft-told tale. How such improvement is to be satisfactorily effected is the question which is beset with many difficulties. Various attempts
Woollen Fabrics of Bengal.

have been made from time to time by members of the Agri-
Horticultural Society, by planters and by other private individuals
with and without the encouragement of Government, to improve
the local breed by the importation of foreign stock, but no
permanent results have been attained. It is needless to give an
account of the experiments hitherto made, as they have been
already most ably and fully reviewed by Dr. G. Watt, c.i.e., in
his Dictionay of Economic Products. Dr. Watt has carefully
traced the causes of failure hitherto to lie first in the omission
of a thorough investigation of the character of the existing stock,
and the improvement of indigenous strain before the importation
of any foreign blood. To quote his own words:

"The conditions of India are dissimilar to those of almost any
other sheep-rearing country. The tendency of the stock has,
therefore, to be investigated, the prognostications of unfavourable
departures fully understood, and the methods of selection and
crossing which are found best calculated to guard against these
dangers, thoroughly established. In other words, we have to
evolve a prepotency suited to the climate and forage, of sufficient
strength at least to give a healthy stock on which to conduct
the further experiments at cross-breeding with superior foreign
races. In this direction, nothing whatever has been done."

131. Dr. Watt further goes on to point out that in all experi-
ments hitherto made, whether in these Provinces or outside these
Provinces, the difficulty has been found to be in the chief respon-
sibility devolving upon Government, there being a marked
absence of private enterprise; and with Government agency, it
is always difficult to secure the necessary continuity for a long
term of years, owing to the frequent transfers of Government
officers. The writer subscribes to the opinion of Dr. Watt. The
first step towards any improvement must be directed towards the
improvement of the indigenous breed by careful selection and by
judicious treatment and feeding. It must not be forgotten,
however, that the climate of these Provinces is undoubtedly
unfavourable to the production of good wool, and it must not be
expected that the Garries of Bengal will be able to produce
wool to compete with foreign competition. Limited results are
only possible.

132. Next comes the question of improvement in weaving
and in machinery. To the writer's mind, there is very little scope
for improvement even here. The manufacturers of the better class
of woollen fabrics (i.e., carpets) cannot compete with similar jail
manufactures, simply because of their rude weaving apparatus
which or account of its cheapness will not readily be displaced by
more expensive machinery. It might, however, be possible to
improve in the decorative line, so far as carpets are concerned,
Woollen Fabrics of Bengal.

as there is no reason why the Kalinbag of Bihar should not produce as ornamental and as attractive a fabric as his brother Kalinbag of Mirzapore. If tuition be given him by his Mirzapore brother, he ought to do as well, and here the writer can only reiterate the suggestion made by him in his "Monograph on Cotton Fabrics," that if it is considered desirable to keep up the higher woollen industry, a small institution should be established and maintained at a nominal expenditure at some centre in Bihar, preferably in Patna, where good carpet-weaving may be taught by a Mirzapore carpet-weaver, or by some one well initiated in the manufacture of jail carpets in Bengal. This is perhaps a matter which may be taken up by District Boards. The outlay for the venture need only be nominal.

133. As for the blanket weaver, it appears to the writer that there is no necessity for improving upon his manufacture. His product is one that is eminently suited in all respects to the wearer for whom it is intended. It is cheap, warm, and durable, though very rough, and is exactly adopted for the poor raiyat's requirement. It is an useful and effective article produced at the minimum of expense, and cannot be improved upon, so far as the use for which it is made is concerned. The trade of the blanket-weaver has no prospect of suffering from outside competition, and may well be allowed to remain as it is.

CALCUTTA, }  
N. N. BANERJEE, } Assistant Director of Land Records  

The 25th October 1899. } and Agriculture, Bengal.
# APPENDIX.

**Villages, thanas, etc., where woollen goods are manufactured.**

*(Extracted from reports received from District Officers.)*

<table>
<thead>
<tr>
<th>District</th>
<th>Locality of the industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burdwan</td>
<td>Kankardanga near Ronai, Khaursully in thana Raniganj, Budhuranga in thana Asansol, Puratonhat near the town of Kalna, Patuli in thana Purbasthal, Bohilapara in Burdwan town, Mahata near Gusara, Mohonpur in thana Shahibganj.</td>
</tr>
<tr>
<td>Burbhum</td>
<td>Hushnabad in thana Suri, Elumbazar in thana Bolepur, thana Maureswar.</td>
</tr>
<tr>
<td>Bankura</td>
<td>Lokepur, Kendee.</td>
</tr>
<tr>
<td>Midnapore</td>
<td>Kharpacl Bazar in the town station of Midnapore.</td>
</tr>
<tr>
<td>Nodia</td>
<td>Krishnagar, Santipur, Kushtia, Moheshganj, Mateari, Bangaljoe, Hira.</td>
</tr>
<tr>
<td>Jessore</td>
<td>Purahate Bazar on the Kumar river in subdivision Jhenida.</td>
</tr>
<tr>
<td>Murshidabad</td>
<td>Jangipur subdivision.</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>Town of Rampur Boalia.</td>
</tr>
<tr>
<td>Patna</td>
<td>Scattered all over the district, excepting the Dinapore subdivision.</td>
</tr>
<tr>
<td>Gaya</td>
<td>In all parts of the district, the villages of Obra and Koraipur, and the town of Daudnagar in the Aurangabad subdivision being chiefly noted for the manufacture of <em>katins</em>.</td>
</tr>
<tr>
<td>Shahabad</td>
<td>Arrah, Buxar, and in many villages scattered over the district.</td>
</tr>
<tr>
<td>Saran</td>
<td>Scattered over all parts of the district.</td>
</tr>
<tr>
<td>Champaran</td>
<td>Scattered over in different parts of the district.</td>
</tr>
<tr>
<td>Muzaffarpur</td>
<td>Muzaffarpur thana, Shakra outpost, Minapur outpost, Paru thana, Shahibganj outpost, Baduraj outpost, Katra thana, Hajipur, Mahuwa outpost, Raghopore outpost, Mahua, Patepur, Lalgaug, Sitamarhi thana, Bola outpost, Sonbarsa outpost, Shihar thana, Majorganj, Bairagnia outpost, Puuri thana, Sursandh outpost, Belsund.</td>
</tr>
<tr>
<td>Darbhanga</td>
<td>Samastipur thana, Tajpur thana, Dulsingh Sarai thana, thana Mahinudinagar, thana Warisnagar.</td>
</tr>
<tr>
<td>Monghyr</td>
<td>Scattered over the Sadar, Jamui, and Begusarai subdivisions.</td>
</tr>
<tr>
<td>Bhagalpur</td>
<td>Scattered over the district, excepting Banka.</td>
</tr>
<tr>
<td>Purnea</td>
<td>Katihar, Araria, Mohamedpur and Raniganj thanas.</td>
</tr>
<tr>
<td>Sonthal Parganas</td>
<td>Dumka, Madhubpur and a few other places.</td>
</tr>
<tr>
<td>Cuttack</td>
<td>In and near Cuttack town.</td>
</tr>
<tr>
<td>Hazaribagh</td>
<td>Khargaon, Nura, Losingna, Giridhi, Pachumba, Sinia, Sandwari, Hisatoo.</td>
</tr>
<tr>
<td>Ranchi</td>
<td>All over the district, except in thanas Chainpur, Kochdega, Bissengar, Toto, Sesai, Palkot and Bano.</td>
</tr>
<tr>
<td>Palamau</td>
<td>Thanas Daltonganj, Garliwa, Paton, Chattarpur.</td>
</tr>
<tr>
<td>Singhbhum</td>
<td>Chaibasssa.</td>
</tr>
</tbody>
</table>

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*Note.*—It is reported that no woollen industry is carried on in the following districts—Hooghly, Howrah, Kulti, 24-Parganas, Jalpaiguri, Darjeeling, Dinajpur, Bankura, Parna, Dacca, Mymensingh, Faridpur, Backergunge, Tippera, Noakhali, Chattagong, Chattagong Hill Tracts, Maida, Balasore, Angul and Khond Mahals, Puri and Manbhum.

DYES AND DYEING IN BENGAL.

I.—GENERAL REMARKS.

Dyeing.—The art of dyeing has long been practised in India, a country which furnishes raw materials for producing a great variety of colours; but whatever degree of perfection dyeing may have attained in past times, at the present day it does not occupy a very prominent place in the list of industries of this country. The importation of cheap European goods and European aniline dyes is proving fatal to the indigenous dyeing industry of these Provinces. This industry used to be carried on at one time on a large scale by silk and cotton-weavers, but their number has sensibly declined during the last few years, and they have been obliged to give up weaving and dyeing for other professions. European dyes, which are not as fast as indigenous dyes, appear to commend themselves to the people of this country on account of their cheapness and their brilliancy of colour. The ease with which they can be used makes them also more popular. These causes have tended to undermine the trade of the professional dyers. Whereas formerly, when a person wanted to wear a coloured cloth, he was compelled to go to the dyer, who alone knew the complicated processes by which colours could be produced from the indigenous products of this country, he now mixes up European chemical powders himself and simply dips his cloth into a solution of the powders, when a coloured garment is ready for his use. There are other causes also which are connected with the low condition of the native industry. There appears to be a want of ingenuity in the production of colours and designs among the people of these Provinces. There is no attempt on the part of native dyers to change their crude processes, and the result is, that European cloths of various patterns and designs find a ready sale in the market. The want of capital also is a stumbling block to improvement of any kind. Dyeing at the present day can at best be said to afford occupation only to a few who, with the aid of indigenous or foreign dyes, are capable of supplying the requirements of those who, through their social status or other circumstance, have retained their preferences for country cloth and country dyeing. In support of the views put forth above, it may be mentioned that silk-dyeing has all but died away in most of the silk districts. In Bankura, Midnapore, Rajshahi, Bogra, Bhagalpur, Malda, and even in Murshidabad, the dyeing industry which once flourished in these places, is now in quite a moribund condition owing to the decline in the silk
Dyes and Dyeing in Bengal.

industry itself. Similarly, almost every district shows a falling off in cotton-dyeing. The saris made in Chandrakona and its neighbourhood in Midnapore still command a sale in the market, but being of very light material, they are not worn by decent women, although their colours are very effectively arranged. There is also a demand still for Santipur embroidered cloth made by the weavers of the Nadia district, but here also imported dyes are chiefly used. Carpet weaving and dyeing has also declined. At one time, it used to be a flourishing industry in Rangpur, Patna, Gaya, and Muzaffarpur. At present, there are but a few families who prepare coloured threads for weaving carpets. The only place where carpet-weaving and dyeing is now carried on to any extent is the Sultanganj mohulla of the Patna City, where, according to Mr. Collin's Report on the Industries of Bengal, the annual outturn of coloured carpets is valued at half a lakh. The dyeing of wool is carried on only to a nominal extent now, and is mostly confined to the Bhagalpur and Patna Divisions. In the Bhagalpur jail, it forms an important item of work for prisoners. Dyeing of other articles, such as wood, sola (pith), &c., is not confined to any particular district, but the industry is so insignificant that there is very little to add here on the subject. Lac bangles are made still in small quantities all over the country, and lac toys are still manufactured and dyed by indigenous processes at Lumbazar in the Birbhum district; but there is no very great demand for the articles made. A good number of dyeing shops are to be seen in Calcutta, especially in the neighbourhood of Muhammadan bustees and houses of ill fame, the chief shops being located in Colootollah, Machuabazar, and Colinga. The above remarks have been made with reference to plain dyeing, but they are more or less applicable also to colour printing, which is done by a class of men known as Chipigars. On the whole, very little printing is now done in Bengal. There are a few up-country printers in Calcutta and in Howrah. Besides these two places, printing is now reported to be carried on to some extent in Hooghly, Rajshahi, Pabna, Gaya, Muzaffarpur, Darbhanga, and Monghyr.

II.—DISTRIBUTION OF THE DYEING AND PRINTING INDUSTRY OVER THESE PROVINCES.

2. Owing to the fragmentary nature of the information contained in district reports regarding the classes who carry on the dyeing industry, it has not been found possible to give any accurate totals for the Province in this monograph.
Dyes and Dyeing in Bengal.

The following table, which has been taken from the Census Report of 1891, shows the number of cotton dyers in each Division of these Provinces:

<table>
<thead>
<tr>
<th>Name of Division</th>
<th>Number of cotton dyers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burdwan</td>
<td>399</td>
</tr>
<tr>
<td>Presidency</td>
<td>480</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>49</td>
</tr>
<tr>
<td>Dacca</td>
<td>10</td>
</tr>
<tr>
<td>Chittagong</td>
<td>58</td>
</tr>
<tr>
<td>Patna</td>
<td>18,284</td>
</tr>
<tr>
<td>Bhagalpur</td>
<td>1,106</td>
</tr>
<tr>
<td>Orissa</td>
<td>28</td>
</tr>
<tr>
<td>Chota Nagpur</td>
<td>372</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,786</strong></td>
</tr>
</tbody>
</table>

The total number (20,786) includes males, females, and children, but it must be remembered that, with some exceptions, adult males alone engage in dyeing.

The above table does not give a full survey of the total number of dyers in these Provinces, as, besides cotton-dyeing, there exists the silk-dyeing industry, and the dyeing of other materials besides cloth, such as wood, *sola* (pith), &c. In many districts also, the work of dyeing forms but an incidental portion of the work of weavers and other castes, and any estimate of the number of dyers should take this fact into consideration. The Census Report is also silent as to the numerical strength of each caste engaged in dyeing, and it, moreover, at best gives a picture of the dyeing industry as it stood six years ago. Since then, owing to the every-day increasing use of aniline dyes, the native industry has gradually declined.

3. Some idea of the relative importance of the dyeing industry in the different districts of these Provinces at the present day may be gathered from the following information extracted from the reports of District Officers. The chief centres of the industry in different districts are stated where known. The information of District Officers has been supplemented with information obtained personally by the writer:

4. Dyeing is carried on on a small scale in the villages of the Sadar subdivision of Burdwan. In the Sadar town itself, there are only three or four shops with about a dozen workmen. In the Raniganj and Kalna subdivisions, it is reported that dyes are not manufactured, and that no dyeing processes are carried on. In
Dyes and Dyeing in Bengal.

Katwa, lac dye was once largely manufactured and used for dyeing in Dignagar and Hatkirtinagar, but it is now found more profitable to prepare shellac in these places. Conch-shell ornaments and tasar cloth are also dyed in Katwa. The numbers who engage in this work are very limited. Altogether, the dyeing industry in the district is said to be in a moribund condition. Only a few dyers exist at the present day, who are scattered over different parts of the district.

5. No dyeing is carried on in this district. Indigo is prepared in nominal quantities in two small factories, and lac is obtained all over the district in small quantities, and used for the manufacture of bracelets and other ornaments.

6. The dyeing industry is for the most part confined to the cotton and silk-weavers of the district.

Bankura. They were at one time numerous, but owing to the importation of European piece-goods and aniline dyes, many of them have taken to menial labour, and there are at present reported to be only about 500 or 600 families of weavers at Vishnupur and Sonamuki, and about 200 to 300 families in Bankura town and in the villages of Rajgram and Birsingpur, who, too, are said to have almost given up dyeing cotton and silk with indigenous dyes.

7. The report from Midnapore states, that here and there dyes are occasionally made, but that the manufacture nowhere amounts to an industry, although several plants and trees grow in the district from which dyes can be obtained. Dyeing was most probably extensively carried on when the silk industry flourished.

8. Dyes are manufactured and used in this district on a limited scale. The indigenous substances from which they are prepared are not produced in the district, but bought from the neighbouring districts of Bankura and Midnapore and from Calcutta. There are about 400 to 500 Laharis (i.e., lac dealers) in the district, who chiefly reside in the Sadar and Jahanabad subdivisions. There are also about 700 to 800 weavers scattered over the district, who engage in dyeing silk and cotton. Besides this, there are three firms in Serampore, where silk handkerchiefs and cloths of good repute are dyed and sent to Calcutta, whence they are despatched to Bombay, Rangoon, Madras, and England. Colour printing is done in these shops.

In Howrah, there are about 25 dyers scattered over the town and few families also of printers.
Dyes and Dyeing in Bengal.

9. Beyond four or five families who prepare a red dye on the occasion of the Holi festival, it is reported that there is no class of people who carry on dyeing in the 24-Parganas.

10. The process of dyeing by indigenous methods is confined only to a few people in this district. Weavers in Santipur and Kushtia use imported dyes.

11. There are about nine families of silk dyers in Murshidabad, whose centres of business are at Khagra, Baluchar, and Mirzapur. These men are weavers by caste. They rarely dye themselves. Each dyer employs about six or seven workmen under him. Besides these, there are three families of Muhammadans, who also dye cotton clothes, especially quilts, which are exported to Calcutta, Dacca, and other places, and two families of toy makers, who dye wooden wares.

12. It is reported, that no dyes are manufactured and that no system of dyeing is carried on in these two districts on any scale.

13. There are only four persons who print cotton clothes, and six who dye them, whose shops are all in the Sadar town. About 30 carpenters dye wooden articles in the Putia, Nator, and Boalia thanas, and about 506 Muchis and half that number of Chamars dye leather throughout the district. About 800 persons of the Malakar and Bairagi castes are reported to dye pith articles chiefly in the towns of Rampur Boalia and Putia, and about 18 families of Doms are reported to dye bamboo and cane wares. The Kumars of the district, who numbered 7,945 according to the census of 1891, all dye their earthen pots.

14. No indigenous dyeing industry is reported to exist in this district.

15. No particular class carry on dyeing in this district. The Tantis, Muhammadans, and Meches of the district dye the endi thread for their own use chiefly, and rarely only for sale.

16. No information is forthcoming as to the number of dyers in Darjeeling. It would appear, however, that dyeing is a very unimportant industry of the district.

17. Nine persons in the village of Nesbitganj, three miles to the west of Rangpur town, are reported to dye thread for weaving carpets, and
Dyes and Dyeing in Bengal.

about 500 persons scattered about in various villages are said to be engaged in dyeing endi cloth.

18. Dyeing is carried on to a small extent by the silk and cloth-weavers of the district. Of the former, there are said to be at present only about half a dozen skilful workers. The number of the latter is estimated at 200.

19. There are about 16 shops of dyers in the district. Pabna. The total number of men engaged in dyeing is estimated at 200 to 300. The centre of the industry is at Pabna town, where there are 11 shops.

20. It is reported that there is no dyeing industry in Dacca and Mymensingh. these two districts.

21. In this district, no industry on an extensive scale Faridpur. exists on the manufacture of dyes or on dyeing.

22. Dyes are unknown in this district, except among the Backergunge. Mughs of the Patuakhali subdivision.

23. [No report received.]

24. It is reported that there is no dyeing industry in this Noakhali. district.

25. In Cox's Bazar subdivision, dyeing is carried on among the Mughs who live in that subdivision.

Chittagong. In Cox's Bazar Municipality itself, there are about 180 houses of Muchs, whose productions are noted for the brightness and fastness of their colour. The chief centre of the industry is in a village called Tekpara. In this village, indigo is also used for dyeing by Mussalman women in 10 or 11 houses; in Ramu and Harbhanga the wives and widows of labourers and traders dye to a small extent. There are about 40 families of weavers in Pahartali village who also dye. In Chittagong town itself, there are only about two or three houses of dyers. Printing is done by a few boys.

26. The number of cotton dyers in the Sadar town is estimated at 100, and that in the rest of the district at 100 also. About 500 men are said to be engaged in stamping cloths in different fancy colours. Besides these, there are about 500 families of weavers in Futwa in the Barh subdivision who dye their own cotton and silk threads before weaving. There are also a number of weavers who dye raw cotton and thread for the purpose of preparing daris (carpets).
Dyes and Dyeing in Bengal.

27. It is estimated that there are 143 dyers at the Sadar subdivision of this district, 38 in Nawada, 46 in Jahanabad, and 65 in Aurangabad; altogether 292 in number. Some of these are really chappar or stampers, whose real business is to stamp shades of various colours on clothes already dyed.

28. The number of persons actually engaged in the dyeing industry is comparatively small. The centres of the higher forms of the industry are Sasaram for dyeing earthenware or plates and Arrah for dyeing wood and cloth.

29. There are about 300 dyers in this district. The chief centres of the industry are the towns of Chapra and Siwan.

30. The number of cloth and thread dyers in this district is about 900, including females. They are scattered throughout the district, but principally carry on the trade in the towns of Bettiah and Motihari. Threads are dyed also for making carpets by carpet weavers, whose number is about 250, inclusive of females.

31. There are 30 to 35 dyers in the town of Muzaffarpur, and 5 to 7 in that of Hajipur, while every other important village in the district has its own dyers. In Muzaffarpur, calico printing is also carried on. In Hajipur, there was a celebrated calico printer, but he has gone out of fashion.

32. The number of dyers is not considerable. They may be broadly divided into two classes, viz., (1) the general dyers, and (2) the printers.

33. Dyeing is now a limited industry in Monghyr, the dyers of the district numbering only about 150. Besides the dyers, there are about 40 or 50 calico printers in the district, the chief centre of whose industry is the town of Shaikpura.

34. Formerly, when tasar silk-weaving flourished in Bhagalpur, dyeing gave employment to a large number of persons; now it is carried on only to a very limited extent in the district.

35. It is reported, that there is no process of dyeing of any sort in this district.

36. There are about a dozen families of professional dyers in this district. Besides this, there are a few families of silk-weavers who colour their own silk.
Dyes and Dyeing in Bengal.

37. Dyeing among the Sonthals is purely a village industry carried on here and there in the district. Besides them, the Jogis manufacture rude dyes. According to the last census, they number 1,500 males and females.

38. It is only in the outlying portions of this district that dyeing is practised to any extent. In all the principal centres, the cheaper and brighter tinted yarn from Europe has superseded the local industry.

39. Dyeing as an independent industry does not exist in this district. Some weavers and tasar-silk dealers practise it as an auxiliary art.

40. [Report not received.]

Angul and Khondmahals.

41. The indigenous dyeing industry is virtually extinct in this district.

42. There is no regular industry at all in this district of Hazaribagh. There is no regular industry at all in this district of Hazaribagh. Preparing or using indigenous dyes

43. It is estimated, that there are not more than about 20 professional dyers in Lohardaga. The weaver classes dye their own clothes here.

44. The total number of families in this district employed in cloth-dyeing is only 16, residing in 12 villages. There are also two families of wood dyers.

45. Dyeing is reported to be carried on in 20 families in each of the 52 villages of Talda thana, and in Barabazar, it is estimated that there are about 1,000 cultivators who take more or less to dyeing. The silk-weavers of the district also dye to some extent.

46. The industry of dyeing is practically unknown to the district. Some few weavers dye, but their number is limited.

Singhbhum.

47. From the above, it will appear, that the chief centre of the dyeing industry is Bihar. The Patna Division of Bihar, and especially the district of Patna, has the largest number of dyeing shops. In Central Bengal, though the industry has declined, indigenous modes of dyeing are still practised to some extent. Dyeing appears to be virtually extinct in Northern and Eastern Bengal and in Orissa. In Chota Nagpur, it is carried on only to a small extent. Silk dyeing still prevails in Murshidabad, and to a limited extent in Bankura, Bogra, and Malda. It has all but died out in other silk
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districts, such as Midnapore, Rajshahi, and Bhagalpur. Printing is chiefly carried on in the Patna Division of Behar. Dyeing and printing is also carried on in Calcutta, but aniline dyes are almost universally used here, the indigenous dyes being employed only when specially ordered.

III.—DYERS AND PRINTERS, THEIR SOCIAL AND PROFESSIONAL STATUS.

48. The Muhammadans are the principal dyers of these Provinces. Among the Hindus, the Tantis are the principal dyers. The other classes who once engaged in dyeing or now engage in dyeing are reported to be Kumars (potters), Kamars (carpenters), Sadgopes, Sarnobarniks, Bairagis, Rajbanghis, Jogis, Rishis, Muchis, Chamars, Kandus, Dhobis, Tatwas, Malis, Paures (weavers), Patras, Sonthals, Kols, Kurmis, Bhumijes, Baidyas, Chatrars, Doms, Mughs and Meches.

49. Dyers go under different designations according to the districts in which they carry on their work, and according to the branch of the industry in which they engage. In Bihar, those who dye cloths are called rangrezes; those who dye silks patuns, and the lac-dyers are known as laheras. In Lower Bengal, lac-dyers are styled laharas, and in Orissa, the silk dyers are known as patras. In Shahabad, those who dye wooden plates and boxes are styled kamangars; those who dye and enamel woodwork, barahais, and those who paint tikulis worn by village women on their foreheads nuniares. Those who dye wood are also called rangsazes in Bihar. In Murshidabad, the dyers of wooden toys are known as kharadis. Those who dye conchshell ornaments are called shankaris, and those who paint churis are known as nuris. Those who paint sola (pith) toys and idols are called malakars; calico and silk printers are styled chappars or chipigars.

50. Generally, professional dyeing is done by males. Women may also dye, but they do so as a rule for their own use at their houses, and do not work in shops. In Chittagong, however, Mugh and Musalman women are reported to carry on dyeing. Boys may be found sometimes working as apprentices in the shops of their relatives.

[N.B.—It may be interesting here to remark, that outside professional dyeing both males and females use dyes on different occasions for colouring. It is a general practice with the poorer class of Brahmans of Bengal to dye the clothes of their sons during the ceremony of donning the sacred thread (pota). The well-to-do Brahmans who can afford to buy coloured silken cloths (chelis) do not take this trouble. At the time of the Charakpmja in Bengal, the Hindus who do penance,
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whether men or women, always dye the coloured clothes they then wear with their own hands. These include all classes of Hindus except Brahmans. Women of all classes, both Hindus and Muhammadans, decorate their feet and the palms of their hands with a red colour obtained from lac. Married women paint their foreheads at the parting of their hair with an indigenous vermilion dye. Women of all classes, especially Muhammadan women, obtain a red dye from the melind (Lawsonia Alba) with which they colour their fingers, nails, hands, and feet. Melind is also used for dyeing the beard or hair among the Muhammadans. Turmeric dye is rubbed over the body by all classes, and the arir is used by the Hindus at the time of the Holi festival.

51. The Muhammadans are the principal dyers and printers in Bihar. They are also to be found in other districts in Bengal. As a rule, they belong to the Sheikh sect. Contradictory reports have been received with regard to their social standing. While from some districts, it is reported that dyeing is not considered derogatory, and that the Muhammadans who practise this art are not looked down upon by their fellow-country men, from other districts it is reported, that the Muhammadan dyers occupy a low social standing among their brethren. My personal enquiries in this matter incline to the former view. Though a Sheikh of some other profession would not intermarry with a Sheikh dyer, it is not to be inferred that the latter is of lower social rank. The dyers have their own restrictions as to marriage, but in other respects they mix freely and equally with all Sheikhs.

The Muhammadans for the most part engage in dyeing cotton, silk, cloth or thread. In Rajshahi, a few families dye articles made of sola (pith); and in Shahabad, in addition to cloth, they dye wood and deal also in lac-dyes.

52. The Tantis belong to the weaver caste. They are to be found in almost every district of Bengal, where to their own profession, they sometimes add the work of dyeing. They are generally very poor, and belong to a low order of Hindu society. Their work is chiefly confined to dyeing cloths and threads.

53. The Kumars belong to the potter caste, and occupy a place below the Kayasths. They are not professional dyers, but simply colour the earthen pots manufactured by them. Men and women both engage in this work. Some few families in Rajshahi are said to paint toys and idols with native colours.

54. The Kamars are of the carpenter caste; and although dyeing does not come within their regular profession, some of them do dye their wooden wares. In Shahabad, these Kamars, or Barahais as they are sometimes called, dye and enamel wood work.
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55. The Satgopes and Sarnobarniks are reported to have at one time carried on the manufacture of lac-dye in Burdwan.

56. The Bairagis profess a religious life, occupying a low social position among the Hindus. They are not allowed to eat with higher castes. In Rajshahi, they are found painting toys made of sola (pith), and in this work men and women alike take part.

57. There is a limited number of Rajbangshis in Rangpur, who are said to dye endi thread and endi cloth for home use and for their neighbours, and not generally for sale.

58. There are few Jogis also in Rangpur who dye cloth, like the Rajbangshis. In the Sonthal Parganas also, Jogis carry on the dyeing industry. These men do not depend entirely on dyeing for their livelihood. They are cultivators, and in times of scarcity take to begging.

59. Rishis are low-caste Hindu butchers, who are said to dye leather in Faridpur. Their number is very limited. Muchis and Chamars also carry on this work. They are of a very low caste, just a little above the Doms in social position. Leather is dyed in Faridpur and other places by low-class Muhammedans also.

60. Kandus, Dhobis, Tatwas and Malis are said to dye with the al dye in Patna. Dhobis are generally calico printers.

61. The Pairs in Lohardaga corresponding to the Tantis of Lower Bengal dye their own yarn before weaving cloth. Like the Tantis, they hold a low place in Hindu society.

62. Patras are the silk dyers of Orissa.

63. Sonthals are reported to engage in dyeing in Bhagalpur, Sonthal Parganas, and Manbhum. They chiefly engage in dyeing cloth and yarn.

64. In Manbhum only Kols, Kurmis, Baidyas, and Chatrars are reported to carry on dyeing operations.

65. Domes belong to the lowest caste of Hindus, whose touch is pollution to other Hindus. They generally dye articles made of split bamboo or cane.
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66. Mughs are reported to carry on their dyeing work in two districts, viz., Backergunge and Chittagong. They appear to be of Arakanese origin, and make good dyers. In Chittagong, it is reported that dyeing forms part of almost every young Mugh woman’s education. They are well noted for dyeing bright colours in the pattern of plaids on silk and cotton clothes.

67. Meches belong to an aboriginal race. They are mentioned in the reports from Jalpaiguri as a class who dye their own clothes.

Besides the above a few Kahars, Telis, Marwaris and Kayasths also engage in dyeing.

68. Dyers as a class are very poor. They dye for local use only. Their ordinary earnings do not exceed Rs. 8 per month, and in order to maintain their families they have to take service and ply various trades, carrying on dyeing only as a part of their work. Some have their own lands to cultivate, and as a rule these are in better circumstances. The poorest class of dyers do not earn more than Rs. 3 to Rs. 5 per month, but there are others also who earn as much as Rs. 12 to Rs. 15 per month. Owing to the greater demand for their work, dyers in Calcutta as a rule are better off than their brethren in the interior. Exceptional cases may be found of rich dyers in the mufassal, who have a large number of subordinates working under them, and who get more than the earnings quoted above, e.g., in Patna there are some dyers who earn as much as Rs. 50 per month; in Gaya one rich dyer is said to earn an income of about Rs. 900 a year, two or three others earn about Rs. 300 to Rs. 500 a year. All these remarks apply to cotton dyers. The poorest class among the dyers, if they be so considered, are the Doms, who colour baskets and other bamboo articles. Their earnings do not exceed Rs. 3 to Rs. 5 per month. The Chamars, who dye leather, are better off, earning from about Rs. 7 to Rs. 15 per mensem. Potters who dye their earthen pots are generally well off owing to the great demand for such vessels among all classes of Hindus. Dyeing carpenters or Rangazees also are as a rule in good circumstances, and earn from Rs. 10 to Rs. 20 per mensem. Silk dyers as a class are in better circumstances than those who dye cotton. Their ordinary earnings vary from Rs. 10 to Rs. 12 per month. Rich silk dyers are to be met with who employ subordinate workmen to carry on their work. There are said to be about nine families of such dyers in Murshidabad, whose net profits average to about Rs. 500
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...a year. The business of silk dyers depends generally upon the conditions of the silk trade of the districts in which they have their shops. Like dyers, calico printers do not ordinarily earn more than Rs. 6 to Rs. 8 per month. At the Serampore printing shops, the proprietors are said to earn from Rs. 20 to Rs. 25 per mensem. The experts employed by them earn from Rs. 10 to Rs. 15 a month, and the boys under the pressman get Rs. 5 per month. In Calcutta, the ordinary earnings of a printer amount to about Rs. 15 per month.

IV.—DYE-STUFFS AND PROCESSES EMPLOYED IN DYEING.

(a) Principal Dye-stuffs.

69. The substances used in dyeing and printing include the fruits, flowers, leaves, roots, seed, bark, wood and galls of plants, and also insects and earths.

The chief indigenous products of these Provinces yielding dye stuffs and now used by dyers are:—Indigo (Indigofera tinctoria), turmeric (Curcuma longa), lac, kusum (Carthamus tinctorius), bakam (Casalpinia Sappan), singhar (Nyctanthes Arbortristis), kamala (Mallotus Philippinensis), palas (Butea frondosa), laikan (Bice orellana), and al (Morinda tinctoria). All the above generally yield principal dyes, but they are also sometimes used as auxiliaries. In Dr. McCann’s Report on the Dyes of Bengal will be found a complete list of dye-producing plants. A full list also of such of them as are now reported by local officers to be used by dyers will be found in pages I and II of Appendix I. Keeping in view the instructions of the Government of India, that products and materials are to be discussed in this report, only in so far as they are needful for the purpose of giving a survey of the indigenous industry, a short description is added only of the more important dyes mentioned above, and the ordinary processes employed in extracting and using them. An account of each dye-stuff and of the many processes which may be employed in their use will be a repetition of what is already described fully in Dr. McCann’s report:—

70. Indigo is used very largely for dyeing, but the dye is generally manufactured by European processes, of which so much is already known that no elaborate description is necessary in this report. Suffice it to say, that the indigo
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manufactured on the European process is not a permanent dye, and it is therefore sometimes mixed by native dyers with some other ingredients, e.g., shell lime, sajimati, treacle, and the pounded roots of the auch or al tree (Morinda tinctoria), as reported from Faridpur, in order to make the colour permanent. Indigo, however, is prepared on the indigenous process by native dyers in Chittagong, and is said to be cheaper than imported dyes. Moreover, it is not found necessary to use lime with it in colouring, probably due to the fact that lime is used in its manufacture. No description is given in the district reports received of the indigenous method of preparing the indigo dye; but the following accounts, extracted from Dr. McCann’s report, may prove interesting.

He states that in Chittagong, “the plants on being gathered are allowed to rot in water and then removed. The water is then mixed with lime, and the liquid allowed to stand for about 12 hours. At the end of this time, a deposit is found at the bottom of the vessel which is dried and kept in the form of cakes.” “In Palaman,” he says, “that the plants are soaked in a large open earthen vessel. The water is beaten up, and then put on the fire in small vessels to boil. When this has been done sufficiently, the dye is strained through country-cloth.”

71 Lac is found as an incrustation on the branches of various trees, being formed by an insect known as the Coccus Lacca. The trees on which it is chiefly found are the pipal or aswnt (Ficus religiosa), the plum tree (Zizyphus Jujuba), the palas (Butea frondosa), and the kusum tree (Schleichera Trijuga). The best lac is said to be produced on the last two trees. It is reported to be produced in Birbhum, Bankura, Midnapore, Murshidabad, Manbhum, and Singhbhum, but its manufacture does not appear to be carried on now at Bankura and Birbhum. Lac is found mostly on trees growing wild. Very few trees are now especially cultivated for its production. In Murshidabad, however, a large tract of land, lying on the right bank of the river Bhagirathi, known as the rarih tract of the district, is laid out with lac-producing plum trees. Each tree is said to yield from 10 to 20 seers of lac. The cost of production varies from one rupee to two rupees per tree, or Rs. 80 to Rs. 160 per bigha, which contains about 80 plum trees. The trade in lac is now very limited. The only districts from which it appears to be exported are Bankura, Murshidabad, and Manbhum. The incrustation in its natural shape is known as stick-lac. This is taken off the trees in March and October by
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pounding, so that the resin is separated from the twigs. The resin is then ground into a fine powder, and well rubbed in cold water for some time. To promote the separation of the dye from the resin, water is added at intervals, and an alkali (saajmati) is sometimes mixed with the resinous powder under water. The liquid is then strained through a coarse cloth; the resin is left behind and is utilized for the purpose of making shellac. The liquid strained is allowed to settle in a vessel for some time until a thick sediment forms at the bottom. A little limewater is added to help the precipitation of the sediment. This sediment is then pressed into cakes, and forms the lac-dye of commerce. From this is prepared another article which is used as a cosmetic, called alta. The first step taken by the alta makers is to pound the lac into a coarse powder. This powder is then placed in a large earthen vessel, which is usually made with a rough inner surface. Some water is then added, and the whole is stirred vigorously with a thick stick. Water is added a second time, and the liquid is heated and left to simmer for some time with a little alum added to it. After this, the contents are allowed to cool and then strained. The liquid thus strained off is of a rich crimson colour. Then some cotton is taken and soaked in a kind of starch made from pulse, and beaten out into a thin circular slab. These slabs or pieces are then placed in the crimson liquid and allowed to become thoroughly saturated, when they are taken out and dried, and are then ready for sale. Eight to twelve such pieces may be had for a picce.

Lac is used for the manufacture of toys, of bracelets, and other ornaments by Laharis. Country lamps, which are so largely used by the natives of this country, generally have a crimson band round the chimney, which is produced from lac. Lac is further used by toy makers (kharadis) for the purpose of coating their wooden wares. Earthen toys and idols are also coated with lac. Weavers use it for dyeing silk, and especially tasar silk materials.

72. Like indigo, turmeric is extensively employed in dyeing cotton clothes, especially at weddings and on other festive occasions. In many districts, house-holders will be found dyeing their bathing napkins in turmeric. In Orissa, almost every house-holder dyes the clothes of his children or of the females of the house with this material. It is used also for dyeing toys and other articles of sola pith. Turmeric yields a colour of a fleeting character only, and is used generally as an auxiliary to other dye-stuffs. It is rubbed also
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on the body in order to give a yellow flush to the skin. The process by which the dye is extracted is very simple. The dry root or rhizome is soaked in water, and then pounded and placed on a piece of coarse cloth. Water is then added and strained through the cloth. From Muzaffarpur, it is reported that one seer of turmeric with two seers of water gives the necessary infusion. In upper circles of Indian society, saffron is generally used instead of turmeric in dyeing clothes yellow.

73. Safflower is much appreciated on account of the many simple and compound colours that it produces. In itself, it contains two pigment principles, viz., safflower yellow, and safflower red. It is largely used all over these Provinces, and especially in Bihar; and in spite of the introduction of aniline dyes, it has not been driven out of the market. Indeed, in Bihar it is regarded as particularly sacred by the Hindus—a fact which is exemplified by the current Bihari aphorism “Bap rahat pet me, put gal bariyat” (i.e., when the father is in the womb, the son goes to the wedding party). The father is the seed, and the son is the dye. The red colour of safflower, being considered as an emblem of holiness and success by orthodox Hindus, is much used for wedding apparel. The Dacca safflower is the best in India. Besides being used for dyeing cloth of cotton or silk, safflower is also used for colouring toys, &c., made of sola pith. The methods of extracting the dye employed in the various districts of these Provinces are in all essentials similar. It will suffice therefore to add the following description of the method employed at Muzaffarpur, which is supported by what the writer has himself observed:—“The florets, after collection, are placed in a basket and dried in the shade. Exposure to the sun weakens the dye. When the florets are sufficiently dry, they are deposited in an earthen jar. About ½ lb. of these florets are mixed with about two seers of cold water after being ground to a coarse powder. The powder is then washed by being rubbed with the hand, and then it is agitated briskly for about 15 minutes or so. The water, which is of a dirty yellow colour, is then decanted. Fresh cold water is again added, and the whole mixture put into a piece of cloth hung on a wooden filter frame. The water is allowed to filter down gradually. This process may be repeated several times until the yellow tint is almost removed. The yellow water thus obtained, known as pewar in Bihar, is sometimes thrown away, and sometimes kept for preparing more complicated
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dyes. When the yellow principle is thus eliminated, some alkaline substance is added to the flowers in order to dissolve the red colouring matter. One and-a-quarter tolas of sajimuti suffice for the purpose. The mixture is then well pounded together. This is done either by rubbing with the hand or treading with the feet. To the above compound is then added about 1½ lbs. of cold water, and when the alkali has been sufficiently mixed with the flowers, the water is allowed to strain through. The resulting solution is now of a red colour.

A little lime juice is sometimes added to neutralize the effects of sajimuti. Wood ashes, and ashes of burnt plantain rinds, and pods of palm flowers are in some cases substituted for sajimuti. Sometimes, again, tamarind, mango, or curdled milk is used instead of lime juice.

74. The bakam plant, from the wood of which is obtained a red dye, is said to grow abundantly in Cuttack. In Faridpur, the bakam dye was at one time largely used, but has been superseded now by majenta and other aniline dyes. The bark of the plant is used for producing an orange-yellow coloured dye in Muzaffarpur. The wood is never used here for dyeing purposes. The oldest and biggest trees are said to yield the best dyes. The bark is also used in Chittagong for getting a pucka or fast red colour. Besides being used for cloth, bakam is also used for the preparation of abir, a red powder which is used during the Holi or Doljatra festival. The mode of preparing it is thus described in the report received from the 24-Parganas:

"The roots of the soonti plant are dried and then powdered, and then mixed with the extract obtained from bakam wood."

From Cuttack, it is reported that abir is made by pounding the roots of the patna (Banjuti—Curcuma Zedoaria) fine, and then steeping the powder in an infusion of bakam wood. The powder is then dried and again steeped and the process repeated until the desired shade is obtained. The powder is then well dried, and is ready for sale. It is stated in the Cuttack report, that imported English dyes have taken the place of bakam even in the manufacture of abir. The bakam dye itself is extracted simply by cutting up the wood in small pieces, or pounding it into a powder and then boiling it for 5 to 8 hours. The proportion of wood to water, as stated in the Monghyr report, is 4 chitaks bakam to 4 seers of water.

75. The trees which bear the singhar flower are not generally planted. They are found growing wild in gardens and homesteads almost in all districts of these Provinces, and
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are reported to grow to perfection in the hilly jungle lands of thana Sherghati in the district of Gaya. This flower is also known by the following names:—Seoli, sephalika, hurasinginghar. The process of extraction of the dye is very simple. The white petals of the flowers are cast off, and the orange-coloured corolla tubes are well dried in the sun. They are then boiled or immersed in hot water until the colour is extracted. The infusion is an orange colour, which is very fleeting. Singhar is used generally as an auxiliary to other dyes. It is also used for dyeing liquor.

76. The palas tree, like the above, is not especially cultivated for its dye. It is found growing wild in gardens and jungles. The dye is extracted simply by boiling or steeping the flowers in hot water. It is used for dyeing cotton and sola articles.

77. The latkan tree, like the palas and singhar, is to be found growing wild in jungles and gardens, and does not appear to be cultivated for its dye. It is known also as bilati-haldi. The seeds are used for the preparation of the dye. A deep yellow and red colour is obtained from the pulp which surrounds the seed. Though fleeting, it is said to last longer than the colour obtained from safflower. By certain combinations, different depths of yellow colours are obtained. It is used for dyeing both silk and cotton. The dye itself is obtained by pounding and boiling the seeds in water mixed with soda and alum. The following process is described in the report received from Hooghly:—"In three seers of hot water one seer of latkan seeds are well thrashed and rubbed. When the water becomes red, and when very little remains of the seeds, the water is placed upon a hearth and heated. The seeds are then thrown away. The red water having subsided to 2½ seers, 1½ tolas of alum are poured into it. After two or three minutes, the red water is brought down. Thus is the colour produced."

78. The kamala plant is also found growing wild. The dye is obtained in the form of a powder from the epidermal glands which cover the fruit. The dye is extracted by drying the fruit in the sun, and then beating out the powder. The colour of the powder is red, but it dyes cloth yellow.

79. The different names by which the al plant is commonly known are al, ach, ach, achu, aus, and daruhariidra. It is reported to be extensively cultivated in the Hajipur subdivision of Muzaffarpur,
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where a superstition exists that whoever raises the first crop must know that his days are numbered. The old are generally therefore chosen for the purpose. The plants are allowed to grow for at least three years and to attain a height of about seven feet before their roots are capable of yielding the dye. The finer roots are generally preferred to the thicker ones. The dye obtained from this plant is used in plain dyeing, and is one of the principal colours also in stamping cloths. It is obtained by cutting the roots in small pieces, and then pounding them well until they are converted into a powder, after which the powder is steeped in water.

N.B.—A short description is now added of a dye prepared in Monghyr. It is locally known as peori, and as perirang in Calcutta, to which place it is always exported for sale. It appears, that it is hardly or never used for dyeing cloth, as it has a peculiar smell, but it forms a good paint for doors, railings, &c. The dye is of a yellow ochre colour, and resembles a mineral. It is obtained in Monghyr from the urine of the cow. The cows are fed entirely on mango leaves, and are given very little water to drink and every drop of their urine is carefully collected in earthen pots and boiled. The water of the urine being evaporated by boiling, leaves a yellow earthy or mineral deposit, which is collected by the gnallas who own the cows. They sell their dye for Rs. 1-8 per seer, and the exporters, it is reported from Monghyr, got Rs. 5 per seer. In Dr. McCann's report, the Monghyr price is quoted at Rs. 4 per seer, and the Calcutta price at Rs. 8 per seer, and the dye is stated to be exported to Europe. About 200 or 300 mounds of peori are produced annually at the present day in Monghyr. Cows that have ceased to give milk and old cows are set aside for the manufacture of peori. They rarely live more than two years on the unnatural food given to them for the purpose.

(b) Ordinary processes employed in dyeing cloth and thread with the more important dyes.

80. The processes followed by native dyers in dyeing cloth with indigo are so well known, and have been so fully described in Dr. McCann's report that nothing but a short notice of them need be given here. The ordinary method of dyeing with indigo, as observed by the writer, was as follows:—Indigo is diluted in water and then mixed with sajimati (Fuller's earth) water. A little more sajimati powder is then added to this mixture, as also lime and molasses. The solution is stirred from time to time for three or four days. The cloth to be coloured is then dipped into the solution and allowed to dry. This is repeated until the required colour is obtained, the depth of colour depending on the number of times the cloth is dipped into the fermented infusion, e.g., the abi (light blue) colour is produced by a very light immersion, the asmani, or sky-blue colour, is produced generally by one or two dippings, whereas the nil (indigo blue) and surmai (blue-black) colours are produced by
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four or five dippings. The proportions of the substances used are given in the report from Monghyr, and are as follows:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Seers</th>
<th>Chitaks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigo</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Sayimati</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Lime</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Molasses and Water</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

The indigo bath is strengthened often with other substances than those mentioned in the formula given above, e.g., with plaintain ashes, with wood of the Morinda tinctoria, with chakunda seeds (Cassia tora), &c.

Indigo, in combination with other dyeing stuffs, gives black, purple, maroon, and green colours of different shades. In Chittagong, where the process is different from that commonly in vogue, indigo is taken and mixed with boiled echu seeds. Ashes of the galia and other saline shrubs are mixed with cold water. The water is strained through a cloth into the jar containing the mixture of indigo and echu seeds until the jar is full. The whole is then stirred up with a stick at intervals, and in from two to six days it becomes a deep black. The cloth to be dyed is soaked in water, and left out in the sun for a short time. It is then dipped in the liquid and again put out in the sun to dry. This immersion and drying in the sun is repeated four or five times until the colour is sufficiently fast.

81. The mode of dyeing with lac is given in detail in the reports from Burdwan, Cuttack, Manbhum, and Singhbhum, and is reproduced here:

**Burdwan.**—"Cakes of dye are rubbed with a small quantity of water in a vessel. Water in large quantity is then added to dissolve the lac, and sayimati (an alkali) is then put in. The whole is then well mixed, and the mixture strained. The strained off liquid is boiled, and to it is added some lodh (Sym- plocos racemosa) powder, when the liquid is strained a second time. The cloth to be dyed is then steeped in this liquid, boiled and then dried. By this means a permanent red colour is obtained.

**Cuttack.**—Stick lac is rubbed in an alkaline solution obtained by soaking the ashes of plantain leaf in water, and mixed with lodh, turmeric, and alum. This preparation is then placed over a fire and allowed to boil. The cloth (silk) to be dyed is also soaked in alum and turmeric water, and placed in the sun to dry. When the above preparation is boiled down to about
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About one third of its quantity, it is mixed with a solution of tamarind, and the silk when dry is dipped into this boiling solution, where it is allowed to remain about a quarter of an hour, and then taken out and washed. To dye one standard seer of silk, the following quantities of materials are used:

<table>
<thead>
<tr>
<th>Material</th>
<th>Seers.</th>
<th>Chitaks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lac</td>
<td>...</td>
<td>4</td>
</tr>
<tr>
<td>Lodh bark</td>
<td>...</td>
<td>0 4</td>
</tr>
<tr>
<td>Alum</td>
<td>...</td>
<td>0 2</td>
</tr>
<tr>
<td>Turmeric</td>
<td>...</td>
<td>0 1</td>
</tr>
<tr>
<td>Tamarind</td>
<td>...</td>
<td>0 4</td>
</tr>
<tr>
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_Manghbum._—The process is similar to that followed in Cuttack.

_Singhbhum._—In Singhbhum, alum only is added to lac water, after which the mixture is boiled and the substance to be dyed is then inserted into the boiling mixture, where it is coloured red.

Lac-dye is used in combination with other substances to produce a red dye, which is commonly used for colouring earthen toys and idols. The colour is fixed by tamarind seed or gajran oil mordant. After the dye has dried, turpentine oil is put on to give the toys a glaze.

82. Turmeric by itself yields a dye of a fleeting character. Other ingredients, such as alum, are therefore added to it to produce a more lasting colour. A mixture of turmeric, sajimati, and lemon produces a brilliant yellow colour. The processes described in the district report from Monghyr, which are similar to those in vogue in other districts of these Provinces, are as follows:

(i) Turmeric is finely powdered and put into water. The cloth is first dipped in the water, and it is then lightly washed in pure water, and then dipped in acidulated water, prepared from alum or lemon, when it is coloured a brilliant yellow. One chitak of turmeric will yield a deep yellow colour to a yard of fine cloth.

(ii) "Turmeric is mixed with a solution of singhar flowers, and then a little alum is added. The cloth is dipped into the solution while hot, and is dyed deep yellow (busanti)."

The other shades of yellow produced from turmeric are:

(a) _Sherboti_, a light pinkish yellow colour obtained by one steeping in turmeric and one steeping in a solution of lime or dried mango;
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(b) Gandaki, a sulphur hue; and

(c) Badami, an almond hue, both of which are obtained by varying the quantity of the lime or mango solution of the turmeric. The latter colour is also obtained by adding kusum flower.

Turmeric is added to other ingredients to produce compound colours.

With indigo, it gives different shades of green, such as dhani (yellow green) and sabuz (green). Other combinations will be found in subsequent paragraphs.

83. Kusum.—The cloth to be dyed is dipped in the resultant tincture obtained, as described in the manufacture of the dye. Different shades of red are produced by steeping for a longer or shorter time, or by using one or other of the red tinctures obtained from successive strainings. The first straining gives a crimson red colour—surk kusum; the second straining brings a light colour, and the third a lighter colour still. A large variety of compound colours is obtained by a mixture of safflower dye with other ingredients. The principal compound colours produced are naranji or kamla (orange yellow), champai (deep orange), badami or keolai (almond hue), golabi (rose), gulnar (pomegranate colour), piyaji (onion hue), baiguni (purple), kusini or kokai (light purple), surmai (blue-black), masi (deep black):

(i) Naranji or kamla, champai, and badami.—The infusion of kusum mixed with turmeric or a decoction of singharphul produces these three colours. Some acid is also added.

(ii) Golabi, gulnar, piyaji.—These are produced by mixing the infusion of kusum with acid, such as lime, tamarind, or mango, in more or less quantity as required.

(iii) Baiguni, kasini.—These two colours are obtained by mixing the infusion of kusum with indigo and acid in quantities required. Bakam is sometimes added.

(iv) Surmai.—This is also obtained from a mixture of indigo and the red dye of kusum.

(v) Masi.—This is obtained from the fresh yellow water obtained in the preparation of the safflower dye, which is added to turmeric and other ingredients.
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84. The liquid dye extracted by boiling bakam wood is of a red colour. To this, alum is added as a mordant, and the cloth to be dyed is dipped in this mixture. Kakreja, a deep maroon colour, is obtained from this dye-stuff. For this purpose, the cloth to be dyed is first soaked in water prepared with myrobalams (hurra) and kasis (hirakosh, or green vitriol), and then dipped into bakam water. A dark purple colour is also obtained similarly. The following details of the process of dyeing with bakam are extracted from the report received from Cuttack:

"The wood of the bakam tree is pounded and denuded of its bark. It is then boiled in the water for two or three hours, and after being allowed to cool is mixed with a little lime sometimes. The yarn to be dyed is at the same time treated with a solution of alum and turmeric, and dried in the sun. When the yarn is quite dry, it is steeped in the water prepared from the wood, where it is kept some hours, and then taken out and dried. The materials for dyeing one seer of yarn are as follows:

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<th>Seer.</th>
<th>Chitak.</th>
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<td>Bakam wood</td>
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<td>Alum</td>
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<td>Turmeric</td>
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In Muzaffarpur, where an orange colour is obtained from the bark, the material to be coloured is simply dipped into a decoction of bakam, obtained by boiling the bark in water.

In Chittagong, the following process is adopted for obtaining a pucka (fast) red colour. "The bark of the bakam (called senhia in Chittagong) is powdered and boiled with water, and the water strained off into a vessel. This process is repeated three or four times. Then one seer of jhuri (Magi-khre, Jasminum humile) is mixed with 15 seers of water and boiled. These two liquid preparations are then mixed in equal proportions of 15 seers each, and 5 tolas of coconut oil and 5 tolas of alum are added. The mixture is boiled, and some portion of it poured over the cloth, which is in a wooden dish. The cloth is then put into a pot with some of the mixture and boiled, and turned with a stick until the water has mostly evaporated. It is then taken out lest it should burn, and left to dry in the sun. To make the colour fast and deep, the process described is repeated three or four times."

In order to produce a pucka or fast red colour, the Mugh women of Chittagong mix the bark of the bakam tree, a bark
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of a tree called chamanho (gach huiti), jhuri, cocoanut oil, alum, and turmeric with a little water, and boil the decoction. On the fluid becoming thick, cotton or silk cloth is put in and boiled, after which it is dried in the sun. This process is repeated five to seven times.

85. The cloth to be dyed is immersed in an infusion of this flower, and then dried in the shade. A little acid or alum is sometimes added.

Singhar. The colour produced is known as basanti. Various shades of orange and red are produced by the intermixture of kusum flower, singhar flower, and turmeric. The processes have been already described above. For colouring liquor, a small quantity of dried corolla tubes of the flower is tied in a piece of cloth and kept in the receiver, while the distillation of liquor is going on. About half a tola is used in colouring 32 gallons of liquor.

86. As with singhar, the dyeing with palas is effected simply by steeping in the infusion obtained by boiling the flowers in water. Alum is sometimes added. The colour produced is a fugitive yellow inclined to red. Dyers use this colour in combination with other dyes, such as latkan, singhar, turmeric.

87. When silk is dyed with latkan, the process as described in the report from Murshidabad, is to mix a powa and a-half of latkan seeds with 15 seers of water and half a seer of sajimati, and to boil the whole with the silk to be dyed. The result is a yellow colour. Cotton may be dyed in the same way. In Nadia, the colour is made fast by the following process:—"The bark of the babul is pounded and boiled with water in an earthen pot. If cotton cloth is to be dyed, the cloth is steeped in the decoction thus prepared and kept for 24 hours. After drying it in the sun, it is steeped and kept for 12 hours in latkan solution obtained by boiling latkan seeds in water. The cloth is again dried in the shade, and then steeped for 6 hours in babul water. It is dried again, and then washed with pure water." This gives a fast orange colour. Silk is dyed in Nadia in the same way, with the following variation in the time for steeping:—"3 hours in babul water, 4 hours in latkan water, 3 hours again in babul water, and 18 hours in alum water."

88. The processes of dyeing are given in detail in Dr. McCann’s report. The following account obtained from Burdwan may, however, be inserted here:—"Sajimati is dissolved in water, strained, and then boiled. As the boiling goes on, the kamala powder is
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thrown into the liquid, boiled, and afterwards alum is added. When the mixture has been boiled for some time, the cloth to be dyed is dipped into the hot liquid and allowed to remain in it for some time till the proper yellow colour is obtained. The cloth is then washed and dried."

89. The process of dyeing with al, as followed in Patna and generally in other districts, where the al dye is used, is rather elaborate, and produces a fast red colour, which does not go off by repeated washes. It is thus described:—"The cloth to be dyed is first given to the washerman to clean thoroughly. It is then steeped into water, mixed with hurra (Terminalia chebula), and the cloth is then dried. This is done to fix the colour on the cloth. For a piece of five yards, it will be necessary to use two pice weight of the hurra. The cloth is then dipped into a mixture prepared of four parts of turmeric, four parts of lodh (Symplocos racemosa), and one part of alum. It is then again washed and dried. Pieces of al wood are well powdered. About ¼th or ¾rd seer of the powder is boiled for three or four hours with six seers of water. About a chitak of dhao flower (Woodfordia floribunda) is also put into it. The cloth to be dyed, which has been bleached, as previously described, remains dipped in it for all the three or four hours, and thoroughly absorbs the red colour of the al."

(c) Minor dyes for cloth and thread and the processes employed in dyeing with them.

90. Among the dyes that are less commonly used may be mentioned the following:—Manjiista (Rubia cordifolia), mehndi (Lawsonia alba), gab (Diospyros embryopteris), toon (Cedrela toona), kantal (jak) Artocarpus integrifolia. Very little information has been obtained from district reports of this dye. It is extracted in the usual way by steeping or boiling the pounded wood in water. The colouring matter is red. The processes employed in dyeing with this substance are given fully in Dr. McCann’s report.

91. It has already been mentioned, that mehndi is used largely as a toilet liquid both by men and women. Mixed with catechu, it gives a deep red dye for this purpose. From Monghyr, it is reported that mehndi is also sometimes, though rarely, infused to tint the borders of saris an orange colour. These saris are worn only on particular occasions.
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92. *Gabis* a junglyshrub, and grows wild in gardens and other places. It is never cultivated. *Gab* (*Diospyros Em-bryopteris*). The fruits which yield the dye can be had generally for the gathering, and are not sold, as a rule, in the market. Its use as a dyeing material chiefly consists in dyeing nets and timber, in caulking boats, and in colouring bamboo baskets and house fencings. The dye produced varies from light brown to black. In order to produce the best dye, the fruit when unripe is broken into small pieces and steeped in about twice as much water for three or four days together. The fruit is removed and thrown away, and the fluid is then gently heated and used as a dye.

93. The dust obtained from the sawings of *jak* wood is used by dyers for getting a basanti or yellow colour. It is generally used for silks. Ordinarily, cloth is coloured by simply steeping it in a solution obtained by boiling sawdust of *jak* wood in water. The silk dyers of Murshidabad use the following process:—"Sawdust of *jak* wood is mixed with the leaves of the *baks* plant (*Justicia adhatoda*), and then boiled in water. The decoction is then strained, and the cloth to be coloured is then immersed in the water thus obtained when a yellow colour is produced." From Chittagong the following interesting account has been received:—"The following process is used by Buddhist priests (Funghi) or by their disciples in dyeing the yellow robes worn by them. The heart of an old *jak* tree is immersed in cool water for two or three days, and then boiled in a brass pot with some alum. When the colour is sufficiently deep, the water is poured into a vessel—more is poured into the vessel containing the wood and more colour extracted. The cloth to be dyed is placed in a wooden dish and kept soaked with the dye for two or three days. It is then dried in the sun. The process is repeated from three to six times to the satisfaction of the Funghi."

94. The only districts from which information has been received of the *toon* dye are Shahabad and Muzaffarpur. The *toon* plant is, however, found in various districts of Bengal, and its flowers, which are generally collected and sold by the poorer classes, are used for producing a yellow colour. The following description of the processes of extraction and dyeing has been obtained from Muzaffarpur:—"One seer of *toon* flowers are boiled in two seers of water and kept on the fire until the
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quantity of the mixture is reduced to one seer. The liquid is then strained, and the cloth to be coloured is immersed in it, and then dried in the shade." The colour obtained is fugitive.

(d) Dyes for materials other than cloth and thread, and the processes employed in dealing with them.

95. The following account has been received from Burdwan for dyeing conch-shell ornaments:—

"Conch-shells are cut into circular bits by circular saws, especially made for the purpose. A few tolas of vermilion are well pounded on a smooth stone. The pounding must be such as to remove all hard particles and reduce the vermilion to a fine soft paste. This operation takes six or seven hours to produce the desired result. Then harital (yellow opriment) is mixed with it, and the two substances are rubbed together. Afterwards lac is added. This lac must be the resinous matter without the dye. The mixture thus obtained is warmed before a fire. By this means a red colouring substance is produced. The yellow colours used in these ornaments is obtained by a mixture of lac and harital, and a black colour is obtained by mixing a little indigo with the resin of lac. Churis or bracelet made of lac are dyed in the same way.

96. The process by which these are prepared and dyed was observed by the writer in Cuttack. It is substantially the same as is followed in all districts, and it will therefore not be out of place to add an account of it here. The principal material of which lac churis are made is lac. To three parts of dry lac one of red earth of the fields is added, and both are put into a handi or earthen pot, and set on the fire, and the mixture is constantly stirred with a stick until it becomes of the consistency of paste. The melted matter being well mixed is then poured out on a flat wooden board. When it has cooled a little, it is rolled with a wooden mallet into a stick. This stick or cylinder of prepared lac is then held up over a fire of coals kept for the purpose in an earthen pan, and as it softens by the heat, it is again rolled backwards and forwards on the board and reduced to the thickness of an ordinary wooden pencil. Pieces of the required length are then cut off from this thin stick of lac, and each piece is held up over the fire and the two ends of it are joined. This is then set on a
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conical framework of wood, seven to eight inches long, tapering from three inches in diameter at the base to two inches at the apex. To the centre of the cone is attached a cylindrical handle about 16 inches in length, which is held in the hand, while the upper framework is made to revolve over the fire. The *churi* is thus moulded into shape, and is smoothed with the blade of a knife when it cools and turns hard. It is taken out and another piece of lac is taken up, and the process is repeated. When five or six are ready, they are again put on the frame and held over the fire, and when they have softened a little, the first and the last *churis* are given a round shape and the intermediate ones are flattened down with the knife. Finally, a coating of lac, coloured red, yellow, green, or blue, according to choice, is put on each *churi*; and while the frame is held over the fire the *churis* are polished with the blade of a knife and with the edge each *churi* is cut and detached from its neighbours. A thread of lac is then put round the edge of each *churi*, and small bits of glass are set round the middle. The first and the last *churis* are covered over with tinsel to resemble silver. The *churis* are then ready for use. Coloured lac used for the coating is prepared in the following manner:

To three parts of lac one of *harital* is added to make the colour, yellow. For a red colour, one part *hingul* (country vermilion) is added to three parts of lac, and for a blue colour one part of indigo is added to three parts of lac. Half of *harital* and half of indigo, added to three parts of lac, give a green colour. The colouring matter is mixed with water and ground on a stone until reduced to the consistency of a thin paste. It is left in this state on the stone, while the lac with which it is to be mixed, having been placed in a piece of cloth, is melted over the fire until it becomes so liquefied, that it can easily pass through the cloth, when it is held over the stone containing the colouring matter and allowed to fall out in drops on the paint. The whole is then mixed with two sticks, and becomes coloured lac, and is wrapped round a stick and allowed to harden. In this way it is kept ready for use.

Coloured lac thread, referred to above, is made by drawing coloured melted lac into thread with a stick. This thread is put on the *churi* round the edges, and represents a raised border.

97. Lac is often used for coating wooden wares along with other materials. The other materials used are for the most part European, and the processes need not therefore be described here.
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98. *Kusum* flowers are used for dyeing *sola* articles. They are dried and steeped in water for two or three days. The juice is then pressed out by squeezing with the hands. It is then mixed with *garjun* oil or tamarind seed mordant, when it is ready for use, yielding an orange colour.

A red colour is also obtained with dye prepared from *palas* and *jaba* flowers. The petals of these flowers are dried in the sun from one to three days. They are then steeped in water and pressed with the hands until a red juice exudes. The petals may also be boiled in order to extract the dye. Lime and alum are added to the dye to make the colour more bright and lasting. The red dye is then painted on the articles to be dyed with a cloth brush, and they are then kept in the shade, as the sun's rays turn them white.

In order to obtain a yellow colour for *sola* articles, turmeric is pounded and mixed with water, and the mixture is then brushed on. The colour is fleeting.

To get a green tint, the juice obtained by squeezing the leaves of *sim* (*Vigna catiang*) plants is used.

In the production of these and other colours imported bazar powders are also used.

99. The colouring given to earthen vessels by potters is thus described in the Rajshahi report:

> "The colouring principally used on earthen pots is red, and is produced in the following way:— "A kind of laterite earth, called *lalmati*, is pounded and mixed with water and kept for three days. The sand is removed by filtration through a piece of cloth. The water left behind is allowed to evaporate for some days until a solid deposit is formed, which, when again mixed with water, is painted with a brush on the earthen pots after they have been dried in the sun. They are then put into the kiln, when the pots become coated with a red colour." In dyeing the pots black, no red paint is used. The holes of the kiln are shut, and oilcake is burnt with the fire. The smoke makes the pots black.

The potters of Manbhum are reported to give a red glaze to their wares with a kind of red earth known as *girmati*. This is probably the same as the red earth of Rajshahi. It is an impure sesquioxide of iron, which is used for painting houses in Cuttack and other districts.

Gunny-bags and pack saddles are also sometimes dyed with a solution of this earth.
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100. The following description has been received from Champaran of the method of dyeing liquor:

"The flowers of the Singhar (Nyctanthes arbor-tristis) plant are dried and kept until needed for dyeing purposes. A small quantity is then tied in a piece of cloth and kept in the receiver while the distillation of liquor is going on. About half a tola is used in colouring 32 gallons of liquor." Similarly, red sandal wood of the same quantity is put in the receiver, and the colour produced is light brown.

V.—MORDANTS AND AUXILIARIES.

101. In addition to the dyes mentioned in previous paragraphs, there are several substances which are for the most part employed as mordants, e.g., lodh (Symplocos racemosa), haritaki or hura (Terminalia chebula), dhainhul (Woodfordia floribunda), babul (Acacia arabica), chakunda (Cassia tora), omila (Phyllanthus emblica). Along with the above may be mentioned the following ingredients:—Alum, gum arabic, lime, kusis (Protosulphate of iron), sajimati (an alkaline earth). The bark and leaves of the lodh tree, which grows wild in the jungle, are used in dyeing. Lodh yields a principal dye; but as it is chiefly used as a mordant, it is mentioned here. Dr. McCann’s report states that lodh bark by itself yields a yellow dye, but no such mention has been made of this in the reports received now, which show that it is chiefly used as an auxiliary to lac, kamala, and al. The way in which it is used with lac and al has already been described. With kamala it gives a fast yellow colour. The process employed in getting the colour is thus described in the Patna report:—“Quarter seer of lodh, half a seer of sajimati, and 1 chitak of molasses are well mixed with 10 seers of water and then put on the fire for about three hours. The mixture is then taken down from the fire, and the thread to be dyed is then put into it and pressed hard with some heavy substance for about half an hour. The thread is then taken out and well wrung. Kamala powder is then well rubbed over it. The thread is again dipped into the mixture previously obtained and again put on the fire. It then acquires a fast yellow colour.” It is stated also in the Patna report, that a fresh green colour is obtained from the thread dyed yellow as above by dipping into an indigo solution and then into a solution obtained by mixing turmeric, hura, alum, and water.
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102. The fruit of the *haritaki* plant is used in dyeing. It will already have been seen that it is largely employed as an auxiliary with various dye-stuffs. It is also used extensively for producing black dyes in combination with protosulphate of iron. Interesting accounts have been received from the Sonthal Parganas, Manbhum, and Singhbhum of the processes employed in obtaining these black colours which are now reproduced.

In the Sonthal Parganas, waist bands and beaded strings are made from *tasar* thread, which is dyed black with *haritaki*. For this purpose, ripe and unripe *haritaki* berries are taken and well ground, and then mixed with water. The *tasar* thread is dipped into the mixture and allowed to remain for 12 hours. It is then taken out and dried and finally placed in black clay (*pankh*) for 12 hours. This process is sometimes repeated twice to obtain a black colour.

In Manbhum, the materials usually employed to dye black are—

1. *Haritaki*.
2. Boiled rice.
3. Iron.

The process is as follows. "The fruit of the *haritaki* is ground to a fine powder. It is then mixed with water and allowed to stand for some time. The water is then poured off, leaving the solid matter behind. The thread to be dyed is dipped into this water and then dried. This is repeated three times. The thread is then ready to dye, and the dye is prepared as follows:—A quantity of boiled rice is mixed with water and allowed to stand two or three days. The water is then poured off, and to it a quantity of clear water added. Into this are put a piece of iron, and the refuse of iron collected from a blacksmith's anvil and the whole is allowed to stand for six or seven days. *Hirakosh* is then added, and the thread to be dyed dipped into this mixture two or three times."

In Singhbhum, the substance to be dyed is put into a mixture of *haritaki*, iron dust, *hirakosh*, and Malacea bean (*Semicarpus Sp.*).

In other districts, the mixture for dyeing, as mentioned above, comprises only *haritaki*, water, and *hirakosh*.

*N.B.—* In Chittagong, a fast black dye is prepared from the powdered bark of the *gatia* shrub, which is probably a *Terminalia*. The powder is mixed with water and boiled. The water is then strained off and fresh water is added, and the boiling is commenced again. After three boilings, alum is added to the separated water, and the mixture is then poured over the cloth, which is kept moistened in a wooden dish. The mixture is rubbed in well with the hands and dried in the sun. The process is repeated four or five times until a fast black colour is obtained.
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103. The *babul* is a familiar tree in many parts of Bengal. The bark of this plant is used for dyeing to some extent, but the principal use to which it is put is that of tanning leather. In the report received from Monghyr, it is stated that *babul* bark, when boiled, dyes cloth of a *khaki* colour. It is made fast by throwing in a little mustard oil into the boiling water. A pale yellow colour is obtained from *babul* bark in the following manner:—“A *babul* solution being made by boiling in water, the cloth to be dyed is steeped into it, and dried. It is then immersed for eight hours in a decoction made from pomegranate (*anar*) rind, *singhar phut*, *alum*, goat’s milk, boiled together with water on a cowdung fire.”

*Babul* with *anar*, *kath* (*Acacia catechu*), *haritaki* and *kasis*, when added to an indigo solution, produce what is known as a *masti* (black) colour.

Very little information is given in the district reports of the other mordants mentioned above. Information about them will be found in Dr. McCann’s Report.

VI.—PRINTING-STUFFS AND PROCESSES EMPLOYED IN PRINTING.

104. The colour obtained from *al*, as already stated, is used extensively in stamping cloths in different fancy patterns. The cloths are stamped with moulds of different patterns engraved in wood. The process described in the Patna report is that substantially adopted by most calico printers, and is therefore reproduced here in full:

“A paste is prepared of about 1 seer of *resin*, ¼th seer of *alum*, ½th seer of *lool* (*Symplcocos racemosa*) and turmeric, well powdered and mixed with 4 seers of water. The paste is well rubbed with the hands, and then it is strained through a thin cloth. The ink thus obtained is used for stamping. After the cloth has been stamped, it is washed and dried. The cloth is then soaked in *al* water prepared as described above and boiled. The portions of the cloth covered with the stamps absorb the *al* colour, while the portions not so covered do not take the colour. This gives a beautiful red colouring of the cloth.”

A reddish black is also obtained thus:—

“Half-a-seer of molasses, 1 chitak of well powdered iron, and 1 chitak of *kasis* (*Protosulphate of iron*) are fermented with 10 or 12 seers of water for 10 or 12 days. After the
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ferment is complete, the mixture is strained through a cloth with the addition of resin and a small quantity of ghi. This gives the paste to be used for stamping. After the stamping is done, the cloth is washed and dried, and then soaked in al water as described above."

It will be interesting here to add the following account of the process of stamping silk cloth, as practised in Serampore in the Hooghly district:—

"Dhajul (Woodfordia floribunda), which is a red flower, is mixed with alum sofada, haridra, gum arabic, and sugar of lead, and then water being added to them, a cream colour is produced. Then additional water mixed with gum is put in wooden boxes of about 3 feet in length and 1½ feet in breadth. Over these boxes, filled with gum water, wooden frames, with oil cloth at the bottom, are placed, and over the oil cloth a blanket. On this blanket, the coloured liquid produced from the articles noted above is applied and brushed. Ultimately, the wood-cut patterns of various kinds tinged with this colour are pressed on the silk cloth spread on a table. The cloths thus dyed are then washed with water, and afterwards they are boiled in hot water with manjista (Rubia cordifolia), and the result is a beautiful cream or almond coloured (badami) stamped cloth."

Mr. Collin states in his Report on the Industries of Bengal that madder (Rubia tinctoria), cochineal (Coccus cacti), and turmeric are used in the silk-printing firms of Serampore, and that their dyes are fixed by the use of alum and sulphate of iron (Kasis). The stamps for printing are carved out of tamarind wood by artists in Barrackpore and show great skill.

From Gaya, it is reported that the Chapgars also use silver and gold, which they fix to the cloth by the gum prepared from babul wood. This tinsel painting is also largely done in Calcutta. Gold foil is generally applied on a violet ground and silver on red.

The patterns used in printing are chiefly floral or geometrical.

VII.—ARTICLES DYED AND PRINTED.

105. Cotton and silk are the principal articles dyed in this country, but besides these, woollen stuffs, as well as articles made of wood, pith, &c., are also dyed. The following list
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comprises nearly all the articles dyed in these Provinces by professional dyers:

1. Cotton cloth.—These include—

   (a) Loin cloths (dhuti). The chief colours in which these are dyed are—red, green, indigo-blue, purple, maroon, orange, and rose colour.

   (b) Sheets (chadar). The colours mostly used for these are—dull yellow, light green, rose colour, orange, and purple.

   (c) Napkins for the waist (gamcha). These are generally coloured yellow with turmeric.

   (d) Head cloths (Dopatta).—Coloured head-cloths are chiefly to be seen in Bihar. They are dyed red, blue, green, purple, in rose colour, and few other colours. Small caps are also dyed with the same colours.

   (e) Saris.—This dress of women is dyed mostly in the same colours as the dhoti. There is also a peculiar kind of dyed sheet, with a double hemmed border worn by women in Shahabad, which is known locally as chaddar. In the same district, masarku is a dyed cloth used by females of the lower orders.

   (f) Shirts (Jama, mirjai).—These are chiefly worn by Muhammadan khalasis (seamen), and are generally dyed blue. A small shirt is worn by Hindustani people, which is dyed in light colours generally.

   (g) Jackets (Kurta).—These are chiefly worn by the women of Bihar. Blue and khaki are very common colours for this garment. Bright colours of all kinds are used for short jackets and bodices worn by prostitutes.

   (h) Drawers (Pajjama).—These are only rarely dyed.

   (i) Quills (Balaposh, rajai or sujani) —The colours used are for the most part the same as those used for dhotis.

   (j) Umbrella cloths.—These are dyed in all colours, preference being given to yellow and green.

   (k) Bathing towels.—These are generally dyed yellow with turmeric.

   (l) Bed sheets and pillow cases and floor cloths —These are dyed in various colours.

(2) Cotton thread.—This is dyed in all colours, and is used for weaving cloth and carpets. In the Sonthal Parganas, threads are dyed for making waist bands and for stringing.
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In Cuttack also, cotton yarn is dyed and used for making patulis with tassels used for ornamenting the hair.

(3) Silk cloths.—These comprise—

(a) Gown pieces.—These are used by Bengalis for making coats, chapkans, chogas, &c., and also by Europeans for making dresses—hence the name.

(b) Korahs.—These are used for making garments as well for lining purposes.

(c) Alovans or chaddars.

(d) Motka dhotis and saris.—These being coarse looking are generally worn by poorer people.

(e) Handkerchiefs and scarfs.

(4) Silk thread (raw).—Silk thread is also dyed and then used for making shawls, saris, scarfs, chaddars, dhoties, and different kinds of plain, striped, checked, and bordered fabrics in the piece.

(5) Wool.—This article is dyed in Purnea for the manufacture of blankets.

(6) The following articles, which are now principally painted with English colours, may also be included in this paragraph as among those for which indigenous dyes are used to some extent, viz., conch-shell ornaments, wooden toys, pith toys, earthen toys and idols, earthen pots, baskets and other articles made of bamboos or split cane, gold and metal ornaments, leather, gunny-bags, and pack saddles.

7. Besides the above, cloths both of silk and cotton are also stamped in different fancy patterns, comprising saris, dhotis, quilts, bed sheets, pillow cases, and floor cloths.

VIII.—COLOURS PRODUCED.

106. From what has been described above, it will be seen, that the chief colours produced by native dyers from indigenous products and used for dyeing cotton clothes are:—Red, blue, yellow, and black. These are the simple or primary colours. Besides these, the following compound colours are also very common:—Orange, green, and purple. A great variety of different shades of the above colours are also produced by varying the proportions of dyeing materials. A list of the more important colours with the cost of dyeing each colour will be found in the next paragraph. Suffice it to remark here that some of the more favourite shades are:—Surkh (deep
Dyes and Dyeing in Bengal.

red), golabi (rose colour), pieyji (onion colour), surmai (dark blue or blue-black), asmani (sky blue), basanti (deep yellow), badami (almond colour), baiguni (purple), narangi (orange), champai (deep orange), gulnarin (pomegranate red), and kakraja (maroon).

Mr. N. G. Mukerji, Sericultural Assistant of the Agricultural Department, states that in Bengal the favourite colours recognized in the dyeing of silk are:—(1) deep blue or indigo black, (2) light blue or grey, (3) red or light red, (4) yellow, (5) orange, (6) green, (7) purple, (8) chocolate colour, (9) sonali (gold colour), (10) asmani (sky blue).

IX.—COST OF DYEING AND PRINTING.

107. The cost of dyeing cannot be given exactly, as much depends upon the supply of material and labour, and upon the nature and intensity of the colour required. It can, however, be roughly said that the approximate average cost of dyeing a seer of cotton in these Provinces is about eight annas and that of a seer of silk about Rs. 2.

Below is appended a table showing prices of dyeing some of the commoner shades of colours, as ascertained by me in Bihar and Calcutta. Though given in different terms, the prices appear to agree more or less with each other, and may be taken as fairly representative of the average charges of dyeing in these Provinces:

<table>
<thead>
<tr>
<th>NAME OF COLOUR</th>
<th>Price in Bihar for dyeing cloth, length 1 yd. and breath 1½ yds. (i.e. 18 giras).</th>
<th>Price in Calcutta for dyeing a sari 5 yds. long and breath 1½ yds. (i.e. 18 giras).</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Abi (light sea blue)</td>
<td>Rs. A. F. 0 0 3</td>
<td>Rs. A. F. 0 0 2 1</td>
</tr>
<tr>
<td>Asmani (sky blue)</td>
<td>...</td>
<td>0 0 6 0 3 0</td>
</tr>
<tr>
<td>Badami (almond colour)</td>
<td>...</td>
<td>0 0 3 0 3 0</td>
</tr>
<tr>
<td>Baiguni (purple)</td>
<td>...</td>
<td>0 0 3 0 3 0</td>
</tr>
<tr>
<td>Basanti (deep yellow)</td>
<td>...</td>
<td>0 0 3 0 3 0</td>
</tr>
<tr>
<td>Champai (deep orange)</td>
<td>...</td>
<td>0 0 3 0 3 0</td>
</tr>
<tr>
<td>Dhani (yellow green)</td>
<td>...</td>
<td>0 0 3 0 3 0</td>
</tr>
</tbody>
</table>
Dyes and Dyeing in Bengal.

<table>
<thead>
<tr>
<th>Name of Colour</th>
<th>Price in Behar for dyeing cloth, length 1 yd. and breath 1½ yds. (i.e. 18 giras)</th>
<th>Price in Calcutta for dyeing a sari 5 yds. long and breadth 1½ yds. (i.e. 18 giras)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gandaki (sulphur hue)</td>
<td>Rs. 0 6</td>
<td>Rs. 0 3 0</td>
</tr>
<tr>
<td>Golabi (rose)</td>
<td>Rs. 0 6</td>
<td>Rs. 0 3 0</td>
</tr>
<tr>
<td>Gulanar (pomegranate colour)</td>
<td>Rs. 0 1 6</td>
<td>Rs. 0 8 0</td>
</tr>
<tr>
<td>Kakreja (maroon)</td>
<td>Rs. 0 1 0</td>
<td>Rs. 0 6 0</td>
</tr>
<tr>
<td>Kasimi (light purple)</td>
<td>Rs. 0 0 3</td>
<td>Rs. 0 2 2</td>
</tr>
<tr>
<td>Masi (black)</td>
<td>Rs. 0 1 0</td>
<td>Rs. 0 6 0</td>
</tr>
<tr>
<td>Narangi (orange)</td>
<td>Rs. 0 0 6</td>
<td>Rs. 0 3 0</td>
</tr>
<tr>
<td>Nil (indigo blue)</td>
<td>Rs. 0 0 9</td>
<td>Rs. 0 5 0</td>
</tr>
<tr>
<td>Piyaji (onion hue)</td>
<td>Rs. 0 0 3</td>
<td>Rs. 0 2 0</td>
</tr>
<tr>
<td>Sabuz (green)</td>
<td>Rs. 0 0 6</td>
<td>Rs. 0 3 0</td>
</tr>
<tr>
<td>Sharbat (light yellow)</td>
<td>Rs. 0 0 3</td>
<td>Rs. 0 2 0</td>
</tr>
<tr>
<td>Surmai (blue-black)</td>
<td>Rs. 0 1 0</td>
<td>Rs. 0 5 2</td>
</tr>
<tr>
<td>Surkh kusum (deep red)</td>
<td>Rs. 0 1 0</td>
<td>Rs. 0 6 0</td>
</tr>
</tbody>
</table>

[N.B.—Illustrations of the above colours will be found in page iii, Appendix II.]

108. Silk.—The cost of dyeing the chief colours in silk are stated by Mr. N. G. Mukerji to be as follows:

<table>
<thead>
<tr>
<th>Name of Colour</th>
<th>Cost per seer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td>Rs. 3 4 0</td>
</tr>
<tr>
<td>Green</td>
<td>Rs. 1 1 0</td>
</tr>
<tr>
<td>Grey</td>
<td>Rs. 1 0 0</td>
</tr>
<tr>
<td>Kamala (orange)</td>
<td>Rs. 0 11 0</td>
</tr>
<tr>
<td>Purple</td>
<td>Rs. 2 8 0</td>
</tr>
<tr>
<td>Red</td>
<td>Rs. 2 8 0</td>
</tr>
<tr>
<td>&quot; (light)</td>
<td>Rs. 1 8 0</td>
</tr>
<tr>
<td>Yellow</td>
<td>Rs. 1 0 0</td>
</tr>
</tbody>
</table>

109. The charge for stamping cloth is reported from Patna to be ½ anna per yard, and from Gaya 5 annas for a piece of cloth sufficient for 1 quilt. The charge from Monghyr is reported to be 2 annas per square yard, and from Rajshahi from 5 to 8 annas per piece of cloth. The charge as ascertained by me in Calcutta is 5 annas per piece of cloth, which is ordinarily 5 yards long and 1½ yards (18 giras) broad.
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X.—**Prices of Materials Used in Dyeing and Printing.**

110. The value of dyeing and printing stuffs varies in different districts with local circumstances. The following, however, are approximately the average prices of some of the principal materials used:

1. **Indigo.**—The prices quoted vary from Rs. 2.8 to Rs. 5.8 a seer.

2. **Lac.**—The price has only been quoted in the Rajshahi report, and is stated to vary from 14 annas to Re. 1.8 per seer.

3. **Turmeric.**—The price varies from two to three annas per seer.

4. **Kusum.**—(Safflower) Up-country safflower is much cheaper than that obtained from Dacca. From enquiries made at Calcutta, it was found that whereas the former sold for about Rs. 10 per maund, the latter cost as much as Rs. 30 to Rs. 40 per maund. These quotations appear to be supported by those received from different districts. While in some districts, the price is quoted as varying from 3 to 5 and 8 annas per seer, in other districts the price is said to be as high as Re. 1 per seer.

5. **Lalchan.**—In Murshidabad, the price of lalchan wood is said to be Rs. 20 per maund.

6. **At wood.**—The price is only quoted in the Chittagong report, and is said to be Rs. 4 to Rs. 5 per maund.

7. **Sajimati.**—(Fuller’s earth, an alkali).—The average price is about 1 anna per seer.

8. **Kasis (Protosulphate of Iron).**—The price varies from 1 ½ to 2 annas per seer.

9. **Hurra (Terminalia chebula).**—The average price is one anna per seer.

10. **Lime.**—The average price is one anna per seer.

11. **Molasses.**—The average price is one anna per seer.

12. **Alum.**—The average price is 2 annas per seer.

It is to be remembered that many of the substances used as dye-stuffs are to be obtained for the picking, and have really no commercial value, being found growing wild in gardens and jungles.
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XI.—PROFITS ARISING FROM DYEING AND PRINTING.

111. From the remarks made in a preceding paragraph, it will be seen that the earnings obtained from dyeing cloth are very small. The profits obtained are certainly such as to attract no competition. The following calculations have been made to show very roughly what these profits may be:

In order to dye cloth blue-black, a colour which finds favour largely with customers, the materials that would be worked, with their quantities and costs, would be as follows:

<table>
<thead>
<tr>
<th>Material</th>
<th>Rs.</th>
<th>A.</th>
<th>P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigo (1 seer)</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sajimati (2 seers)</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Kusum (12 seers)</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Acid, &amp;c.</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Labour of two men</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

These materials would suffice to dye 8 thans each containing 25 yards of cloth. All these thans could be dyed if necessary by two men in the course of a day. Approximately therefore Re. 1 represents the cost of labour and materials per than. An anna a yard would be the price paid to the dyer for such colouring, which for a than of the above measurement would amount to Re. 1-9. This would give a profit of 9 annas to two men in a day, or 4½ annas per man per day.

In order to dye cloth red with kusum flower, a colour which is very much appreciated and especially by weavers, the following would be the cost:

<table>
<thead>
<tr>
<th>Material</th>
<th>Rs.</th>
<th>A.</th>
<th>P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kusum flower</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sajimati</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Tamarind or mango acid</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Labour</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1</td>
<td>11</td>
<td>2</td>
</tr>
</tbody>
</table>

With the above, 8 saris could be dyed each 5 yards in length. The charge for dyeing being on an average 1 anna per yard, the dyer would get Rs. 2-8 for the eight saris dyed. This would leave a profit of about 12 annas for two men, or six annas for each man.

The profits would differ with different colours. It may be, however, generally stated that the profits of the dyer vary ordinarily from four to eight annas per day.
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112. The following calculation has been made to show profits arising from printing. Six ordinary pieces of cloth, which generally measure 5 yards x 18 giras (i.e., 1½ yard), may be dyed in sondali (a favourite colour for printed cloths) and stamped at a cost of Re. 1-7. A printer working the whole day could print 10 saris, but he seldom gets so much work except on festival occasions. The man from whom the present enquiry was made prints from 150 to 200 saris per month, i.e., about six saris per day. The charge for each sari is five annas, i.e., Re. 1-14 for six saris. This gives a profit of seven annas per man per day. The figure thus arrived at closely corresponds with the profits actually got by the printer from whom the information was obtained. At the very outset, it was stated by him that his monthly profits amounted to Rs. 15.

XII.—UTENSILS, &c., USED IN DYEING AND PRINTING.

113. The dyer's plant consists of simple country-made articles, viz.—(a) a large earthen vessel, which is used as a vat for keeping and mixing colours, called a gomli or mat in Bengal and chor in Bihar; (b) two to five smaller earthen pots called arthras or nads, or dobas, also used for holding liquid dyes; (c) a large earthen vessel (jalo) for water; (d) an ordinary pestle and mortar of stone used for pounding dye-stuffs, known as the silinor in Bengal and lohra silant in Bihar; (e) a larger pestle and mortar of wood (not to be found in all shops); (f) a cocoanut shell used as a spoon for removing liquid dyes from one vessel to another; (g) a wooden filter frame, on which a piece of cloth is suspended in the form of a bag known as the manji or majikut; and (h) a stirring stick for mixing dyes called the dandi or kati. The average cost of the above is as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Rs</th>
<th>A</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gamlah</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5 Arthras</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>1 Jala</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>1 Silinor</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>1 Large pestle and mortar</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1 Cocoanut shell</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1 Filter frame with cloth</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1 Dandi or kati</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

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114. The plant of the printer consists of—

(1) A wooden table, called a chauki or maj. It may be high or low, so that the workman may do his work either seated or standing. The price varies according to size from 8 annas to Rs. 2.

(2) An earthen gamla or vat for holding the dye. Price 1 anna.

(3) A small wooden box holding dye into which the printing block is dipped before stamping. The price varies from 8 annas to Re. 1-8.

(4) Printing blocks.—These are generally made of bael or tamarind wood. They are of all sizes and engraved in all patterns. The price depends upon the size and pattern, and ranges from 1 anna to Rs. 4 each.

(5) A brush. Price 2 annas.

(6) A blanket to be placed on the working table under the cloth to be stamped. Price Re. 1-8.

(7) A piece of white cloth to be placed over the blanket. Price 6 annas.

For tinsel work, a second gamla is necessary, which is used as a stove, as well as an earthen saucer in which glue is heated over the stove. The price of these two vessels is about 2 annas.

[N. B.—(a) Illustrations will be found in pages iv and v, Appendix III showing dyeing and printing utensils, and dyers and printers at work.

(b) Illustrations of stamped patterns will be found in pages vi, vii, viii, ix, Appendix IV.]

XIII.—THE MANNER IN WHICH DYERS DISPOSE OF THEIR GOODS.

115. The professional dyer of cloth, as a rule, has no goods to dispose of. He merely dyes cloth or thread brought to him. There are, however, some exceptions to this general rule. Wherever weaving and dyeing are combined, cloths are dyed for sale in the local market by the weavers themselves. Traders from Calcutta in certain cases go into the mufussal, and buy dyed clothes of special value, e.g., the dyed clothes made by the weavers of Bankura or the silks made and dyed in Murshidabad. From Chittagong, it is reported, that Mugshe dye silk and cotton cloths sufficient for local consumption and for export. Similarly silk and cotton dyed clothes are sometimes exported from other places, e.g., from Barh in Patna and
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Jajpur in Cuttack, where the dyeing is done altogether by weavers. Quilts are also dyed for export in Murshidabad. Carpet weavers who dye their own threads and then weave them into carpets often sell their own articles. Sometimes, when a dyer is sufficiently well off to employ subordinate dyers under him, though not combining weaving with dyeing, he plies a regular trade in dyed clothes. Printers also generally print the cloth supplied to them, and do not keep ready-made printed clothes for sale. The Serampore printed handkerchiefs, which are largely exported for sale, are an exception to this rule.

When the manufacture of dyes is carried on on a large scale, e.g., the manufacture of lac, the dye is made for sale, and finds a place in local as well as in distant markets.

Other articles that are dyed, such as wooden and sola toys, earthen toys, &c., are always sold in fairs or local markets.

XIV.—Classes by whom Dyed and Printed; Clothes are Worn.

116. The Hindus of Lower Bengal use coloured cloths only to a limited extent. It is generally the younger women and girls who wear coloured saris on festival occasions, otherwise white cloths are preferred. In Bihar, coloured clothes are more common, especially among women. Muhammadans as a rule show a greater partiality to coloured clothes than Hindus. It is quite a familiar sight in Calcutta and elsewhere to see Muhammadan kholatis (sailors) and bhistas (water-carriers) always in coloured habiliments. In Bihar, most of the poorer Muhammadans will be found wearing coloured head pieces. Muhammadan women are not as fond of colours. Coloured cloths are also universally used in these Provinces by prostitutes. Stamped cloths are mostly patronized by Muhammadan women.

N. N. Banerjei,

Assistant Director of Land Records

and Agriculture, Bengal.
# APPENDIX I.

List of dye-producing plants as obtained from District Reports.

<table>
<thead>
<tr>
<th>Vernacular Name</th>
<th>Botanical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td></td>
</tr>
<tr>
<td>Achhu</td>
<td>Morinda citrifolia.</td>
</tr>
<tr>
<td>Am</td>
<td>Mangifera indica.</td>
</tr>
<tr>
<td>Amera</td>
<td>Phyllanthus emblica.</td>
</tr>
<tr>
<td>Amultas</td>
<td>Cassia Fistula.</td>
</tr>
<tr>
<td>Anar</td>
<td>Punica Granatum.</td>
</tr>
<tr>
<td>Aparajita</td>
<td>Terminalia tomentosa.</td>
</tr>
<tr>
<td>Asumchhal</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td></td>
</tr>
<tr>
<td>Babla (Babul)</td>
<td>Acacia arabica.</td>
</tr>
<tr>
<td>Bakam (Tari, Senhya)</td>
<td>Cossalpinia sappan.</td>
</tr>
<tr>
<td>Rakas</td>
<td>Justicia adhatoda.</td>
</tr>
<tr>
<td>Bara Chandra</td>
<td>Zizyphus jujuba.</td>
</tr>
<tr>
<td>Bor</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td></td>
</tr>
<tr>
<td>Chainaho</td>
<td>Michelia champaca.</td>
</tr>
<tr>
<td>Champa</td>
<td></td>
</tr>
<tr>
<td>Chhetalung</td>
<td></td>
</tr>
<tr>
<td><strong>D</strong></td>
<td></td>
</tr>
<tr>
<td>Dawakaphut</td>
<td>Woodfordia floribunda.</td>
</tr>
<tr>
<td>Dhyphul</td>
<td></td>
</tr>
<tr>
<td>Dhao</td>
<td></td>
</tr>
<tr>
<td>Dhawn</td>
<td></td>
</tr>
<tr>
<td><strong>G</strong></td>
<td></td>
</tr>
<tr>
<td>Gab</td>
<td>Diospyros embryopteris.</td>
</tr>
<tr>
<td>Gatica</td>
<td>Tagetes patula.</td>
</tr>
<tr>
<td>Genda</td>
<td>Ficus glomerata.</td>
</tr>
<tr>
<td>Gular</td>
<td></td>
</tr>
<tr>
<td><strong>H</strong></td>
<td></td>
</tr>
<tr>
<td>Halad (Huldi)</td>
<td>Curcuma longa.</td>
</tr>
<tr>
<td>Hans, Haritaki (Harra, Harida)</td>
<td>Terminalia chebula.</td>
</tr>
<tr>
<td>Hansinghar (Sephalika, Seoli, Singhar)</td>
<td>Nyctanthes arboristis.</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX I—concluded.

<table>
<thead>
<tr>
<th>Vernacular Name</th>
<th>Botanical name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
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<td>Hibiscus rosa-sinensis.</td>
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<td>Eugenia jambolana.</td>
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<td>Kachnar</td>
<td>Bauhinia variegata,</td>
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<td>Kamala</td>
<td>Mallotus philippinensis.</td>
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<td>Kanthal</td>
<td>Artocarpus integrifolia.</td>
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<td>Kesraj</td>
<td>Wedelia calendulacea.</td>
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<td>Khair (Papri khair, kuth)</td>
<td>Acacia catechu.</td>
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<td>Manjist (Manjista)</td>
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<td>Paras (Pulas)</td>
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A MONOGRAPH ON CARPET-WEAVING IN BENGAL.

HISTORY.

 Carpets fall under two heads. The most ancient are those that are produced by weaving, and the more modern are those that are produced by both looping and weaving. Sir George Birdwood thinks that the former (called darris and satranjis), "illustrate the most ancient ornamental designs in India, perhaps earlier even than the immigration of the Aryans." At Amreli in the Baroda State, and in other parts of Southern India, darris are made in which complicated patterns are woven in, depicting hunting scenes, etc. The manufacture of pile-carpets (called kalins, galichas, dulichas, and asans) was probably introduced by Persian workmen and their descendants, who followed in the wake of the Muhammadan conquerors, to the principal ruling cities of India. Persia was recognised by the Muhammadan rulers as the home of the best carpets, and they delighted in importing prayer-mats and floor-rugs for their personal use from that country. On settling in India, the workmen from Persia reproduced the famous fabrics in this country, and taught the art to the natives. Kalins or galichas and asans have their pile made of wool, and dulichas of cotton. The warp and the woof are nearly always made of cotton. Patna was at one time famous for its pile-carpets, though the industry has practically died out within the past few months. In the district of Gaya where the industry is carried on at Obra, Koraipur, and Daudnagar, it was introduced by Nawab Daud Khan, a Rasaldar of the Emperor Aurangzeb, who founded the town of Daudnagar about the latter part of the 17th century, on receiving a grant of parganas Anchha, Manora, and Goh, as a reward for his conquest of Patama. The original manufacturers were brought from Delhi, Agra, and Mirzapur, and the present carpet-weavers of Gaya trace connection with the district of
Mirzapur and to Nizamabad in the district of Azamgarh. Darris and satranjis are made in Patna, Gaya, Bhabua, Champaran, and Bihar, and in Rangpur in Eastern Bengal. In support of Sir George Birdwood's theory of the Hindu origin of cotton darris and satranjis, and the Muhammadan origin of woollen kalins, may be pointed out the fact, that in 1901 out of 413 woollen carpet weavers 328 were returned in the Census reports as being Muhammadans and only 85 as being Hindus; while among 1,415 cotton carpet and rug makers, 728 are returned as being Hindus, 685 as being Muhammadans and 2 as being Animists. The cotton carpet sellers are however more Muhammadans than Hindus. Of the 1,542 cotton carpet sellers, 911 are returned as Muhammadans and 631 as Hindus. At Obra the two carpet merchants are both Hindus, and at Daudnagar also the carpet merchant is a Hindu.

2. The carpet-weaving industry never took hold of Murshidabad or Calcutta. The damp and warm climate of lower Bengal is unsuitable for rearing sheep or using carpets to any extent, and the mat-weaving industry of lower Bengal may be regarded in the light of a substitute.

3. The carpet-weavers, like all good artisans of India, are extremely reticent to outsiders about the details of the industry. They suspect that the motive of any enquirer into the state of their industry is to take the bread out of their mouths. The Collector of Patna says, "no amount of assurance on my part could reassure their suspicious minds."

THE INDUSTRY IN JAILS.

4. Considering the low state of the industry at present, the manufacture of darris, satranjis and pile-carpet, carried on with profit in jails, cannot be said to do the industry any harm. Though Sir George Birdwood and Mr. T. N. Mukharji are both very much against the jails manufacturing these articles, it is very doubtful if the industry would have lived at all in its higher branches, but for the encouragement given to it in jails. There some pieces of fairly good pattern are always ready for sale, and the Jail Depot in Calcutta has always a fine collection for
show and sale, including a collection of patterns. The difficulty with
native weavers working on their own responsibility is, that they
always need to be given an order often several months in advance
and some earnest money. Any pieces they may have ready without
previous order are always got hold of by their money-lenders or by
carpet merchants, who leave to the weavers very little margin of
profit. The mahajans will not buy from the weavers any really fine
pieces of carpet, as they are expensive. It is only the local rich
dealing direct with the weavers that can afford to wait for a good
piece of carpet, and to pay a portion of the price in advance.
But even they are so particular about the price they pay, that they
seldom get any really good stuff. The local rich are usually not
enlightened enough to encourage local art, and the art consequently
dwindles; and if it had not been for the jails keeping up a high
standard of efficiency in the art, and a stock always ready for sale,
the industry might have died out altogether. Travellers and travelling
merchants buy the best stuff they can get from the shops,
which are at best poor. They cannot afford to advance money and
wait. The quantity of carpets turned out by jails is comparatively
so little, that beyond keeping up a demand and a taste for Indian
carpets, they do little else, and the creation of the demand and the
taste helps to keep up the lower branches of the industry. The
consequence is that the number of carpet-weavers has increased
within recent years, though that of good carpet-weavers has steadily
deprecated since the days of Muhammadan patronage. In fact the sale
of Jail carpets represents, on the whole, the patronage offered to
the art by the British Raj, whose principles of Government are,
and must be, different from those of the Muhammadan rulers in
the matter of patronage of art-ware, mainly because no Governor
or District Officer can wait very long for a good article, and the
Jail articles are good enough for their purpose for taking home on
furlough or retirement. Even the Nepal Durbar grew impatient
of advancing money to the Kalinbafs of Patna, and went to Mirzapur
in the United Provinces for their supply. For want of patron-
age the work had to be readjusted and the weaving of high class
carpets had to be practically given up. Under such circumstances
the jails stepping in only keeps the knowledge of the art alive
among a number of people, and offers a source of supply of carpets without advances. The jail does another very useful thing. In the Jail Depot patterns can be purchased, and with patterns weaving of carpets is a comparatively easy art. In the case of the village weaver, the pattern is in the mind of the workman.

5. The system of weaving in vogue in Jails is an improvement over the ordinary native system. For the sake of economy, the native weaver sits at the end of his room, with his back against the wall, with his feet in a long hollow before him and the warp in front of him, so that the light from the entrance to the room or windows is interrupted by the web, in front of him. In the Jail the light falls directly on the web, the space between the loom and the wall not being utilized. In the Jail, all the thread used is new, though clippings from darri-weaving are often utilized for making cotton pile-carpets, as in the Chaibassa Jail. The panja used has a straight handle and ten forks, and it is usually manufactured in the Midnapore Jail. The shears used are English spring-shears and not the uncouth scissors of local manufacture. The teasing needle employed after each series of looping and putting in of the woof is not used by village weavers.

EXTENT OF THE INDUSTRY AND ITS INDUSTRIAL POSITION.

6. The carpet-weaving industry of Bengal is of very minor importance, the total number, including dependent members of families who subsist on it, being less than 5,000. In 1891 the total number of woollen carpet-weavers was 371, and of cotton carpet-weavers and sellers 2,169, against 413 and 4,004, the corresponding numbers in 1901. It cannot be therefore said that the number of carpet-weavers and their dependents within recent years has been going down, though the tendency of late years no doubt has been towards turning out cheaper articles for which there is greater demand, i.e., darris, dulichas, and asans, instead of carpets proper. Of the 413 woollen carpet-weavers, the actual workers consist of 181 males, and 1 female, while their dependents number 223. Only one person is returned as partly depending on agriculture. Of the cotton
carpet and rug makers, 501 are males, 111 female workers, 830 dependents, and only 36 of the 501 actual male workers are returned as partially depending on agriculture. This shows that these people are only slightly less prosperous than the woollen carpet-weavers. Of the 1,541 carpet-sellers, there are 617 males, 392 female workers, and 549 are dependents; and of the 617 male workers, only 17 are returned as depending partly on agriculture. This class, therefore, though prosperous, is obliged to employ their women more than the weavers. The comparative prosperity within late years of the carpet-weaving industry is indeed a sign of the prosperity of this Province, and is a refutation of the theory of some who think that the Province is annually getting poorer. But it must be admitted that high class carpets are scarcely ever made now-a-days for the native gentry, and this is attributed to the impoverished condition of the higher classes among natives. But it is partly at least due to apathy also.

7. What has been said here about the industry generally will be supported by the statements contained in the report from Patna which has still the largest number of carpet-weavers in Bengal. The report makes the following remarks:

8. "Patna.—The Census Report of 1891 gives some useful information, but in the last Census the number of persons engaged in carpet-making was not separately shown. The calculation in families is only an attempt at an approximation based upon local investigation.

"I.—KALINS.

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<th>About 25 years ago</th>
<th>About a decade ago</th>
<th>Present day</th>
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<td>100 families</td>
<td>Not given.</td>
<td>14 or 15 families</td>
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"Though the present number is given as 15, some of these take up kalin-making only now and then. There were only two proficient kalin-makers in 1891. Now, only one, Khodabux, ekes out a precarious living from his profession.

* From personal enquiry, I found that Khodabux was too old and feeble to do any work, and that his two sons had given up carpet-weaving and taken to weaving of darris.
II.—PANJA (OLD LOOM).

About 25 years ago.  About a decade ago.  Present day.
...
...  200 families ...
...  25 families.

III.—KARGA (NEW LOOM).

About 25 years ago.  About a decade ago.  Present day.
Non-existent ...
...  50 families ...
...  600 families.

"The Census Report of 1891 gives the total number of carpet-makers as 921, almost equally divided between male and female. The present number may be put down at about two thousand."

9. Thus the re-adjustment of the industry on new lines in the district of Patna has been for the good of the industry, though an aristocratic industry has been democratized. The weavers themselves are generally more prosperous now, and they do not feel the need of troubling their women to partake of the industry to that extent to which they did in former years. The Collector of Patna remarks: "One fact stands out from this brief survey, viz., that utility and economy are taking the place of refinement and luxury. The struggle for existence is becoming keener in the upper classes of Indian Society. The blanket has superseded the kalin; the karga darrī is more durable* and valuable than panja, its predecessor." A large number of carpet shops may be seen in the Sultanganj mahalla of the city.

10. In the district of Patna, carpet-making is practically confined to the Patna city. In fact, Patna is the great seat of darrī manufacture in Bihar. The manufacture of kalin is practically extinct; cotton dulichases and woollen asans are still made in the jurisdiction of thanas Sultanganj and Alamganj in Patna city; darrīs and satranjis are made in Sultanganj, Alamganj, and Peerbahore, also by 3 families at Bhasasur, Bihar town, by a few families at Dinapore, and in the local jail. Cotton dulichases, 6 feet by 3 feet, are sold for annas 14 each. These are however made out of thread spun from old quilts. Asans, 1½ ft. by 1½ ft. are sold for 4 annas each. The warp and woof of asans are made of old cotton, but the pile is of new wool. The

* It is not correct to say the karga darrīs are more durable that the old panja darrīs.
number of warp threads in each of the two layers of the 1\(\frac{1}{2}\) ft. of asans is 124. In the Patna Jail, darris are sold for Rs. 1-10-6 per seer, the cost of the dyed material being Rs. 46 per maund. The only galicha of Patna make which I saw is at the house of Babu Purnendra Narain Singh. But this was made several years ago.

11. Gaya.—In Gaya there are 42 men at Obra and 5 at Daundnagar who can manufacture kalins. The workmen who are usually relations of a master-weaver earn about 4 annas a day (after the period of apprenticeship is over) and the master earns about Rs. 10 or 12 a month. The carpet-weaving industry goes on briskly at Obra, and the fact that Hossan Bux, one of the master-weavers, lost 6 men from plague and the whole village 11, is considered a great loss to the village, as they were all getting full work when they were living. The best carpets in Bengal are made to order at Obra by five weavers named Sobrati, Doman, Hossan Bux and his brother Raji Mian, and Matbar. These are able to dye yarn with native dyes and turn out high class fabrics if they get the price. They are also able to reproduce any pattern, if the pattern is sent to them. Sobrati is regarded by the whole village as the ostad or the expert. He had gone off his head, but now he is well, and though still deep in debt, he is able to work. He employs three relations and turns out common asans for which the demand is unlimited. Doman employs five relations, and the female members of his house help in the preparation of the warp and the dyeing of the thread. Hossan Bux has the largest establishment of all, employing five relations and three servants in turning out both kalins (galichas, dulichas and asans) and darris. Raji Mian employs two relations and a servant. He also turns out both kalins and darris. Matbar has two servants. The other kalin-makers produce 9 inches by 9 inches asans, which are required for ceremonial purposes by Hindus. These are sold at 1 to 2 annas apiece as the stuff is quite worthless. The principal satranji makers of Obra are Sakawat, Akbar Ali, and Ali Raja. The place being out of the way, few orders come, and the men are never prompt in carrying out orders. The weavers are, however, constantly employed in turning out articles which the two resident mahajans will buy. The names of the two firms of mahajans are (1) Chunilal Hazari Lal and (2) Hazari Lal.
12. Shahabad.—In Shahabad, *darris* and *kalis* are made in the Arrah Jail, in the town of Sasaram, in Nasiriganj, Chenori, and at Bikramganj, all in the Sasaram sub-division, and at Bhabhua. There are about 16 families of *Kalibafs* in the town of Sasaram, and 10 families of butchers follow the profession of *dari*-making while following their hereditary occupation also. In the town of Bhabhua there are 38 families of *Kalibafs* who weave *darris* only. They have 20 looms among them. The condition of the *Kalibafs* of Sasaram is fairly prosperous.

13. Champaran.—In Champaran, the *dari* and *satangi*-making industries are carried on to a fairly large extent, specially at Mehsi and Gobindagunge, where cotton cultivators do both spinning and weaving. Machine-made yarn is however oftener used. The jail-made *darris* are preferred to those made in villages. According to the Census Report for 1891, Champaran had 672 persons depending on *dari*-weaving that year. The census report for 1891 gives no separate figures for carpet and *darris* weavers for the different districts, and the district report gives no further information on the point.

14. Muzaffarpur.—In Muzaffarpur, the industry is practically confined to the towns of Muzaffarpur and Hajipur. There are 88 persons engaged in the industry at Muzaffarpur, and the total value of the carpets, annually made in the district is only Rs. 6,000.

15. The industry is not considered a flourishing or a profitable one, and the monthly savings of individual weavers have been estimated at only Rs. 3 or 4. The best carpets in Bengal are made in the Muzaffarpur (as well as Bhagalpur) Jail.

16. Other Districts.—In Hazaribagh, Singhbhum, Manbhum, Bhagalpur and Saran, the industry is carried on in the jails only. At the Purulia Industrial Show, Miss Shushila Biswas exhibited a few specimens of hand-made woollen carpets. Hand-made *asans* for sitting on were also exhibited at Khulna, at the last Agricultural and Industrial Show.

**CARPET WEAVING SCHOOL.**

17. The carpet-weaving establishments of jails may be looked upon in the light of schools. Unfortunately when the prisoners go
out they never take to the industry, and the teaching is thrown away on them. They have not the capital to start on their own account, and it would be well if a company or an association were to employ them after their release. There is one school for girls conducted by the Church of England Zenana Mission Society at Barnagore, north of Calcutta, where the weaving of galichas and asans is taught to the girls by a professional weaver from Mirzapur.

18. The Rev. Dr. Graham of Kalimpong is also arranging for the teaching of the industry in connection with the Colonial Homes at Kalimpong.

DISPOSAL OF FABRICS.

19. General.—Most of the carpets and darris made are disposed of locally, i.e., sold by local mahajans. The Sonepur Fair is also a great place for their disposal. The mahajans export the carpets to Calcutta and the Bengal Districts generally, and there is sale in all parts of Bihar also.

Patna.—The panja or old loom satranjis are sold by weight at about a rupee per seer. The karga or new-loom darris sell by measurement at 8 annas up to Rs. 3 per piece, according to size and quality. The price has increased of late years owing to the increase of price of cotton and to the larger demand for karga darris. Paliram and Haziram Phakira, merchants of Patna, are the principal exporters from this district.

20. Gaya.—The Obra carpets of Gaya sell at various prices, the cheapest being sold at 1 anna. One to three-anna carpets are 6 to 9 inches square and of flimsy and worthless materials. They are sold in large quantities, as Hindus offer them to priests on funeral and other occasions. Asans meant for use, i.e., for sitting on at meal times or at worship, are 2 to 2½ ft. square. These are sold from 8 annas to Rs. 8 per piece, the cheaper kinds being usually sold by twenties. An asan which was priced at Rs. 7 weighed 3 seers exactly. The coarser and cheaper carpets are made of cotton thread manufactured from old cotton of quilts which sells usually at 3 to 4 seers to the rupee according to the fineness or coarseness of the yarn. The thread spun from it is sold by women spinners at less than
half the rate at which finer thread made out of new wool and cotton is sold. Sheep's wool and the imported cotton thread sells at 1 seer and 1 chitak per rupee.

21. Arrah.—In Arrah Jail, the raw material costs 14 annas to Re. 1 per seer, and the price at which darris and satranjis are sold from this jail is Re. 1-6 to Re. 1-8 per seer, and that at which kalins or galichas are sold varies from Re. 1-8 to Rs. 2 per seer. In the Sasaram subdivision, however, darris and galichas are sold by measurement and not by weight.

22. The annual sale of darris and carpets in Sasaram may be put down at Rs. 26,000, about Rs. 14,000 representing the value of local sale, and Rs. 12,000 that of export to Calcutta and other parts of Bengal.

23. Saran.—In Saran, where carpets are made in the jail only, there is no local demand for the article, and the produce is sent to the Calcutta Jail Depot for sale, where carpets of cotton yarn are sold for Re. 1-12 per seer, and of woollen yarn at Rs. 2 per seer.

24. The Jail Depot in Calcutta is the place where, the surplus stock of carpets and darris from all the jails accumulate and they are sold at the same price in Calcutta as in the mufassal jails.

INDUSTRIAL POSITION OF CARPET WEAVING.

25. I have already pointed out that where a readjustment of the art has been effected, as at Patna, the weavers are in a flourishing condition, though outside Obra the condition of the carpet-weaving proper is in a most deplorable condition. In neither, the carpet or the darr manufacturing industry is there any dependence on agriculture, and hardly any necessity for employing women and children. An industry which is able to support a large proportion of non-working women and children must be considered a flourishing industry. Yet, many of the district reports assume a very pessimistic tone about it. The Gaya report says, the daily earnings of a weaver are only 2 to 4 annas, and the Muzaffarpur report says the monthly earnings of a weaver are only Rs. 3 or Rs. 4. The Shahabad report, however, enters into a calculation which shows that darris-weavers are able to earn Rs. 7 to Rs. 10 a month, and kalin-weavers
about Rs. 12-8. This seems to be a more reasonable supposition, as
the social position of the darri and carpet-weavers are everywhere
about equal and much above that of an ordinary cultivator. The
calculation given in the Shahabad report is this: The ordinary size
of a darri is 4½ cubits by 2½ cubits. The quantity of cotton yarn
required for this size is 2½ seers at 1½ seer to the rupee. The
cost of colouring the 2½ seers is 4 annas. The darri sells for Rs.
3 to 4, so that the earnings of a weaver per darri is 12 annas to Re. 1.
A darri takes 2 to 3, and very good ones up to 8 days' weaving. A
galicha of the same size takes 8 days' weaving and the earnings of
a weaver on a galicha are Rs. 3-4. Hence the monthly earnings of
a darri weaver is Rs. 7 to Rs. 10 and of a galicha weaver Rs. 12-8.
The average monthly outturn of a loom in darris of different sizes
is about 10, valued at Rs. 30, and the value of the outturn per
family per year may be put down at Rs. 300 to Rs. 400. From
personal observation at Obra and at Patna, I am able to say
that the master-weavers earn at least Rs. 10 a month and their
workmen, who are usually the relatives of the masters, get Rs. 6
to Rs. 8 per month in addition, and the whole earnings of a family
is often Rs. 30 or more per month.

26. The Patna report says that the exporting merchants advance
money to the weavers and also machine-spun thread. In some of
the larger concerns labourers are engaged who are paid according
to the work done.

27. A satranji manufacturer earns from eight to ten pice a day,
a darri maker from three to four annas. Kalins do not ordinarily
pay better than satranjis. Fine kalins fetch better prices, but they are
not often ordered. As most of the weavers of Patna and other
districts are now darri weavers, the earnings of operatives are
probably 3 to 4 annas a day, and the substantial weavers who employ
the operatives earn Rs. 10 to Rs. 12 each, i.e., the earnings of a
darri establishment are about the same as of a kalin establishment.
Mr. N. N. Banerjee in his "Monograph on the woollen fabrics of Bengal"
speaks of the kalins in this way:—"Their industrial position is
also very fair, as the goods turned out by them find a good
sale in local fairs and markets, and are also often exported." I
endorse this view from what I have seen of them.
MATERIALS USED.

28. For kalin or galicha manufacture, either cotton or cotton and wool are used, and for satranji and darri manufacture, cotton only. Cotton galichas, the pile also of which is of cotton, are called dulichas. The wool is, except in the case of one or two jails, invariably the wool of the country. No distinction is made between lamb's wool and sheep's wool, which are both mixed up in preparing the roving. The wool roving is prepared by Gareris and sold in hals and bazars for Re. 1 per seer, and sometimes up to 1 seer and 2 chitaks. The cotton in the case of the jails is the yarn imported from the Empress Mills, Nagpur. In the case of the village weavers, English, Bombay or Ahmedabad yarn and homespun cotton are both employed, and for cheap articles cotton from old quilts spun into a coarse thread is used. The cotton, if new, is bought at about a rupee a seer, and if from old quilts 3 or 4 seers to the rupee. There are three shearings in the year, namely, autumn shearing in October, spring shearing in February, and summer shearing in June. The spring shearing gives the softest wool. The cut wool lies in a bundle on the floor, and the hairs are separated by a bow called the dhuna. The bow string is struck, and by beating among the hairs, it separates them. This process goes on until the whole is a soft mass. The wool is then made up into bundles, large enough to hold in the hand, and spun like cotton by the Gareris or sheep-keepers themselves. The thread is boiled after purchase by the kalinbafs in a preparation in which the proportion of saji to water is 1 to 8. The thread is then washed in cold water and it becomes soft after washing. If the boiling in saji water is continued too long, the thread gets disintegrated and there is great loss. Experience guides the kalinbafs in this matter. Hajipur wool is often imported into Patna, and it is sometimes used as wool in old loom or panja satranjis, and sometimes as warp in kalins. The roving of wool is as a rule used for making the pile only for kalins and asans. Cotton from old quilts is often used for making the warp and the woof of both galichas and satranjis. This cotton is not carded, but is taken up in small pieces and thread spun from it. Mill yarn is employed chiefly
for panja warp and warp for good kalins and asans. Cotton from the Victoria and Elgin Mills of Cawnpore, and also from Calcutta Mills is used as woof for karga looms. At Fatna, for the karga loom, the thread used for the woof is what is called "Mogul ticket" thread from Bombay, which costs the weavers Re. 1-4 per seer. For the woof, either No. 8 or No. 5, or No. 4 thread is used, which is bought, respectively, at Rs. 2-3, Rs. 2, and Re. 1-15 per bundle of 5 seers. The mill-made thread has almost replaced the hand-spun cotton yarn from locally-grown cotton. Darris are usually made out of yarn from the Empress Mills at Nagpur; the cost price of the cotton is 14 annas to Re. 1 per seer. The coarse yarn from old quilts sells at 3 to $5\frac{1}{4}$ seers to the rupee. Mill-made yarr is preferred for its cheapness, a seer of locally spun new thread being obtainable at 13 annas, while 10 annas per seer is the usual cost of the machine-made article. When cotton yarn No. 10 is bought, it is opened out and twisted six or ten folds in ordinary spinning wheels,—the six folds is for the warp and the ten fold is for the woof. Dyed cotton yarn is used for the woof. For darris and satranjis, the horizontal loom is used, and for pile carpets, whether galichas or asans, the vertical loom is used. In some jails, the vertical loom (which occupies little space) has been introduced for weaving satranjis also. Satranjis are made of various sizes, and the patterns turned out are also various. The waste yarn from making darris can be used for making the pile of the carpet as is done at the Chaibasa Jail. The pile is about an inch in thickness, in the case of woollen fabrics, but about $\frac{1}{4}$ inch in the case of cotton dulichas. The dying materials are usually foreign aniline dyes. But indigenous dyes are also used, such as indigo, lac, turmeric, safflower, bakam, kamela, palas, laikan and al. The yarn dyed in indigo is supplied by the Buxar Central Jail to other jails. From the Nagpur Mill dyed cotton yarn is obtained for Rs. 46 a maund. At Sasaram, native cotton thread costs one rupee for $1\frac{1}{4}$ seer, and it is dyed at home by the weavers.

**DYEING.**

29. Though dyed thread is sometimes bought, the manufacturers generally dye the cotton or wool themselves. For the snow-white
colour the washerman is employed, who charges one anna for a seer of yarn and gives back 14 chhitaks for every seer of wool he takes for washing. For the best carpets, the wool is dyed with lac and indigo. The aniline dyes furnish the colouring of the common carpets. For dyeing wool with aniline red, it is boiled three times in the dye mixed with water, to obtain permanancy of the colour, and the wool is washed well after each boiling. Other aniline dyes are simply mixed in cold water and used. The dyed wool is then unravelled or re-wound by the women of the house. For cotton darris and satranjis, blue and white in successive stripes are the usual colours employed. The blue colour is obtained by boiling one seer of indigo, one seer of lime, three-fourth seer of treacle, and two to three seers of saji, with eight gharas of water. The proportions are changed according to the strength wished for. The preparation is kept in a large bowl about two and-a-half feet in diameter sunk in the ground to within an inch of the top. The thread is moistened and kept soaked in the preparation till the dye is absorbed. It is then exposed to the air and washed; and if darker colour is wanted, dyed again as before. Five dyeings in the indigo vat give what is called black dye. For making carpets, i.e., galichas, dulichas and asans, all colours are employed. The recipe for aniline dyes is simple, and this is one of the chief reasons for the popularity of these dyes.

30. For dying thread blue the cost is 2 to 4 annas a seer; for red 1½ annas; for green 1 anna, and for catechu 2 annas. In washing and dyeing wool there is loss of 1 chitak of weight for every seer.

31. For more detailed information as to the methods employed in different districts for dyeing cotton and woollen thread, the reader is referred to Mr. N. N. Banerjei's Monograph on Dyes and Dyeing.

PATTERNS AND PRICES.

32. Carpets whether made of wool, cotton or a mixture of wool and cotton are made of various recognized patterns each of which is represented by a technical term, denoting the nature of the
pattern, the name of the patron, place of origin, or some other accident in connection with it. The patterns are all fantastic, representing nothing in particular, and only effect is aimed at by symmetrical posing of the fantastic figures, and harmonious blending of colours. The neatest patterns in use are employed in jails, and in the Jail Depot patterns can be bought. The names of the principal patterns are: Gopiganj, Madhosingh, Jangipur, Jafri, Patnai, Pinjra, Jhardar (tree-pattern), Jaldar, Phuldar, Irani or Persian, Hang-Hassia (darri or mat-pattern), Kashmir or Shawl pattern, Akbar Shahi, and Ali Musjid.

33. All the patterns have a border (hansia) and a ground in the middle, and the borders have each a separate name, such as chhuria, kaul, salbafi, tinpahari, pathar-kala, etc. Even in the same village one kanwabaf may know by heart one pattern of which another may not know even the name. At Obra, it is not the custom for a master-weaver to direct the workmen as to the number of loops of different coloured thread each is to put in at any particular moment in a particular place. The workmen has it all by heart.

34. The prices vary from one anna to Rs. 600. Asans, ahsnas or ashnis used for sitting on at prayer or meal times, may be valued at as little as 3 annas a piece, or as much as Rs. 6 or Rs. 8 a piece. The 2 feet by 2 feet cotton-pile asans made in the Singhbhum Jail are sold at Rs. 3 each, but this is a high class asan which takes 12 days' making. The coloured materials and the white warp and woof (about 1½ seers) costs Re. 1.14, and 12 days' wages in the jail are calculated at Re. 1.2. An ordinary good asan takes two days' making, and it costs 13 annas,—at least that is the price which Sobrati of Obra gets for his asans. There is a so-called asan which is sold at Obra, 20 for 20 annas. This is 9 inch square and made for ceremonious purposes only, and not for use. One man is able to finish on an average one and-a-half piece a day of the common kinds of asans which are 2 feet by 2 feet. The larger galichas may be made of any size, but the usual size is 7 feet by 4 feet and the price of this size varies from Rs. 6 to Rs. 30 according to quality. In jails, galichas are also sometimes sold by the weight at Re. 1.8 to Rs. 2 a seer.
35. Darris, including satranjis, can be hardly dignified with the name of carpets. They are usually made of three patterns:—

I.—Flower pattern made with different coloured cotton woof on plain white ground.

II.—Greek pattern, with angular stripes on the border.

III.—Buxar tent pattern is the ordinary striped tent darri. This is called the Lil-abi pattern at Obra, the stripes being alternately deep and light blue, and the borders have white diamond-shaped spots. Though darris are usually made of white and blue stripes, other colours are sometimes used, such as gulabi (rose pink), gulvar (deep red), basanti (yellow), and naranji (orange).

36. Sold by the weight, darris are usually sold for Re. 1-6 to Re. 1-8 per seer, and as the price of the coloured thread is 14 annas to Re. 1 per seer, there is usually an income to the weaver of 8 annas per seer of yarn used, and the income is larger when they colour their own thread, as they usually do. In 1905, at the Arrah Jail were sold 104 darris weighing altogether 26 maunds 7 seers and 15 chitaks. As a rule, the total cost, including that of material, comes to Re. 1 per seer and 2 annas per seer can be obtained as net profit after paying the operatives. Bhutia wrappers and door-curtains made in Birbhum and other jails can hardly be classed as carpets, though they are sometimes spread on the floor or used as bed covers.

PREPARATION OF WARP AND WOOF.

37. These preliminary processes have been described in Mr. N. N. Banerjei’s Monograph on Woollen and Cotton Fabrics, and there is nothing special about the preparation of the yarn in the carpet manufacture. Women help in the warping, dyeing and twisting of thread. The cotton yarn used usually consists of No. 10, No. 8, or No. 6 thread, six to ten being usually twisted together simultaneously.

THE LOOM FOR MANUFACTURE OF KALINS.

38. We have seen how the wool is carded, spun with wheels, boiled in sayi, washed and coloured with indigenous or aniline dyes.
The warp is then prepared. The loom used for the manufacture of galichas, dalichas, and asans is a vertical loom. It really consists of two long beams, one or both of which are inserted in the walls of the house to save upright beam. The warp is tied to a bamboo lath which in its turn is tied to the top beam, and then wrapped round this beam. The attachment of the lath to the beam is made in four or five places, where there are holes in the beam. The workman sits at the foot of the loom behind the warp in the case of the ordinary loom, but in front of the looms used in jails, and does the weaving and looping. The web, as it is woven, is wound round the lower beam of the loom, the upper beam paying out the warp. The attachment of the warp to the lower beam also is by means of a lath exactly like the one to which the warp is tied above, and which is tied to the beam below at four or five holes as in the case of the top beam. On the same loom one or half a dozen fabrics can be arranged to be woven.

39. The loom thus consists of a lower and an upper roller, which are capable of revolving, as occasion requires, on two uprights, or in holes in the walls themselves. The rollers have each a hole in which a pin is put, which serves to keep the roller or kath in position. When the operator wants to roll the prepared carpet and unfurl more warp for work, he unties the pins. From the ceiling along the whole length of the room overhead, or from a bamboo stretched along the length of the room, hang several rolls of various colours of thread for the pile for use as occasion requires. Just above the operator's head is firmly fixed another bamboo over which is suspended a curved lever to the ends of which are tied strings from alternate threads in the warp. Thus one set of threads is kept backward and the alternate set forward, and through the "shed" thus formed, the bundle of woof thread (which is of cotton) is passed. No shuttle is used, but only a ball of cotton or the cotton rolled over a six-inch long stick. The laying of the woof is done not tight and straight, but in a wavy or loose manner. Having put in two or three woof threads through the shed of the warp, made by alternate easing and tightening of the ends of the curved lever, as is done in horizontal looms, he takes
the strips of coloured wool hanging over-head and puts in at
different places of the warp as much, and as many varieties of,
wool as are necessary for his pattern. Each loop of coloured
wool (or coloured cotton in the case of dulichas) is passed through
one thread of the front set of warp, and one thread of the back
set of the warp. He puts in two or three more weft threads again
handling the healds two or three times for producing alternate
sheds, and then the coloured strips of wool are put in different places
of the warp again, and the panja or iron comb is used each time
to press in the web, i.e., after each layer of pile, and the two or
three woof threads have been put in. Having woven and pressed
home one series of pile thread and weft thread, the weaver uses
his scissors to cut the wool evenly. In jails, before the scissors
or rather shears are used, a teasing needle is employed to bring
out the pile, which is now laid softly and evenly, like the pile of
velvet, and not in separate threads, and the pile is drawn out firmly
by the fingers, and in erect state cut out with the shears. This
gives a soft feel to the pile, and the thick and even appearance of
the pile of the jail carpets is due to this, while the pile of the
Obra or the Patna carpet is harsh and thready in appearance. The
sitting of the weaver in front of the loom and not behind (that he
may work in full light) and the use of the teasing needle are
very desirable. The pair of scissors used at Obra and at Patna
has a loose pin round which the two prongs work, the exact distance
between which has to be regulated by the finger to cut the wool
up to the required length of the pile. In jails, shears provided
with a spring are used. The more valuable the carpet, the greater
is the force used in the hammering and setting with the comb,
and the wider are the prongs of the scissors kept to make the
 cushion tight, thick and soft. The last operation in each series is
the tying the edges usually with woollen thread. When the re-
quired pattern with borders is thus completed, some space is left
unwoven, and another carpet is started afresh. The same warp
does for weaving twenty asans, 2 feet square, and when the whole
length is completed the web is unrolled, and pieces cut out at the
unwoven parts. The pattern is reproduced from memory, and is
kept as a hereditary heirloom, descending from father to son. Usually asans are sold to mahajans in twenties. Boys are taken on by kaiinbas as apprentices for 6 months up to one year and-a-half, when no pay is given to the apprentices but only food. Afterwards they are paid according to the work turned out, and they earn at first about 2 annas a day, but when well skilled, about 4 to 5 annas a day.

40. There are now few who will be willing to pay for the cost of a first class carpet like the famous Warangol Hyderabad carpet which belongs to Mr. Vincent Robinson and which was shown in the Indian Section of the South Kensington Museum. This carpet has 400 knots to a square inch, and the patterns on it are so complicated that a change of needle is required for every knot. A Warangol silken carpet 7 feet 5 inches long and 5 feet 2 inches wide, exhibited in Calcutta in 1883-84, was priced at Rs. 3,772, a woollen one to the same dimensions at Rs. 950, and a cotton one slightly larger at Rs. 790. One can imagine what such carpets had cost in labour, and how long it would take to produce them, and who could buy such carpets. It is only a veritable Nabob who can patronise an art of this sort, and art connoisseurs must be getting fewer every day in the hurry and scurry of the modern civilized world, and Nabobs are getting more and more scarce. A cheap imitation of the celebrated Persian carpet answers very well, and some of the Indian jails at least are keeping up this standard of excellence in Bengal, a standard which is valued at Rs. 2 a seer. Europeans are the great patrons of good carpets, and it is to be regretted that rich natives do not take a pride in the possession of Obra and other high class carpets. High class carpets alluded to here are not made in Bengal.

41. I saw at Obra a large (9 × 4½ cubits) carpet which was made for a rich zamindar, on order, out of a pattern supplied by him, and the weavers had used cotton out of old quilts, aniline dyes, and the pressing of the woof and the pile had been done very lightly. I asked the weavers why they had behaved like this, and their reply was they
could not do any better when the price was fixed at Rs. 45. They could have done what was right if they were allowed Rs. 100 as price. If Obra weavers get Rs. 8-8 per square yard they can use new raw materials, Indian dyes, and they can press home the pile, with the woof, while weaving.

THE KARGA LOOM FOR DARRIS.

42. Twenty years ago, when the hand-loom industry of Patna was in its last stage, one Lain Mian, of Patna, who was a maker of cotton cloth and satranjis, conceived the idea of utilizing the ordinary hand-loom in the manufacture of darris. Since then, this hand-loom manufacture, called karga darris, has made vast strides, and the number of darri-makers has been increasing very fast. The darrí can be made by one weaver with the new loom, while with the panja loom at least two men were required. The differences between the karga loom and the ordinary cloth loom are the following:

(1) Instead of a shuttle, a stick about a cubit long with the woof thread wound round it, is used.

(2) The weft thread is purposely put in in a slack manner that it may not remain stretched and straight, but get woven into the texture. Owing to this important difference, mill-made darris will not be a success.

43. The karga loom, like the ordinary cloth loom, is set over a hollow, the healds (gulla) being worked with the feet from the hollow. It has also a punchan, or bow, made of two sticks ending in two pins, a sort of a bow to keep the width of the darrí uniform. It has a hata with reed to press the woof tight. There is also, as in the cloth-loom, a warp beam (bhajni) to which, by means of a danta, or lath, the warp is attached, and round which, as the
weaving goes on, the web is rolled. The other end of the warp hangs loosely over another danta which is tied to two ropes hanging from the ceiling as in some cloth-looms. The work goes on fast as in ordinary looms, one to two darris 6 feet by 3 feet being woven daily. A than, or piece, of three such darris is called tikri, and is sold for Rs. 2-4, i.e., for 12 annas a piece. Larger sized darris (5 cubits by 2½ cubits) are also made with the karga loom in pairs, that are called to-gaja. These are sold for Rs. 2-8 per couple. The profit to the master-weaver is 3 annas for the three pieces of a tikri, the workmen being paid 2 to 4 annas a day according to the quantity of work they turn out.

THE PANJA LOOM FOR SATRANJIS.

43. The width of the darrī woven by the karga loom is necessarily limited to 4 or 5 feet, i.e., the width to which human hands could go. The satranjis made with the old panja loom are not limited in width. The warp is stretched to its full length in this loom and not rolled up on a beam. When the width of the satranji is great, more than two men have to work at it. When weaving, the two or more men sit on the web, and to prevent the web touching the ground, a plank is kept underneath. As in the kalin and karga loom, instead of a shuttle, a stick is used with the weft thread wound round it. There is no reed, as there is in the karga loom, but a panja is used, which is a palm-like piece of wood fitted with seven flattened pieces of iron stretched like fingers. The panja of the satranji loom has a wooden and straight handle and it has 7 forks, while the panja of a carpet loom has a bent iron handle and 12 to 14 forks. The healds or heddles which alternately raise or depress the threads of the warp are suspended from a bamboo stand which can be worked as the work proceeds. They are worked with the hand, and not with the foot, as in cloth looms and karga looms. The number of healds is the same as the number of men engaged. There being no cloth beam to warp the web round, the weavers move on from one end to the other, proceeding at the rate of 1 cubit
a day for darris of ordinary sizes. The jail rate is 4 square feet per day, but experts can work faster. The warp consists of twisted thread laid in two layers, the separation being made by the healds alternately raising one layer and depressing the other. The weavers work the dyed woof wound round the sticks. As one weaver receives the shuttle-stick, the other drives the woof home with the panja, raises the depressed layer of warp by means of the heddle, and the first weaver passes on the shuttle. This process goes on alternately. The four end threads of two layers of warp are four thick cords running lengthwise which represent the two thick lengthwise cords at the ends of the satranji. When the darri is woven up to the heddle-posts, the latter are moved on. When the work is finished the fag ends of the warp are twisted into knots. For a big satranji one man is exclusively employed to work the heddles, and three or four for weaving. No scissors are required for making darris, but only a bamboo stick for shuttle and a panja.

SUGGESTIONS FOR IMPROVEMENT.

44. (1) The industry should be planted in the modern centres of population and fashion, say, Calcutta, Dacca, Darjeeling, etc. In an out-of-the-place like Obra in the Aurungabad subdivision of Gaya, where there is not even a railway station, the industry has no chance. The actual manufacture may be carried on at Obra, but there should be at least show-rooms facing principal thoroughfares in large and important towns where only the best Obra carpets and asans should be kept.

(2) Only the most high class raw materials, such as lamb’s wool sheared in spring, should be used. Silk (such as kichi silk of silk filatures) should be also employed as is done in Hyderabad and other seats of industry. Agave fibre may be also employed as in Bhawalpur.

(3) The Commissioner of Patna may perhaps start a scholarship fund with the help of such of the local zamindars of Gaya and Patna as Rai Pasupati Nath Bose Bahadur, Babu Purnendra Narain
Singh, Sayyud Zaffar Nawab, etc., who are interested in industrial matters, and send two carpet weavers annually to learn the superior methods in use in Bikanir, Mirzapur, Bhawalpur, and Warangol. This will be the means of introducing improvements in the industry in the Patna Division. The Obra industry should be on a par with the Mirzapur industry at least.

(4) Only Indian vegetable dyes which produce fast colours should be used, and officers ordering carpets might insist on this, and proprietors of show-rooms in Calcutta, etc., may do likewise.

(5) Men trained in jails to weave carpets at present do not follow the profession of carpet-weavers when they go out. An organized attempt should be made with the help of jail authorities to get hold of these men and employ them in establishments started in Calcutta, Dacca, Darjeeling, etc., in connection with the show-rooms. Men willing to follow the occupation of carpet-weavers (and perhaps in the case of other industries taught in jails) may be handed over to their future employers a month before their release, that they may get a taste of their occupation outside the jail before they are actually released with a month's wages to their credit. This may induce them to come back after a temporary visit to their friends at home, and continue the industry in the factory. I understand the only objection of prisoners at present to following the avocation of carpet-weavers after their release, is want of capital. Government cannot be expected to start factories, but private European and Native capital ought to be directed into channels like this.

(6) The best jail methods at least should be followed in these factories, including the use of the teasing-needle, admittance of more light, and use of jail-patterns.

(7) The darri manufacturing industry needs no special encouragement, as it seems to be flourishing. District Officers may be asked to take interest in the matter, and get good satranjis and carpets exhibited in the local fairs. At the Sonepur Fair, specially good prizes may be offered to attract the best fabrics.
CONCLUSION.

45. In the preparation of this Monograph the following books and papers have been consulted:—

(1) The reports from the District Officers specially written for this Monograph.

(2) Sir George Birdwood's "The Industrial Arts of India."

(3) Mr. T. N. Mukherji’s "Art Manufactures of India."

(4) Mr. N. N. Banerjei’s "Monograph on the Cotton Fabrics of Bengal."

(5) Mr. N. N. Banerjei’s "Monograph on the Woollen Fabrics of Bengal."

(6) Mr. N. N. Banerjei’s "Dyes and Dyeing."


(8) Report on the Existing Arts and Industries of Bengal by Mr. E. W. Collin, r.c.s.

46. The information obtained from the above was supplemented by the personal observations of the writer of this Monograph at Obra in the district of Gaya, at Patna City, in the Church of England Zenana Mission Society’s School at Barnagore, north of Calcutta, in the Indian Museum, and at the jail at Chaibassa in the district of Singhbhum.
MONOGRAPH ON STONE-CARVING
IN BENGAL.

The subject of this monograph, as ordered by Government, was “Stone-Carving and Inlaying,” but from the reports of District Officers it does not appear that the art of inlaying is practised anywhere in the Province. The Collector of Midnapore reported that some inlaying was in progress in a Muhammadan tomb in the Mirza Mahalla of Midnapore, but further inquiry showed that the “inlay” was not of stone, but glass set in chunam. Stone-inlaying is not an indigenous art anywhere in India. It does not, I believe, appear in any building previous to the Muhammadan invasions. It was first introduced by the Arabian stone-workers, but was not used extensively until the building of the great mosque of Fatehpur-Sikri by Akbar, which, according to an inscription on it, was intended as a copy of the “Holy Place at Mecca.” In Jahangir’s time stone-inlaying became the fashionable method of architectural surface decoration as a substitute for painted tiles and tile Mosaic, and by Shah Jahan’s reign the process has been so thoroughly learnt by Indian artisans that the most skilful inlayers employed in the decoration of the Taj were Hindus from Kanauj. In Hindu buildings, however, inlaying was never largely used, so that on Aurangzib’s accession, when the Mogul Court discouraged the luxury and extravagance of former times, this art rapidly declined. For some generations later the palaces of Hindu Princes in Rajputana gave desultory employment to the descendants of Jahangir’s and Shah Jahan’s craftsmen; but as stone-inlaying was never adopted as a means of decoration for Hindu temples, the art soon became extinct, and is now carried on only by a few families at Agra and the neighbourhood, who are chiefly employed in making curiosities for tourists.
My monograph is thus necessarily restricted to the subject of stone-carving. I understand that the Government intend that the scope of these monographs should be confined chiefly to the description of the various industries as they now exist, and not extend to the whole ground of archaeological and historical research.

The geological conditions of Bengal constitute it as essentially a country of brick and terra-cotta buildings. Excluding the sub-Himalayan districts, the area where stone becomes the most convenient and plentiful building material is only about a fourth of the Province, comprising roughly the Divisions of Orissa and Chota Nagpur. Even in the localities where stone is largely used for building purposes the development of the art of carving in these materials generally implies the existence of settled communities and a certain degree of civilization, for, when durability is not the most important consideration, wood, on account of the greater facility with which it can be worked, will always be preferred to stone for purposes of decoration.

In very early times when the greater part of Northern India was covered with vast forests, and transport of stone for long distances was impossible, wood was the chief building material over the greater part of the country; but when the builders in wood came across convenient quarries of sandstone they found in it a substitute which would be cut and worked almost as easily and exactly by the same method as their own material. The red sandstone of the United Provinces and the Punjab, especially, could be easily cut into curved beams for roofs or into thin slabs for panels and used for all the constructional forms which are generally only adapted to wood. From these conditions were evolved some of the most prominent features of the stone architecture of Northern India, which even in the present day retains a good deal of the character of its wooden prototypes, both in the construction and in the treatment of the decoration. In its technical treatment the sandstone carving of the Punjab and Rajputana
is purely the style of wood-workers. It is only in localities where the native builders had to deal with coarse-grained and more refractory stones that they were compelled to adopt the technique and forms of construction which are specially characteristic of stone work.

It is not to be supposed that the oldest Buddhist stone buildings, which are so obviously copies of wooden types represent the earliest attempts at stone construction by Indian builders; they probably only indicate that the builders coming to a place where a stone which could be easily worked with carpenter's tools was plentiful, adopted it as the most convenient material. In the present day there is no distinction in caste between a wood-carver and a stone-carver. The same man frequently works at both wood-carving and stone-carving, and the tools and process used in either work are almost the same.

Within the area in Bengal which may be described as a stone-building country, it is practically only in Orissa, under the flourishing native dynasties first established in the early centuries of the Christian era, that a great style of stone-architecture and stone-carving has developed. The splendid antiquities of Orissa have often been described. In the ornamentation of the hundreds of temples, monasteries, and other works of stone which were built in the course of many centuries in the districts of Cuttack and Puri, the Orissa carvers acquired the most extraordinary technical skill in architectural decoration Hindu art has known.

There is pitiful remnant of this splendid art still struggling for existence all over the Orissa Division, but unless Government adopt some more effective measures for preserving it than those hitherto employed it is not likely to survive many years. There are carvers still to be found whose work, in spite of all the discouraging conditions which surround them, is hardly inferior in artistic perception and technical skill to that of their predecessors. A few of them have been lately employed by the Archæological Department in restoring
ancient carvings at Kanarak and elsewhere, and the Director-General in his report for 1902-1903 says (page 46) that "the work of the modern stone-mason, a native of Bhubaneswar, does not fall much behind the old work, except that modern restorations of human and animal figures are less graceful than their older models." If this employment were of a permanent kind no better means could be found for reviving Indian stone-carvers' art, but unfortunately there is no prospect that it will afford them anything but temporary existence.

I am able to endorse fully Mr. Marshall's appreciation of modern Orissa carving. It is often not very inferior to the old work. In style it is much more interesting than the better known sandstone carving of Rajputana and the Punjab, which is often monotonous and more suggestive of furniture than of architectural decoration. While the Orissa carvers are in no way inferior to those of North-West India in delicate surface ornamentation, they have not hampered themselves by the limitations of a wood-carver's technique, but have fully realized the technical possibilities of their material for producing bold effects of light and shade suitable for architectural work.

I will take the work of a carver named Chintamani Mahapatra, of Pathurisahi in Puri town, to illustrate the present condition of the craftsmen and the style of their art. I found him and his sons employed in making small soapstone-carving by the sale of which they now earn a living. They generally work in soapstone obtained from Dompara near Cuttack, because it is the easiest material to work with and because the prices their work obtains in the bazar are generally very small. Occasionally however, they work in a potstone obtained from the Nilgiri Hills near Balasore, which is much more difficult to carve. The soapstone-carvings are generally coloured black to make them resemble the more expensive work in handstone, a process which depreciates the real artistic merit which many of them possess. I
PLATE 1.

SOAPSTONE CARVING FROM PURI.
PLATE II.

CARVED DOORWAY OF THE EMAR MATH, PURI.
PLATE III.

DETAILS OF THE CARVING ON THE EMAR MATH, PURI.
PLATE IV.

A CARVED COLUMN, PURI.
PLATE V.

CARVED DOORWAY AT THE BIROJA TEMPLE JAPUR, ORISSA.
purchased from him for a rupee and-a-half a charming little sculptured group of Krishna and the Gopies which he had just finished in soapstone (Plate I). Fortunately the blacking process had not been applied. The carving only represents two or three days' work, but it is full of animation and artistic feeling, while the composition and the combination of gradations of relief are admirable. There are five or six other families of stone-carvers in Puri who live by the same kind of work, as there is now no demand for the really fine architectural carving which they can produce. There are several splendidly carved stone doors in Puri town, executed within the last fifteen or twenty years by Chintamani and by two other stone-masons or carvers called Mahadeba Maharana and Kapil Mahapatra, also of Puri. Plates II and III show one of the doorways of Emar Math, a Vaishnavite monastery, which would bear comparison which the carving of the Mediaeval Gothic cathedrals in Europe. The delicate surface carving in low relief is admirably contrasted with the bold cutting of the pilasters supporting the projecting cornice over the doorway. It is altogether a fine piece of work, worthy of the best traditions of Orissa architecture.

Plate IV is another good example of the same men's work, one of a series of columns supporting the verandah of a private house. Since these were completed, about ten or fifteen years ago, the men have been compelled to subsist on the cheap soapstone work before described, as there is now no demand for finished sculpture of a better class.

It is deplorable that the standard of public taste in Bengal should have fallen so low that skilled artists of this stamp have no employment for their best talent; while the lowest class of commercial Italian statuary, incomparably inferior to the art which these men can produce, is in regular demand at prices which would make all the sculptors in Orissa rich beyond their wildest dreams. The very fine carved doorway shown in Plates II and III, which is an incomparably
finer example of architectural decoration than any to be found in Calcutta, is said to have cost only about Rs. 1,200, or less than is often paid for a common garden-statue, a simpering Venus, or a vulgar ballet-girl in marble. Among the houses of the wealthy and educated classes in Calcutta there is not one that contains columns so well designed and carved as that shown in Plate IV, the workmanship of which would cost about Rs. 50.

In other places in the Puri district a certain number of stone-carvers have found employment lately in the building or restoration of Hindu temples. At Bhubaneswar, Raja Rani Moktaswar, Sidhaswar, Bhaskareswar, Brahmeswar, and Pursarameswar have been recently restored, and various sculptured figures have been replaced. The Collector reports that at Tangi and Bolegarh in the Khurda subdivision two temples have recently been built in which there is a certain amount of carving. Stone-carving is also carried on to some extent in Haldia, Ghatikia, Tangi, Narangurh, and other villages in the Khurda subdivision.

In the district of Cuttack, also, the fine old art still exists, though it is said to be steadily declining for want of patronage. At Jajpur, the ancient capital of Orissa, the work of restoring the Temple of Biroja has been carried on for the last twenty or thirty years, the expense being undertaken by a Babaji who has spent his life in begging for funds. The carving is done by a local artist, who is paid four annas a day. Plate V illustrates some of the beautiful work he has done.

At Aul in the jurisdiction of the Kendrapara subdivision some stone-carving is now being executed for the Temple of Barahanath at the expense of the zamindar of that place.

The total number of families of stone-carvers in the district of Cuttack is said to be about 38. Of this, 26 live at Banki, 10 in Jajpur, and 2 in Kendrapara.
The average wages earned by the stone-carvers in the Orissa Division is from four to eight annas a day.

Besides stone-carving proper, there is a good deal of architectural work carried on in Puri and probably in other places in the Orissa Division in a kind of conglomerate stone, too coarse-grained for fine carving, in which the ornamental details are roughly blocked out by the chisel and afterwards finished by a layer of fine stucco or chunam.

The process of applying fine plaster to stone work is a very ancient one in India, and is used for figure sculpture as well as for ornamental details. The chunam often serves as a ground for fresco painting, as in the well-known decoration of the Buddhist carvers of Ajanta. In Puri I noticed a number of finely designed pedestals or altars for the tulasi plant executed by this process, which in former times reached a very high degree of perfection. It is quite a distinct art to stone-carving and is not practised by ordinary stone masons. For a damp climate like that of Bengal this plaster work has the practical advantage of preventing moisture from penetrating through bricks and porous kind of stone.

Chota Nagpur.—Chota Nagpur, like Orissa, is geologically a stone-building country, but the population has never grown into large and flourishing communities, as in the great towns of ancient Orissa, and the stone-carvers’ art does not appear to have been developed to any great extent locally.

There are a certain number of ancient temples and buildings at Jaganathpur and Chutia, a few miles from Ranchi, and at Nagar, about 49 miles distant, which are evidence of the existence of a local art of stone-carving in former times; but in the Mogul period the masons for building the forts at Palaman are said to have been imported from Jaipur in Rajputana. At the present time the masons of the district hardly ever do carving, but earn about three annas a day.
by making cheap stone utensils, used chiefly by colliery coolies at Raniganj. The utensils, consisting of trays, cups, and bowls, are sold at prices varying from two pice to three annas. Between 70 and 80 families are engaged in this kind of work. The quarries from which the stone is taken are within the zamindaris of the Manki of Terai and Thakur of Mardhan, who lease out the right of working them. The vessels when made are brought by the masons to Kudadih and sold to a mercantile firm, Messrs. Mahamad Hossein & Co., which retails them to petty dealers. The value of the present outturn is said to be between Rs. 8,000 to Rs. 10,000 annually.

Gaya and Patna.—In these two districts, as in Chota Nagpur, stone-carving has become practically extinct, though various forms of working in stone are still carried on to some extent. There are still two families in Gaya town, the members of which are fairly expert carvers and occasionally do some architectural work. A bathing-ghât built with Chunar stone with some good carving on it which was finished in 1896 is a creditable piece of work, designed and constructed by one of them named Ganga Bishen. The expense was borne by the Gayawal, Chota Lal Sijwar, whose name is given to the ghât. The ordinary work of those two families is carving small idols, puja vessels, and animals, in which they show considerable skill and seem to earn a very fair income. The stone mostly used for this work is a rather hard potstone from a hill called Pathalkatti, 19 miles to the north of Gaya, where there are about 25 other families of stone masons who, with the exception of one man, Somi Ram, who does ornamental work, are all engaged in making plain stone utensils like those in Chota Nagpur. Their earnings are said to be from 6 to 8 annas a day. All these men, who profess to be Brahmans by caste, are said to be descendants of stone-carvers and stone-masons who were brought from Jaipur in Rajputana about 140 years ago to build the great Vishunpada
Temple in Gaya town. Their ancestors were expert artists, but they themselves have deteriorated so much from want of practice in the higher branches of their art that for any important architectural work carvers are now brought from other Provinces. There are several noticeable stone buildings now being constructed or recently finished in Gaya town, all by imported masons and carvers, and built of Chunar or Mirzapore stone. They have been designed and constructed entirely by native architects and builders. Among these are two dharamsalas for pilgrims built at the expense of Rai Suraj Mall Bahadur, a Marwari of Calcutta. One close to the railway station is just finished. The other now being built is in the Mahalla Tilha of the old town. Both of them are very well constructed and contain some excellent carving in the characteristic style of Mathura and Hathras of the United Provinces, whence the workmen are brought. As it is sufficiently well known and not a local style, I do not think it necessary to illustrate it in this Monograph. The cost of each of these dharamsalas is said to be about a lakh of rupees.

A still more important work is a temple dedicated to Radha Krishna, near the northern gate of the old town, begun about five years ago, and now nearing completion. It is designed and built by architects and masons from Jaipur at the expense of the present Gayawal, Babu Balgobind Lal Sen. Except that the architectural effect is marred by the use of thin iron columns to support the porch in front of the principal shrine, the building is an example of the best modern Jaipur work. It is very richly carved in the local style of Rajputana, fortunately not spoilt by attempts at imitations of Anglo-Indian ornamental design. The style is, as I have observed before, largely influenced by the technique of woodwork, and does not aim at the bold effect of light and shade combined with delicate gradations of relief which are so admirable in the
nearly extinct art of Orissa stone-carvers. The plain stonework of
the interior of the principal shrine and part of the outside are being
decorated in fresco work by the old Indian process alluded to above
which I have been trying for several years to introduce into Calcutta.
The wages of all these imported men are fairly good. The principal
mistersies who design and superintend the whole work get from Rs. 30
to Rs. 40 a month, while the ordinary masons and carvers earn
from Rs. 15 to Rs. 25 a month. In the Patna district the conditions
are very similar to those which obtain at Gaya. Clay and bricks
are the ordinary building materials, and when any important architec-
tural work requiring stonework is constructed, skilled masons and
carvers are brought from outside the Province. The local masons
occasionally carve small idols, selling from four annas to five rupees
each, but their ordinary work is the cutting of grinding-stones,
potters' wheels and making of stone utensils.

There are also a few lapidaries who cut glass for imitation
jewellery, and cut and polish pebbles and crystals brought from
Monghyr and Bhagalpur. Some of these are engraved with texts
from the Koran and used as amulets. Further details are given in
the schedule attached to this Monograph.

Calcutta.—There are a few firms in Calcutta, mostly located in
Bentinck Street, engaged in supplying the demands for tombstones
and monumental masonry, in which there is sometimes a certain
amount of carving of no artistic interest, and it is always of a
conventional type copied from mediocre European models. They
employ altogether about 50 masons, whose wages vary from Rs. 10
to Rs. 25 a month. These men are brought from Monghyr, Patna,
and Dinapore districts. They work both in stone and in marble,
the latter mostly imported from Italy. For any important architec-
tural work in which carving is used the masons are usually brought
to Calcutta from Bombay; but owing to the same system of copying
mechanically conventional European types which they do not understand, the ornament they produce is always insipid and uninteresting and in most cases would be better left undone. For the offices of the Military Secretariat, completed this year, about 130 masons and carvers were employed. The stone used on the ground floor was brought from Mirzapore, and the masons who worked it came from the same place. They were paid from 12 to 14 annas a day. These men were designers and carvers as well as masons, but, as they only designed Indian ornament and the style of the building was Italian Renaissance, all the carving was entrusted to the masons brought from Bombay, paid Rs. 2 daily, who were only accustomed to copy European patterns. These they executed with the usual mechanical dexterity, but without any of the real feeling which belongs to original artistic work. This failure must inevitably result from a system which is entirely opposed to sound artistic principles.

TECHNIQUE.

The tools used by all stone-carvers in India are practically the same as those used by wood-carvers, and call for no special notice. The only difference is that the stone-carvers' mallets are heavier and weighted with lead to give the chisels and punches greater cutting power. Stone utensils, like cups and trays, are turned in the ordinary native hand lathe. The European process of "pointing," by which a sculptor's plaster model is mechanically reproduced in stone or marble, is not used by the native sculptors, as they always work directly on the stone.

THE FUTURE OF STONE-CARVING IN BENGAL.

It will be gathered from the facts I have stated that stonecarving, as a fine art, will soon cease to be indigenous in Bengal, unless some more effective measures are taken than those hitherto adopted by Government for the preservation of Indian art. The
aid hitherto given by Government towards Art Exhibitions and Art Museums has nearly always been misdirected, as it has only encouraged the production of bric-a-brac, cheap as art but dear as merchandise, for the European market. Real art, such as that of the Orissa stone-carvers, which is a valuable asset in a country's economic resources and a most important factor in national culture, derives no benefit, but rather suffers, from spasmodic and unorganized efforts which tend more towards satisfying the demand of a capricious and uninformed section of the public than to raising the general standard of taste. My experience of such exhibitions and art collections has been that the best work of Indian art workmen is very rarely represented in them.

The massive character of Orissa stone-carving makes it difficult to transport, and thus while the lighter sandstone-carving of the Punjab and Central Provinces is often in evidence at Indian exhibitions and in Museum collections, the better art of Orissa stone-carvers never appears. Moreover the time allowed for the preparation of Indian Exhibitions is invariably far too short, so that it is impossible to represent any of the best work except that which is in general demand and thus is in least want of advertisement.

The almost total extinction of the stone-carvers' art in Bengal may be attributed to three main causes:

First—The exclusive use of European styles in public buildings so that there is no longer any employment for the hereditary native builders, unless they become mere copyists of the regulation designs. It follows from this that there is no employment for native stone-carvers in public buildings, except when they are converted from good artists into indifferent mechanics.

Secondly—The neglect of the study of Indian architecture in Indian Colleges of Engineering. The graduates of
these Colleges are largely employed in designing houses and palaces for Indian gentlemen of wealth and position. They naturally follow the styles of which they know most and which they see followed in public buildings, with the same disastrous results to Indian art.

Thirdly—The standard of public taste, which is so uneducated that it possesses no power of discriminating between good art and bad art, but merely follows the fashion of the day. This is principally due to the exclusiveness and narrowness of the system in Indian Universities, which, while nominally intended to provide a complete system of national culture, only recognizes Law, Engineering, Medicine, Science, and Literature as the learned professions, and ignores Art altogether, both as a means of general intellectual training and as a very important factor in national culture and material progress.

These are large questions which hardly come within the scope of this Monograph, but they will have to be dealt with in any serious attempt to develop Indian art industries.

For the present I would only suggest that in the new galleries which are shortly to be erected for the combined collections of the Calcutta Government Art Gallery and the Art Section of the Indian Museum, two of the inside doorways should be carved by the best men obtainable from Orissa. For that purpose I would propose that a fixed sum, say Rs. 3,000 should be set apart from the grant for purchases of works of Art in the coming year. The Art Gallery would then possess good examples of modern native stone-carving which might be the means of diverting some at least of the large sums which are
spent in Calcutta on inferior sculpture and architectural ornament towards the preservation of the splendid art of Orissa.

In concluding I must express my acknowledgments to Mr. E. F. Growse, i.c.s., Commissioner of Orissa, to Mr. H. P. Christian, Deputy Collector, Bankipore, Babu Guru Charan Lal, Collectorate Clerk, Gaya, and Babu Abhoy Prasad Das, Deputy Collector, Cuttack, for valuable notes and information which I have made use of in this Monograph.

E. B. Havell.
Schedule showing the condition of the Stone-carving Industry in Bengal, 1905.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Number of families employed</th>
<th>Average earnings.</th>
<th>Remarks.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ORISSA DIVISION.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puri District.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puri town</td>
<td>5 or 6</td>
<td>4 to 8 annas</td>
<td>The best workmen are very excellent carvers, but as they do not find other remunerative work, they are compelled to make cheap soapstone idols for the bazar.</td>
</tr>
<tr>
<td>Bhubaneswar</td>
<td>Do.</td>
<td>Ditto</td>
<td>The Temple of Bhaskareswar, Brahmeswar, Raja Rana Moktaswar Sidhaswar and Parshurameswar have lately been restored by local carvers, whose work is very good.</td>
</tr>
<tr>
<td>Tangi and Bolegarh</td>
<td>Exact number not returned.</td>
<td></td>
<td>Two temples have been constructed lately in these places in the Khurda subdivision.</td>
</tr>
<tr>
<td>Haldia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ghatikia</td>
<td></td>
<td>Ditto</td>
<td>Two temples have been constructed lately in these places in the Khurda subdivision.</td>
</tr>
<tr>
<td>Tangi</td>
<td></td>
<td>4 to 8 annas</td>
<td>Two temples have been constructed lately in these places in the Khurda subdivision.</td>
</tr>
<tr>
<td>Narangurh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CUTTACK DISTRICT.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jajpur</td>
<td>10</td>
<td>Ditto</td>
<td>Some fine carving has been carried out in the last 20 or 30 years for the Temple of Biroja in Jajpur town, the cost of which has been defrayed by a Babaji who begs for funds.</td>
</tr>
<tr>
<td>Banki</td>
<td>26</td>
<td>Ditto</td>
<td>At Aul in the Kendrapara subdivision some carving on the Temple of Barahanath is being executed at the expense of the zamindar.</td>
</tr>
<tr>
<td>Kendrapara</td>
<td>2</td>
<td>Ditto</td>
<td>Some fine carving has lately been executed on the front of the Jagannath Temple at the Garh of this Raja of the State.</td>
</tr>
<tr>
<td><strong>TRIBUTARY MAHALS.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khondpara</td>
<td>Not returned</td>
<td>4 to 8 annas a day.</td>
<td>These are common masons who make stone utensils used chiefly by the colliery coolies in Raniganj. The value of the yearly output is said to be between Rs. 8,000 and Rs. 10,000. The principal places of the industry are within the zamindari of the Manki of Terai and of the Thakur of Marthana, who own the quarries. A firm of merchants at Kudadih act as distributing agents.</td>
</tr>
<tr>
<td><strong>CHOTA NAGPUR DIVISION.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranchi district</td>
<td>About 70</td>
<td>3 annas a day</td>
<td>Some fine carving has lately been executed on the front of the Jagannath Temple at the Garh of this Raja of the State.</td>
</tr>
<tr>
<td><strong>MANDHUM DISTRICT.</strong></td>
<td>Number not returned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madanpur (pargana Panda)</td>
<td>Number not returned.</td>
<td></td>
<td>A few families of the masons who do similar work to the masons at Ranchi, but occasionally they carve also. About five years ago they did some carving for a temple in Chirkunda belonging to Nanda Gora.</td>
</tr>
</tbody>
</table>
### Schedule showing the condition of the Stone-carving Industry in Bengal, 1905—concl.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Number of families employed</th>
<th>Average earnings</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PATNA DIVISION.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patna</td>
<td>50 to 100 workers</td>
<td>4 to 12 annas a day</td>
<td>The industry is chiefly confined to four firms of shop-keepers at Marasganj Ghat. The work consists of articles for domestic use, such as curry-stones, pestles, cups and other utensils, similar to those made in Chota Nagpur. Rough figures of Hindu gods, varying in prices from 4 annas to Rs. 5, are carved.</td>
</tr>
<tr>
<td><strong>Gaya District.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pathalkatti</td>
<td>25</td>
<td>6 to 8 annas a day</td>
<td>There are also a few families of lapidaries, or hakkaks, who cut and polish stones for rings, ornaments and amulets. The carving of an ancient Muhammadan tomb at Manaer, 6 miles from Bihta railway station, has been lately restored at Government expense.</td>
</tr>
<tr>
<td>Sapneri</td>
<td>3</td>
<td>Ditto</td>
<td></td>
</tr>
<tr>
<td>Dhammahra</td>
<td>1</td>
<td>Ditto</td>
<td></td>
</tr>
<tr>
<td>Gaya town</td>
<td>7</td>
<td>Ditto</td>
<td></td>
</tr>
<tr>
<td><strong>BURDWAN DIVISION.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Katwa</td>
<td></td>
<td></td>
<td>Their ordinary work is the manufacture of stone utensils similar to those made in Patna. Ditto ditto.</td>
</tr>
<tr>
<td>Dainhat</td>
<td></td>
<td></td>
<td>Two families of skilled carvers who make idols and occasionally do architectural work. The others do the same work as those at Pathalkatti. Two dharmasalas and a temple to Radha Krisha are now being built in the town. The carving on them is very good, but all the workmen are brought from the United Provinces. The wages of these men vary from 8 annas to Re. 1 per day.</td>
</tr>
</tbody>
</table>

These are places in the subdivision of Katwa, in which there are a few stone-carvers who make rough Hindu idols.
A MONOGRAPH ON WOOD-CARVING IN BENGAL.

PREFACE.

MR. E. B. HAVEL was selected in October 1901 for writing a monograph on wood-carving in Bengal. But he having gone to England on leave, his duty devolved upon me.

From the report obtained by the Government of Bengal from the different Collectors, it appeared that no wood-carving was carried on in other districts of the Province than Monghyr, Bhagalpur, Patna and Gaya. It was suggested that I might visit Gaya, Patna and Monghyr to see the wood-carvers at work. Accordingly I visited the above places, and append the following notes:

Subsequently I received a Note on Wood-carving in the district of Cuttack, prepared by Babu Monmohan Chakravarty. But as the industry in wood-carving is not in a better stage here than in Behar, I did not think it worth while to visit the district; but I am glad to add to my modest work Babu Monmohan Chakravarty's note.

The Economic Section of the Imperial Museum in Calcutta possesses a good collection of wood-carving, made in many parts of India and Burma. But so far as it regards Bengal, there are only three specimens—a nice massive pillar carved in Muradpur and the models of the temples at Kantanagar and Barakar, which are excellent indeed.

These three samples are a good proof that the wood-carving industry in Bengal had, and may have still, clever mistries, able to do any sort of decorative work in wood-carving.

PATNA.

Nothing remains in Patna to testify to its identity with the ancient Palibotra, the Capital of the Maurya Emperors, visited by the Greek Ambassadors of the successors of Alexander.

The existence of wood-carving here at the present day is practically nominal. Judging, however, from the remains of the older wood-carvings in that interminable line of houses extending from Bankipore to Patna, it is clear that much better work was produced in the past, when this industry appears to have enjoyed a period of happy florid forms, with which the work done at present cannot bear comparison. It would appear that all the old carving visible along the road, where the villages of Muradpur, Chowhatta and Aru are situated, was cast more or less from the same mould, so little is the variety in form and design; still we can observe a special characteristic in each group of carvings, which distinguishes it from those of the other villages. The carving to which I allude is that in connection with the buildings, such as the pillars, architraves and brackets supporting their verandahs and roofs. The village of Gulzarbag has the best local specimen. Unfortunately, nowadays, the taste of the inhabitants has changed. When a house is near to fall in pieces, and it is re-built, no more carved pillars are used; bricks are the only substitute. Originally most of those pillars were first worked by the turner, even those with large diameters, and afterwards carved by clever artisans. The wood used here is teakwood in general, but sometimes siscoo and paissor. When the present proprietor of a house changes the old pillars, the work of the turner is dispensed with, and the pillars, although fairly well carved, remain of a quadrangular form. This is easily gathered from the fact that all the quadrangular carved pillars are invariably the new ones. The freizes also are good, and a few of the panels, too; but in general this carving, although effective, is of very rough execution, and cannot stand comparison with that by the artisans of Lahore, Delhi and Agra. There are very few wood-carvers at present at Patna, and the decay in this profession has proceeded so far that
none of the new buildings on the long road between Bankipore and Patna has any wood-carvings at all. A very small percentage of the men make their living by carving blocks for printing cotton materials, and their wages vary from 6 to 12 annas per day. The demand for these blocks is constant, and will certainly increase in the future. These artisans do not follow any given design or pattern; they invent their own motives of decoration. Youths earn two or three annas per day by copying the blocks made by the men, but they seem to possess a very abundant view of invention. I have seen more than 60 blocks, all different, deserving praise and encouragement. Having made some interrogations, and especially asking them why they do not devote themselves to the more important branches of wood-carving in connection with architecture, such as pillars, architraves, brackets, doorways, window-framing or screens, fancy chairs, fancy tables, boxes and caskets, they answered that they could do all these things, but that no demand exists for them. I pointed out to them that they have beautiful specimens to copy from in the marble pillars made in Jeypore at the entrance of the beautiful Sikh temple, which are really masterpieces of their kind. Unfortunately they seem to be destined to continue making these wood blocks for printing cotton, and may never have a chance to use their talent for better work. Many others are making toys, which are distributed in great quantities in the country, and find their market in bazaars and fairs. The turners work with very primitive apparatus and tools. With some up-to-date inexpensive machinery they could triple their output of work; but then there is the risk that the production might become too much for the demand, therefore it is advisable in this respect to let them go on in their old ways.

The wood-carvers on blocks use better tools, but they expend too much time in finishing their work, the old adage ‘time is money’ will probably always remain unknown to these poor men, to whom the whole world seems to be circumscribed to limits of their own land, and, as a natural consequence, they are, as a class, very improvident. In conclusion, I do not see any prospect of a better future for the wood-carving industry in this district.

GAYA.

In this old city the wood-carving industry must have reached the apex of the beautiful as shown in the examples which belong to the earliest periods of this art. Unhappily this excellence has not been maintained in the pieces of later date. I do not hesitate after twenty years' experience in India decisively to say that the taste of the well-educated and rich classes has so deteriorated in recent times from that exhibited in these earlier works, that it would be childish folly to entertain the slightest hope for much improvement in the wood-carving industry under present conditions, and should the industry stand in need of patronage from the present generation of natives.

The rich as well as the poor people of the past, while building their dwellings, appear to have held to the constant idea that some part of the ambient, where they had to spend the greater part of their lives, should possess something to delight the eyes, therefore stone and wood carving was employed in the erection of a frontage to a house whose proportions, adequate to the means and aesthetic of its owner, would generally afford at least some carved pillars, doorways, architraves, carved windows, etc., etc.

I went through the remotest recesses of the extensive native quarter and had the opportunity of admiring some really beautiful wood-carving, which must have originated from the splendid examples of old carved stone on the Buddhist and Hindu temples which seem so gloriously to defy the ravages of the centuries.

I visited the house of Rai Behari Lall Barihck Bahadur, where the best specimen of ancient carving can be admired and profitably studied. Here I found a door with its pillars, architrave and friezes so admirably carved that they might well be exhibited in a museum. Near this house is the corner of a very narrow lane, at which there is a small house evidently old, and displaying some beautiful carvings of the more minute style, almost resembling chased silver or filigree work. The natives themselves have great veneration for this building, owing to the beautiful construction of its verandah, beams, pillars and
freizes. Many other fine examples here are injured by several coats of tar having been laid over them in such a way as almost to obliterate the ancient carving, of which little or no trace is now visible. The same barbarous process of tarring or coating has unfortunately not spared the grand Buddhist temple at Buddhā Gaya, a site which cannot fail to inspire in the archaeologist the same interest as Nineveh, Memphis, Thebes, Jerusalem, Athens and Rome. Alas! With such opulence of good samples of the wood-carving industry, the modern mistri is just like the Araba Fénice—

"Che ci è ognun lo dice
Dove sì nessun lo sa."

In fact, there is now no wood-carver in Gaya who may be able to do any work similar to these splendid remains. Industry in the strict sense of the word does not exist either in Gaya town, Manpur, Maksudpur, Buddha Gaya or Tikari. The mistries are mere carpenters, and very seldom receive orders for even common carving.

In Budha Gaya I spoke with a mistri who had carved a nice architrave in the court-yard of the Buddhist monastery four years ago, and from that time he has had no orders for any other carvings, for which the man has special talent. He insists that this architrave carved by him is in the ancient Buddhist style; but it is not so, as the carving possesses all the characteristics of the Burmese manner, as indeed do the greater part of the old carvings in the town of Gaya. An exception might be made in favour of those of Rai Behari Lall Barrick Bahadur's house and a few others. Patna has a style more purely Hindu, and is certainly more free from this Burmese influence. I was extremely disappointed to find the few wood-carvers in the above-mentioned villages doing carpenter’s work only, because in order to see them at work upon the higher branch of their handicraft (I allude to wood-carving) I had travelled in very uncomfortable conveyances, sometimes 16 miles at a stretch, from the town of Gaya. All the mistries when not engaged on simple carpenter’s constructive work, employ themselves making boxes of different sizes, inlaid with brass, a very common work indeed in this locality, for which there is always a demand, and from which they can earn from 8 to 12 annas per day.

I met a man named Paghu mistri in Mahalla Koivibari, whose right arm was injured. He showed me the little carving he had in stock, for which I regret I cannot share the opinion of Babu Baij Nath Sahay, who admires it much, and describes it in his Note on Wood-carving in Gaya. Altogether the mistries, who are tolerably good at wood-carving, in Gaya and its surrounding villages already mentioned do not exceed twenty in number, and the cleverest of the lot are Alkon (the one who carved the long architrave at the Budhha Gaya temple) and Ghamand. Given workmen of this class, there is very little hope for the betterment of modern wood-carving, which, as an industry, is rapidly becoming extinct even in this district.

The wood used here, as at Patna, is sissu or paison, which offers a better medium for carving than teakwood, which possesses a viscous fibre, giving a good deal of trouble even to the most skilled artisan. The tools I have seen used by the local mistries are good ones, and all of European manufacture. With the exception of the already mentioned Barrick and two or three other rich native gentlemen, nobody cares for good carving in Gaya, as the new houses are built in a pseudo-European style, or in a horrid mixture of styles which, while giving a partial suggestion of Oriental character, shock the aesthetic sense, and may be broadly defined as outrages on architectural taste.

MONGHYR.

I have observed in this town, which I have crossed in every direction, that the wood-carving used for the frontages of houses and for their interior decoration is of very poor quality indeed. The reason is easily found in the fact that wood-carving, as it is understood in Bunkipore, Patna and Gaya, is not carried on here. In reality there is no wood-carving in Monghyr but only inlaid work, for which there is a fair demand and clever artisans. The small quantity of carving necessary in this inlaid work on small articles of daily use is made on ebony or mahogany wood, the depth of the carving not exceeding
the thickness of a rupee, and therefore the work of the local artisan is not employed on heavy carving in paimor or sissoo wood, such as pillars, architraves, freizes, doors, etc.

The Monghyr carving has a certain reputation for the embellishment of inlaid work, and the craft has been handed down from father to son for several generations. The few families practising it were established here in the middle of the 18th century, and they were brought to Monghyr, as the tradition goes, by Mir Kassim, with his gun-makers. It may be supposed, then, that the wood fittings of the guns were the only articles worked upon in the very beginning of the industry by those mistries who, it is known, excelled so well in making rich inlaid work on the gun-carrriages. When the demand for such work ceased in the course of time, the artisans devoted themselves to other branches of the industry, and applied their inlaid work to objects such as those in use at the present day.

I commenced my tour at Kassim Bazar, where there are a number of toy-makers, notably the shop of an artisan of good repute named Bisu mistri; but in this case I was not fortunate, as I found the suburb in deep consternation on account of the ravages worked by plague during the last two weeks. Poor Bisu mistri was himself unfortunately registered among the victims of this dreadful disease. His shop was closed and his family had gone elsewhere. The people of the neighbourhood, whilst lamenting his death, informed me that he was a clever artisan, and not inferior to Kali Charan and Bansi, also prominent wood-carvers here, whose work I was able to examine afterwards in their shop at Baherotal. These two men are now considered the local celebrities of the profession in Monghyr, having been specially selected for this reason to work on the exhibits of the Darbar Exhibition at Delhi. These men doubtless possess talent, but they lack originality. The fronts of the articles they make are in each case always the same, and the decorative motives are never changed, whether it be the cabinet, the table, boxes, brackets, caskets, inkstands, stools, frames, etc., the pieces have always the same form, the sole difference being confined to the proportions. When we have seen the small stock of these goods usually kept in a shop, all the other collections are mere repetitions, with more or less finish, which latter factor influences the cost of production. Kali Charan and Bansi mistries have their large workshops in Baherotal, but they do not possess the happy knack of showing off their labour to advantage. The shop is large and dirty; the so-called stock is accumulated in a small dark room at the back, and the objects are shown to the visitor piece by piece. I had a long conversation with these two artisans on the technical part of their work, giving them some good hints on it, and showing how their tools, are of old pattern, and the ease with which they could get good modern tools which would both work better and shorten their labour. But as I know from experience how the natives act after receiving good advice, I fear they will never change their old tools, unless they go to work under European direction and management in the Government workshops or elsewhere. I also pointed out to them how useless and absurd it is to have ebony or any other hard wood soaked in water previous to carving it, which is erroneously supposed by them to make it better fitted for carving purposes. The wood, I explained, to them, must be well seasoned and dry, in order to get the best results in carving.

The price of ebony is Rs. 3 per square cubit, while ivory sells at from Rs. 6 to Rs. 16 per seer.

The wages earned by the men employed under Kali Charan are Rs. 12 per month, and boys receive Rs. 5 to 8 per month; these are somewhat low rates for the skilled labour necessary for work of this kind. No doubt Kali Charan takes the lion's share of the profits and could pay a little more to his assistants. Fortunately, for him, and his class of employers, this country is yet a stranger to the Trades Union strikes and socialistic combinations of Europe. The humble condition of the operatives and the comparatively small financial interests involved in these industries, contribute, no doubt, towards this happy immunity.

I visited also Madapur, where one Kidru Mistri has his shop with a few boys to assist him. He has a small stock of carved work ready, executed in the cheapest line, and told me that he does not care to produce better work, as the public is not ready to pay for it. I did my best to persuade him that his
theory was wrong, and that a better article, nicely formed and well finished in all its details, will always command a good price.

Ivory and stag-horn also are used for inlaid work in Monghyr, and the price of an object varies in accordance with the material used. Stag-horn costs only a rupee per seer.

This industry is carried on also at Banaik by three families of mistries.

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Note on Wood-carving in Cuttack by Babu Manmohan Chakravarty, Special Excise
Deputy Collector, Cuttack.

The industry of wood-carving is a minor one in this district, less important than the art of (e.g.) stone-carving. It is also a decaying art, carved works of wood being much less found or done than before.

2. In the following kinds of work wood-carving is, or rather was, mainly used:

(i) Wood-work of houses, specially veranda's (ver. chandni such as—(a) ora, goja, thorasta, chitakathi of thatch frames;
(b) doors, door-frames and windows;

(ii) Furniture: articles for personal use, such as bedsteads (leg and head specially), stools, chests, lamp-stands, pothi-guards, pothi-stands (vyasana), kaldikathna (cups for holding turmeric), combs (pania), small-boxes;

(iii) Vehicles, such as palki, chandola Vimana (of idols), boat's prow;

(iv) Carved mythological figures for show at the time of yatra's, such as Ravana and other demons, Hanumana and other monkeys, and so forth.

(v) Toys.

3. The following are the principal objects carved on the works:

(i) Beings, mythological or otherwise, such as Krishna, Radha, Sakhis (mainly in the thatch wood-work), and demons, monkeys, &c., in the yatra's.

(ii) Animals: lion, elephant (specially in thatch wood-work and bed-

(iii) Plants, lotus in bud, half-blown or full-blown (the most favourite of all kinds) ses flower, muchkindi flower, creepers (leaves on turning stems with flower, and occasionally fruits).

(iv) Other objects, such as ropes (round posts).

(v) Geometrical patterns, as in windows (the toy figures are not included in the above).

4. Five kinds of woods are chiefly used, as sala, for thatch wood-carving, door-frames and other rough works; sissoo, for bedsteads and chests; vyasana, for doors and windows; gvinga, for toys; and paldhua, for yatra figures. Jack-fruit wood is also used for bedsteads, boxes, chests, etc.

5. The principal tools used are—

(a) Nihana, for cutting.
(b) Kholas, patuli and nasula, for turning wood.
(c) Tajis, for carving, in varying sizes, from the breadth of a thread (suta) to an inch broad.

6. The carved-works are done chiefly in the mofussal, and rarely in the town of Cuttack. They are generally done by carpenters (barhai), but the toys are carved by a class of chasas known as kharadi. The latter are deemed inferior to barhai's, and do not intermarry with them.

7. The wages in the mofussal are khoraki (food) plus three annas to four annas in cash. In the town they vary from five annas to eight annas per diem.

8. The industry of wood-carving is more or less dying out. In old days temples, math's and large houses had their inner verandah wood-work elaborately carved, while the doors and windows contained good specimens of lotus and geometrical screen patterns.
Some idea of old carvings may be found from—

(1) Tulipur matha in Cuttack town;
(2) Thakurbari (chapel) of one Gobinda Swain at Kola Sarabha, pargana Kodinda, thana Sadar;
(3) The matha at Sujanpalaupada, pargana Hariharapur, thana Jagatsingapur.

CONCLUSION.

In my humble opinion the wood-carver in Bengal will never improve his craft, and will always produce the same kind of work. All his forebears did so, therefore he does not trouble himself to think for a moment of inventing a new form or a new detail. This sad apathy is perhaps due to the proverbial laziness of the Hindu artisan, or to his narrow mind, which often amounts to actual prostration, and accounts for this want of research and invention in his craft.

I do not by any means advocate innovation at this late period of Indian art, when its forms and conventions have become so familiar to the public mind, that they in a variety of cases virtually constitute its sole claim to a distinctive existence. There is no possibility in India of any movement, even remotely similar to the Arte Nova recently exemplified at the International Exhibition of Decorative Art at Turin, where its English exponent, Walter Crane, is looked upon as a man with a new message for the art world. Nor is this desirable, for Indian art, in consideration for its past, is not called upon to develop any radical changes in the future, and cannot now have an evolution like the art of other nations. It has been for too long a period in a state of lethargy.

To hope, then, for an evolution in Indian art to-day would be vain; but we can well hope for a revival following a very short programme (similar to the one formulated with three words only by the grand composer, Verdi, about Italian music “Torniamo all’ antico”) which would consist more in the restoration to Indian art of all that was admirable in its earlier forms than in changing the classic traditions of artistic industries, which have already suffered enough from the intrusion of corrupt forms, largely due to foreign exploitation.

The present object of the Government of India, as well as that of all lovers of Indian art, is to co-operate for the betterment of the Indian artisan’s condition, as well as for a revival of all the Indian arts, of which happily some noble examples belonging to the most flourishing periods of each branch of art and industry are preserved to us.

The Durbar Exhibition at Delhi will, no doubt, be the great starting point. There we shall see the productions of the past compared with those of the present; and I trust that a serious and deep study of that Exhibition will clearly point out the lines along which future progress is to be made in order to insure the revival of every branch of this Indian art.

When the Indian artisan will commence to understand that he is an object of real interest to his rulers, he will become another man.

With more confidence in himself and his prospects, the artisan may be expected to cultivate his artistic ideas through the glorious roads already marked by tradition.

With such a magnificent past to guide him, it is not unreasonable to expect that the Indian artisan might with patience and encouragement be induced to take a personal interest in the regeneration of his art, which, though it may not, as I have already pointed out, be profited by change, must improve and prosper during the era of revival which, let us hope, is impending, and may lead eventually to a renaissance on Indian art.
The ancient and the modern.—In India the most primitive and the most modern things exist side by side. The wild aborigine of the jungle is the next-door neighbor of the man of highest modern culture. Primitive usages and appliances have also survived the changes of thousands of years and maintain a hoary existence side by side with the less romantic customs and things of modern times. The fire-drill is still made to yield the fire required for sacrificial purposes, while on the same spot the lucifer match is struck to light the fragrant havanna. The ancient bullock-chariot creeps beside the railway with its snorting locomotive and rushing train, and under the roadsides telegraph wire the slow messenger goes his weary way carrying letters written on palm-leaf by means of an iron stylus. The hands of the sturdy maid bend beneath the weight of massive brass-wristlets of the most primitive make, while the arms of her delicate mistress glitter with faceted gold-bangles of the most refined workmanship. Thus, in innumerable instances, the most ancient are seen to live side by side with the most modern customs and usages. Native India bears the silent impress of man's social and domestic history from the earliest of ages, though it possesses hardly any authentic record of kings and battles, invasions and massacres.

Development of Metal Manufactures.—These living relics of the past invite a minute research to trace step by step the gradual development of the metal manufactures of India. The dried-up shells of wild gourds which hung handy from trees of the primitive forests no doubt formed the first drinking-cup of the earliest man in India. These shells are still used as such by religious itinerants whose austere life permits only the simple habits of prehistoric ages, but no luxurious innovations of later days. But when the art of copying vegetable and animal objects in stone was learnt, when gold and copper were discovered and the manufacture of brass invented, the householders began to make, though not without a protest against the change, vessels and other articles of stone or metal similar in shape to that of the natural objects employed in domestic use, chase, war, or personal adornment. In brass the gourd shell gradually developed into the Lota and the Ghati, and in copper the scooped-out rhinoceros-horn, which on account of its comparative rarity and durability must have been a very valuable utensil in ancient times, and the oblations poured out of which are still considered highly acceptable to gods and ancestral manes, became the sacrificial vessel called Koshá of modern days. The large round leaf of the lotus, or the copy of it made by pinning together smaller leaves of other plants, which, together with the plantain leaf, is still used as a plate all over the country, is the original of the modern Thálā, and one half of the round Bel rind or the cocoa-nut shell, still used as a cup, spoon, or ladle, gave the model for the modern Bāti or the Katorá. Hollowed pieces of wood, still used, specially in jungle tracts, to keep water, milk, or pea-soup during feasts and festivals, formed models for large brass jars called Gharás, or for circular basins called Gámīsā. The iron arrow-head of later times was the copy of the pointed deer-horn sharpened by rubbing it on stones, and the modern plough that of the

* Brass, versacular Pītā or Pūtā, is an alloy of copper and zinc; bronze, called also bell-metal, versacular Kāndā, is an alloy of copper and tin; Bhāraś, an alloy of copper, zinc and tin, generally sold as Kānā; copper, versacular Tūmā or Tūshā.
forked branch of a tree used to scratch the soil in primitive agriculture. Similarly, flowers and leaves of trees, such as the _Champá_, the _cocoa-nut_ and the _Páñ_, gave form to various brass ornaments of personal adornment. As a sign of increasing prosperity of the people, household utensils, hitherto made of _basket-work_ or clay, are now being made of brass, as more suitable for domestic purposes on account of their portability, durability, and greater purity. The rice-washer made of shining brass now glitters in every utensil shop, though that made of sliced bamboo by the low-caste _Dom_ is still almost in universal use. The vessel called _Hánik_ , used to boil rice, is being made of brass, though that made of clay is still used by high and low, as the former is costly, requires daily cleaning and scrubbing, and is said to make the food cooked in it heating and harmful. The incense-holder called _Dhumochi_, may now be had of brass, though fifty years ago solely that made of clay burnt the _Dhup_ and _Dhuná_ of the Hindus and the _Lobá_ of the Muhammadans. Thus, within recent years, things formerly made of wood, bamboo, or clay, are, when found feasible, being made of brass or copper.

**Purity measured by antiquity.** — Reluctance for change, which is always present in man's nature in every age and clime, and also his vain efforts to withstand its irresistibility, are nowhere better displayed than in the measurement of the purity of a thing in proportion to its antiquity. This standard, according to which things obtained a higher or a lower place on the platform of religion or caste, is not confined to discoveries or inventions alone, nor to implements or utensils, nor to wood, stone, or metals, but also extends to every walk of life, from the obsolete thoughts and practices of old times to articles of food or raiment introduced into the country in later ages. If no other consideration comes into play, the greater purity of a thing is but expressive of its greater antiquity. The newer the thing, the lesser is it acceptable to gods and men in a religious and caste point of view. The greater purity of the cane-sugar than date-sugar, and of the pulse _Mung_ than _Másh_ (Phaseolus sp.) betrays the earlier introduction of the former and the later introduction of the latter. Potato and cabbage, brought almost within the memory of man, have not yet quite got over the stigma of their foreign origin; while the pine and the custard apple have become acceptable to gods and men, all trace of their early history having been lost in the dim haze of four centuries of Indian life. Similarly, wool is purer than cotton, but silk, which no doubt is a later introduction, has evidently been credited with the virtues of wool, being an allied product, and being too valuable and too powerful an article to submit to be relegated among impure things, though its production entails the sacrifice of myriads of lives. Following this standard of measuring the antiquity of a thing by its greater or lesser purity in the eye of religion and caste, we find here a corroborration of the results attained by anthropological researches in other parts of the world, which have given a clue to the early progress of man from the use of wood, bone, horn, and stone, to that of gold, copper, bronze, and iron. Gold being found in the native state no doubt was the first metal to draw the attention of man, and it therefore rightly received the name _Ayas_, or that which attracts, which name was subsequently transferred to iron, owing probably to its magnetic properties. Gold, however, is too rare a metal to come into extensive use, except, as the sacred books assert, in the Age of Truth, when the world was sinless, and when the people necessarily could afford to eat off golden plates and drink out of golden cups. In point of purity, and consequently in point of antiquity,
copper comes next, which, though in India scarcely found in the native state, was easily smelted from its ore by spontaneous jungle fires that no doubt raged in the primitive forests as they rage now in spite of trained rangers and watchful guards. The use of copper revolutionised the habits and customs of the age, and from the day of its discovery a new era may be said to have dawned upon the early history of man.

**Antiquity and purity of metals.**—It is very probable that at first all household articles were made of pure copper, but in time it partly gave way to its more gold-like alloy, brass, and later on to bronze. Copper being first in the field is held to be the purest of all inferior metals; brass coming next, occupies the second place; and bronze, though more costly, beautiful and useful, and less harmful owing to its greater resisting power against rust and corrosion, is the last in point of purity, and is liable to defilement by the touch of men not approved by caste. In Europe the use of bronze—i.e., the alloy of copper and tin—might have preceded that of brass, the alloy of copper and zinc; but in India it seems to have been the reverse—at least the relation between purity and antiquity seems so to indicate. This is explained by the almost total absence of workable tin ores in India, though zinc is also very scarce. The same forest-fires which discovered for man the existence of copper by smelting the ores, must also have taught him the preparation of brass by melting into an alloy zinc-blendes associated with copper, which sparsely occurred in the neighbourhood of tracts where the Aryans formed their first settlements.

**Supersession of copper.**—Though brass came into extensive use in the manufacture of household utensils, copper was not altogether discarded. As observed before, things in India somehow or other get mixed up with religion. From birth to death, from the building of a house to the wearing of a shell-bracelet, all form occasions for a series of thanksgiving and devotion of man to the service of God. The most ancient things having the longest standing and the closest alliance with religion, the latter becomes their last refuge, when discoveries, inventions, and innovations have driven them from every other field, from every nook and corner of Hindu household and Hindu social life. Old things, therefore, die hard in India, and do not die at all if they have fairly associated themselves with religious ceremonials. From the most primitive gourd-shell to the costliest of plates, each gets a place allotted to itself, and modestly goes on performing its duties and functions for all time to come. Pure copper, all but discarded from every other household use, has nevertheless retained its place in religion, and is now chiefly employed in the manufacture of sacrificial vessels, at least so far as Bengal is concerned. Since the advent of the Muhammadans, however, who use it tinned, copper is also largely employed in the manufacture of ordinary utensils for Muslim households. Brass, being less liable to defilement than bronze, is employed for making articles which can be allowed to be used, scrubbed, and cleaned by people of all castes, and being also cheaper, is largely utilised in the manufacture of articles of common and constant use, chiefly water-vessels and cooking-pots. Bronze, less liable to be tarnished and affected by acids and salts, and at the same time being more costly, is reserved for dishes, plates, cups, and drinking vessels.

**Metal-working castes.**—It appears that in the Hindu social system there were originally no separate castes to work the different metals. Vaisyas and the higher Sudras, under the general name of "Karmokārs" or "artisans,
might freely choose any metal to work it as a profession, until it became hereditary, and gradually differentiated and stereotyped itself into a separate caste-occupation. Thus, jewellers and workers in gold and silver became the Swarnakár caste, and braziers and workers in copper became the Kánsári caste of our days, while the name Karmokár is now exclusively applied to the caste which works in iron and steel. Three classes of metal-workers—one working in gold and silver, the second in brass and copper, and the third in iron and steel—thus differentiated themselves into three separate castes, with the invariable injunction against intereating and inter-marrying. They were, however, all held highly respectable, in a caste point of view, until the degradation of the gold and silver smiths, the Swarnakárs, which tradition ascribes to their incorrigible propensity to interfere with the precious metals entrusted to their care for the manufacture of plates or ornaments. But even before the advent of Western education in Bengal, which in various directions has upset the old caste-professions, the privilege of working any of the metals never remained the exclusive property of any one caste. Thus, many of the Karmokárs of Dacca have long forgotten their caste-profession of manipulating steel and iron, and have acquired a wide fame for their workmanship in gold and silver; and the Kánsáris of Blawánipur, near Calcutta, have for some time past taken to the manufacture of gold ornaments, silver plates, and delicate instruments, in preference to making copper pots, brass goglets, and bronze plates. On the other hand, all castes without distinction seem to have trespassed into the hereditary profession of the braziers themselves, and are seen busy hammering copper, moulding brass, and polishing bronze, or selling the utensils as wholesale merchants, retail shopkeepers, or wandering hawkers. In the hilly districts of Western Bengal, metal-artisans, or at least certain sections of them, seem to have gradually evolved out of the aboriginal or semi-aboriginal iron-smelters. As they became Hinduised and improved their professional position by advancing from iron-smelting to iron-working, and from iron-working to working in more valuable metals, they, on the authority of one of the later sacred books, traced their descent from a Hindu divinity and laid claim to the same respectability as is enjoyed by their brother-craftsmen in other parts of the country. On one of those occasions, which were so very common in the infancy of the world, a mighty demon rose into power and drove away the minor deities from their celestial possessions. The god Siva, by virtue of whose reckless boon the demon had acquired such invincibility, was besought to save the hapless celestials from this terrible calamity. Taking pity upon the fugitive gods, Siva created a man to fight the demon, and sent him down to earth fully equipped with blacksmiths' tools. Meeting the demon, the man challenged him to a single combat, but he laughed at his presumption, considering that so tiny a creature would scarcely form a mouthful to eat. The man then defied him to enter his furnace, which request, with the customary stupidity of a giant, he readily complied with. The man began to blow his bellows hard, but the giant inside the furnace, with the stubbornness of his race, would neither stir, nor cry, nor scream, though his body soon got red-hot, melted, and began to flow out in all directions in the form of molten masses of iron, copper, and other metals. This was the origin of the metals, and that man was the ancestor of the artisans who work in metals. They were subdivided into eight classes according to the metal in which they worked or things they made:—(1) Lobár-kámar who work in iron;
(2) Pitule-kāmār who work in brass; (3) Kānsāri-kāmār who work in bronze; (4) Swarna-kāmār, who work in gold; (5) Ghatrā-kāmār, who make imitation fruits in iron, figures of owls, the vehicle of the goddess of wealth, and who use the charcoal left behind of wood with which dead bodies have been cremated; (6) Chānd-kāmār, who make brass mirrors; (7) Dhokrā-kāmār; and (8) Tāmra-kāmār, who work in iron and copper. But the Kānsāris of Central Bengal hold a more recognised position in the Hindu social system. Various stories are related about the origin of this caste in the sacred Purānas, specially in the Brahmavaivartta and the Bṛhadārṇava Purāṇas, but they do not deserve to be mentioned here. Sufficient to say that the Kānsāris themselves claim to be Vaisyas and one of the five sections of the great commercial class of Bengal. These five sections are:—(1) Gandha-banik, or the scent and spice sellers; (2) Sankha-banik, or conch-shell sellers; (3) Kansa-banik, or sellers of brass and bronze utensils; (4) Mani-banik, or sellers of precious stones; and (5) Suvarna-banik, or sellers of gold and silver. The general public, however, consider the first four as higher Sudras for whom a good Brāhmaṇ can officiate as a priest. The last, or the Suvarna-baniks, have suffered in public estimation owing to a royal edict, about the cause of which there are many stories current. The most current story is to the effect that more than eight hundred years ago a king of Bengal caused a number of golden calves to be made and distributed among the Brāhmaṇas. One of these being filled with liquid lac-dye was taken to a Suvarna-banik for sale. In order to examine the quality of the gold, he cut into the calf and thereby let out the blood-like liquid. The inexpiable guilt of killing a cow was thus fastened upon him, and the king, who had a grudge against the caste, at once degraded it to the position of the lower Sudras. In Behar the brazier caste is called the Kasera, who work in copper, prepare brass and bronze, and mould and beat them into utensils. Another caste, called the Thatera, also work in metals, whose speciality lies in polishing and engraving the utensils made by the Kasera and manufacturing ornaments.

**People engaged in manufacture and trade.**—The following table shows the total population, the number of persons belonging to the three recognised brazier castes, and the number of people actually engaged in manufacturing and selling brass and copper ware in each Division of Bengal:

<table>
<thead>
<tr>
<th>Name of Division</th>
<th>Total population</th>
<th>Total number of Kānsāri</th>
<th>Total number of Kasera</th>
<th>Total number of Thatera</th>
<th>Number of people actually engaged in brass and bronze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burdwan</td>
<td>7,688,818</td>
<td>5,377</td>
<td>...</td>
<td>325</td>
<td>22,454</td>
</tr>
<tr>
<td>Presidency</td>
<td>8,555,126</td>
<td>9,260</td>
<td>...</td>
<td>161</td>
<td>13,333</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>8,019,187</td>
<td>1,004</td>
<td>...</td>
<td>42</td>
<td>5,346</td>
</tr>
<tr>
<td>Dacca</td>
<td>9,844,127</td>
<td>1,200</td>
<td>...</td>
<td>...</td>
<td>11,167</td>
</tr>
<tr>
<td>Chittagong</td>
<td>4,190,081</td>
<td>394</td>
<td>...</td>
<td>...</td>
<td>1,902</td>
</tr>
<tr>
<td>Patna</td>
<td>15,311,014</td>
<td>...</td>
<td>14,256</td>
<td>12,245</td>
<td>22,845</td>
</tr>
<tr>
<td>Bhagalpur</td>
<td>8,882,090</td>
<td>3,121</td>
<td>...</td>
<td>10,067</td>
<td>10,611</td>
</tr>
<tr>
<td>Orissa</td>
<td>4,047,352</td>
<td>13,379</td>
<td>...</td>
<td>4,436</td>
<td>20,776</td>
</tr>
<tr>
<td>Chittim Nagpur</td>
<td>4,628,793</td>
<td>2,158</td>
<td>...</td>
<td>2,041</td>
<td>7,650</td>
</tr>
<tr>
<td><strong>Total Bengal</strong></td>
<td><strong>71,346,987</strong></td>
<td><strong>36,604</strong></td>
<td><strong>14,256</strong></td>
<td><strong>29,277</strong></td>
<td><strong>119,084</strong></td>
</tr>
</tbody>
</table>
The details of the last column in the preceding table—viz., the number of people actually engaged in the manufacture and sale of brass and copper ware—are given in the following statement:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bordwan</td>
<td>3,153</td>
<td>11,971</td>
<td>111</td>
<td>1</td>
<td>3,724</td>
<td>3,979</td>
<td>4,215</td>
</tr>
<tr>
<td>Presidency</td>
<td>1,365</td>
<td>5,101</td>
<td>30</td>
<td>74</td>
<td>3,473</td>
<td>1,861</td>
<td>758</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>462</td>
<td>2,227</td>
<td>41</td>
<td>...</td>
<td>945</td>
<td>504</td>
<td>167</td>
</tr>
<tr>
<td>Dacca</td>
<td>2,220</td>
<td>2,220</td>
<td>100</td>
<td>...</td>
<td>2,973</td>
<td>1,421</td>
<td>2,224</td>
</tr>
<tr>
<td>Chittagong</td>
<td>405</td>
<td>340</td>
<td>71</td>
<td>...</td>
<td>128</td>
<td>333</td>
<td>598</td>
</tr>
<tr>
<td>Patna</td>
<td>2,227</td>
<td>2,227</td>
<td>23</td>
<td>74</td>
<td>7,733</td>
<td>9,264</td>
<td>22</td>
</tr>
<tr>
<td>Bhagpur</td>
<td>1,683</td>
<td>2,229</td>
<td>13</td>
<td>...</td>
<td>1,526</td>
<td>4,924</td>
<td>433</td>
</tr>
<tr>
<td>Orissa</td>
<td>1,503</td>
<td>1,503</td>
<td>...</td>
<td>...</td>
<td>12,616</td>
<td>229</td>
<td>1,149</td>
</tr>
<tr>
<td>Chotia Nagpur</td>
<td>2,015</td>
<td>813</td>
<td>...</td>
<td>...</td>
<td>1,137</td>
<td>3,446</td>
<td>59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22,035</strong></td>
<td><strong>29,700</strong></td>
<td><strong>398</strong></td>
<td><strong>759</strong></td>
<td><strong>34,255</strong></td>
<td><strong>25,981</strong></td>
<td><strong>5,228</strong></td>
</tr>
</tbody>
</table>

**Raw Materials: Copper.**—No indigenous copper is now available, the smelting of the metal in this country having almost entirely ceased. The imported metal is now solely employed for the manufacture of copper vessels. Only sheet copper is used for such purposes. Old copper collected in the country and imported copper bricks and tiles are melted down and made into brass and bronze, but are not used directly in the manufacture of copper vessels. Copper vessels, however, are never made by casting into moulds, for the manufacturers do not know how to melt this metal, without the addition of zinc, tin or lead. That known as the Russian copper is preferred for the manufacture of copper vessels. The following table shows the import of copper into Bengal during the five years ending 1892-93:

<table>
<thead>
<tr>
<th>Years</th>
<th>1888-89</th>
<th>1889-90</th>
<th>1890-91</th>
<th>1891-92</th>
<th>1892-93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat.</td>
<td>R</td>
<td>Cat.</td>
<td>R</td>
<td>Cat.</td>
<td>R</td>
</tr>
<tr>
<td>Old copper</td>
<td>151</td>
<td>4,921</td>
<td>100</td>
<td>3,000</td>
<td>3,120</td>
</tr>
<tr>
<td>Unwrought: Other sorts</td>
<td>23,511</td>
<td>12,04,000</td>
<td>79,310</td>
<td>23,68,458</td>
<td>51,116</td>
</tr>
<tr>
<td>Wrought: Lanetta</td>
<td>1,019</td>
<td>2,41,302</td>
<td>911</td>
<td>2,23,787</td>
<td>1,789</td>
</tr>
<tr>
<td>Mixed</td>
<td>23,877</td>
<td>12,55,187</td>
<td>41,403</td>
<td>16,04,586</td>
<td>30,647</td>
</tr>
<tr>
<td>Sheets, etc.</td>
<td>3,288</td>
<td>1,58,317</td>
<td>24,782</td>
<td>10,35,635</td>
<td>16,128</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34,772</strong></td>
<td><strong>31,42,546</strong></td>
<td><strong>234,620</strong></td>
<td><strong>69,27,177</strong></td>
<td><strong>150,546</strong></td>
</tr>
</tbody>
</table>

**Brass.**—Brass is still made in this country, but its manufacture has somewhat suffered of late years owing to the import of sheet-brass from foreign...
countries. The following table shows the import of brass into Bengal during the five years ending 1892-93:

<table>
<thead>
<tr>
<th>Year</th>
<th>1888-89</th>
<th>1889-90</th>
<th>1890-91</th>
<th>1891-92</th>
<th>1892-93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrought (including sheet-brass)</td>
<td>2,915</td>
<td>1,52,680</td>
<td>2,996</td>
<td>1,70,592</td>
<td>2,862</td>
</tr>
</tbody>
</table>

Imported sheet-brass is only used in the manufacture of hammered utensils, and country brass both for hammered and cast vessels. Brass is still made in many places. Generally country brass is an alloy consisting of 2 lb of copper and 1½ lb of zinc, but that with 1½ lb of zinc to the same quantity of copper is considered a better quality, and still better that with copper and zinc in the proportion of two to one. But brass of such superior quality is now seldom made, except by special order. Inferior brass is also made of 3 parts of copper, 2 of zinc and 1 of lead. A very small quantity of lead is often added to brass in order to make it soft and malleable. Copper sells at Rs 46 per cwt., zinc at Rs 9, and brass at Rs 42. It is, therefore, advantageous to the maker of brass to add as much zinc to the alloy as he can possibly do. Brass is made in the following way:—A round hole, 2 feet in diameter and 3 feet deep, is dug on the floor of the shop, upon which an iron grate is placed. This iron grate is covered by a thin coating of clay, leaving several small openings at intervals. The hole is then enclosed by a circular clay wall, 3 feet high, open at the top. Immediately outside the wall a small aperture is made on the floor leading to the hole under the iron grate. This is the furnace, which is technically known as the stíl. The object of the small openings left on the iron grate is to allow the ashes of the fuel to fall through them into the hole beneath, as well as to allow a free circulation of air. The aperture made on the floor connecting it with the hole underneath the grate ensures the free passage of the air, as well as allows the ashes to be taken out when the hole is filled with them. Crucibles, called muchi, of various sizes, made of clay, mixed with sand, rice-husk, and chopped jute, are kept ready beforehand. These are filled with copper and zinc pieces, in the proportion mentioned above, into which a handful of salt is put to serve as a flux. Borax is sometimes substituted for salt, especially when some hard old brass has to be melted down. The crucibles are next arranged in the furnace and covered with the fuel, which in the neighbourhood of Calcutta is generally coke, but in other places charcoal. The fire is then lit, and it takes three hours to melt the metals and to form them into an alloy. Formerly bellows were worked to supply a blast to the fire, but the present construction of the furnace has rendered it unnecessary, the air passing through the aperture on the floor to the bottom of the furnace, and thence to the fuel through the small openings in the grate, having been found quite sufficient for the purpose. Country brass is either hammered into utensils or immediately cast into moulds, the process of which will be described hereafter.

**Bronze or Bell-metal (Kána).**—Bronze is not imported, but made in the country. It is an alloy consisting of seven parts of copper and two parts of tin. There is a saying current among the braziers—

Sátéy doyáy kore jaro
Táte ámó táté gáro.
Mix seven of copper with two of tin,
Heat it alternately and beat it thin.
Bronze is made within a furnace either in the same way as brass or the fusion of the metals is effected in a small open hole, in which the copper is first placed and covered with the fuel. The blast is supplied through a bent tube connected with the bellows. When the copper is sufficiently heated, the tin is placed upon it. Both the metals now melt, mix and form bronze. This kind of bronze is good for gongs. Bronze when made is either at once cast into moulds of vessels or set apart to be worked afterwards. Pure bronze, as a rule, is only employed in the manufacture of plates and other articles that require to be made by hammering. For cast articles an impure alloy called *Bharan* or *Toul* is chiefly used. This is generally made by adding some brass or zinc into pure bronze, or some tin into brass. There is no fixed proportion of the metals employed to produce *Bharan*, but the greater the quantity of zinc in the alloy, the more is it of inferior quality. *Bharan*, in short, is brass with a little admixture of tin to give it a whitish appearance and to enable the dealers to sell it as *Kān să* to the public. A kind of bronze, called gun-metal, is made in some places with one part of tin to ten of copper. A small quantity of lead is also sometimes added to *Bharan* to make it soft and easily workable. In some places of Behar the following bronze alloys are prepared:—(1) *Kān să*, lead and brass mixed; (2) *Bhorat*, brass and copper mixed; (3) *Phulkān să*, pewter, copper, and silver mixed. Tin sells at Rs. 70, and *Bharan* and bronze from Rs. 50 to Rs. 80 per cwt.

**Mode of Manufacture—Hammered Articles.**—Utensils are either hammered into shape from sheet-brass or sheet-copper, or from country brass or cast into moulds, or partly cast and partly beaten. Sheet-brass (except scraps) or sheet-copper are never melted and made into cast articles, but are always beaten into shape and joined if an article is made of several pieces. All cast articles are made from brass or bronze prepared in the country. Copper articles are always beaten, never moulded. If a plate or any other article consisting of one or more pieces of the metal is required to be made, the copper or the brass sheet is first marked out by a pair of compasses and the piece or pieces cut off by a kind of scissors called *kādari*. It is then made into the required shape by alternate heating and hammering, and finally turned in the lathe. Some of the larger vessels, specially water and cooking pots, are made of two, three, or more pieces. Each piece is first reduced to shape by continual hammering and afterwards joined together by means of borax and a solder, which is a kind of hard brass, being an alloy of copper and zinc. The final polish is given in the lathe. Beaten bronze articles require more frequent heating in the fire and hammering as it is brittle, and readily breaks under the hammer. Bronze articles require to be tempered by dipping them in water while red hot. Hindus of Bengal do not use copper vessels for ordinary household purposes, but only as sacrificial utensils. Muhammadans put them to domestic use, but get them tinned when they can afford to do so. Buyers prefer hammered to cast articles, as the former can only be made of superior qualities of brass and bronze. In point of fact most of the cast articles sold as bronze are not made of bronze or *Kān să* but *Bharan*. The workmen of Kharār in the Midnapur District can only beat out vessels of inferior bronze. Bronze or *Kān să* vessels are never made by joining two or more pieces together, as there is strong superstition against this practice.

**Cast utensils.**—For cast articles a mould is first prepared which is called *chhūnch*. The mould is made of very fine clay mixed with chopped jute. The
worker, taking a lump of soft clay in his hand, presses and flattens it with his thumbs on the inner surface of the vessel of which a copy is to be made. Sometimes a wooden or a clay mould of the vessel to be cast is first made and on which the clay is pressed, or in some places, as at Ránagháit, a wax facsimile is used for the purpose, the wax being subsequently melted out. When the whole inner surface of the vessel is in this way covered with a layer of clay, one or more incisions are made upon it to allow the clay-coating to be separated in pieces from the vessel when dry. These pieces are subsequently joined together and the mouth closed, rendering it a hollow clay vessel of exactly the same shape as the metal vessel to be cast. It thus becomes the core of the mould. When this core is thoroughly dry, a similar layer of clay is put upon it, and the required number of incisions made. This outer layer of clay is separated from the core when dry, and is found to have formed a cavity all round between it and the core by drying and shrinking. This cavity is generally of the same breadth as the required thickness of the vessel to be cast. If it is not so, then the worker has to scrape off a portion of the clay from its inner surface in order to produce the required vacuum between the outer shell of clay and the inner core. This done, the outer shell is again put upon the core, the incisions joined, and the mouth closed, leaving only a small aperture for the molten metal to pass into the cavity between the outer layer of clay and the inner core. Very often a layer of clay is put first on the outside and then another on the inside of the vessel. These layers of clay are separated and joined together by which the required cavity is necessarily formed between them. The mould thus completed is next thoroughly dried. It is then put upside down upon the crucible, which has previously been filled with pieces of the metals of which the alloy—either brass, bronze, or Bhavan—is to be prepared in the furnace. The crucibles are therefore of different sizes, according to the size of the vessel to be made and the required quantity of the alloy to be formed. They are capable of holding from ½ lb to 20 lb of the alloy. After fitting the mould to the crucible they are joined together by a thick plaster of clay, so that both the crucible and the mould look like one lump of clay. They are then arranged in the furnace. Four or more crucibles and moulds can go into the furnace at a time, according to the size of the vessels to be made and the space they would occupy. When the worker perceives, which he does by experience, that the metals have thoroughly melted inside the crucible and have formed the alloy, he brings each crucible and mould out of the furnace by iron tongs, called Sánráí, and turns it upside down. The crucible is now turned over the mould, and the molten metal enters the cavity in it by the aperture left in the mouth. Before taking the crucible out of the furnace it is very important to see that the mould has also become thoroughly "ripe," i.e., of the same temperature as the molten metals, as otherwise it would burst. Considerable experience in the work is necessary in order to be able to guess that both the metal and the mould are ready to be taken out of the furnace. If the moulds are not joined to the crucibles, they have to be made red hot somewhere outside the furnace before the molten metal is poured into them. When sufficiently cool, the crucible and the mould are broken to pieces and the cast vessel taken out. The combined weight of the copper and the other metal placed in the crucible slightly exceeds the weight of the vessel to be made. This is necessary, so that the metal may reach the remotest parts of the cavity in the mould, specially the bottom, and no vacuum left. This excess quantity
of the metal forms a small projection outside the aperture of the mould. This is now broken off from the vessel by an iron rod, called the Sābal, as well as other projections that may have formed on other sides. Smaller irregularities are next chiselled or filed off. The vessel is then glued to the lathe by means of a compound made of lac, sāl (Shorea robusta), resin, and brick-dust, and all remaining irregularities and unevenness are polished off by turning and planing upon this instrument. While still turning upon the lathe, the final polish is given by pressing upon it a small ball of hair steeped in sweet-oil. Some vessels, such as cooking-pots, called Boknoś, require to be put into shape by much hammering after a preliminary cast has been made. Larger vessels, such as the water-pots called Gharūs, are made by joining two or three pieces together which are separately cast. The price of a vessel, specially that of eating and drinking utensils, depends, not so much upon the superior quality of the metal, as upon the polish given to it while on the lathe. The same class of vessel which would sell at twelve annas per lb would fetch 2R2 per lb if highly polished. The wide celebrity which the bronze plates, cups, tumblers, and other articles made at Khánkrā, near Murshidabad, have acquired, is no doubt due to the purity of the metal employed in their manufacture, but to a still greater degree they owe their reputation to the high polish given to them.

**Instruments.**—The instruments used in the manufacture of copper and brass vessels are simple and few in number. They may be named as follows:—The hammer and the anvil, which are of various shapes and sizes, the chisel, the iron tongs, the file, the lathe, the scraper used for the lathe called Noyāli, a rod of iron called Sābal of various sizes, a small piece of triangular iron to scrape the clay mould, called Chhūrī, or knife, scissors called Kātāri, wooden hammers, bellows, two-legged wood, called Dothengo for holding Sābal etc., etc.

**System of Manufacture and Prices.**—Copper, brass, and bronze articles are generally made by the braziers to order given to them by dealers or capitalists, who supply the raw materials or advance money for their purchase. The makers are paid by weight of articles turned out, the rate being 2R20 to 3R0 per ewt. of bronze utensils and 1R15 to 4R0 of brass and copper. Labour being cheap in the interior of the districts of Burdwan, Bankura, and Midnapur, large quantities of vessels sold in Calcutta are made there. The utensils are also sold retail by weight, the price being 8 annas per lb of copper, 6 to 8 annas of brass, and 12 annas to 2R2 of bronze.

**Patterns.**—Patterns are distinguished by the shapes of the vessels, not by different styles of ornamentation, for except in a few sacrificial vessels and water-pots no decoration is employed. Indeed, decoration in articles for daily use will be useless, for it cannot last long under the wear and tear of daily scrubbing and cleaning. Patterns as distinguished by shapes generally take their names from those of the places where they were first made, such as the Bāleswar from Balasore, Gangeswar from Gay, Khánkrā from Khánkrā, etc. New patterns are also sometimes introduced in commemoration of some notable event, such as the Elokeshi-bāti, after a woman named Elokeshi, who some years ago was murdered by her husband for misconduct with the monk in charge of the shrine at Tārakeswar in the Hooghly District. The event created considerable stir at the time, owing to the fact that a holy man was implicated in it, and that the woman was most vilely misguided by the machinations of her step-mother. The horror for the sin committed by the
monk and the sympathy of the people for the injured husband found vent, among other things, in the introduction of various household articles of new patterns bearing the name of the woman, such as fish-knives (with which the woman was hacked), Sāris, utensils, etc. Other patterns receive their names from the fact of their being ribbed or not ribbed, polished or not polished, etc., etc.

Classification of Articles.—Copper, brass, and bronze articles may be classed as sacrificial vessels, water-pots, cooking utensils, eating and drinking utensils, other household articles, musical instruments, ornaments for personal adornment and miscellaneous articles. The following is a list of the principal articles made, the names of places mentioned being those of which the articles have been examined:—

I.—SACRIFICIAL VESSELS.

Koshá.—Made of copper, chiefly at Calcutta, Bānsberiā, Navadwip, Dāinhāt, and Sāntipur. It is an open water-vessel, probably an adaptation of the prehistoric scooped-out rhinoceros-horn. It now resembles in shape the long petal of the plantain flower, and is used to hold water during worship. There are two kinds, heavy and light. Heavy Koshás are called Aghya, and lighter ones are known as Mājā.

Kushi.—A miniature of above. Used as a spoon to take out water from the Koshá.

Tāmракunda.—Made of copper in the above places. A circular basin with a high rim, in which the idol is placed while being bathed.

Tāt.—A copper plate on which the idol is placed after washed and while being worshipped.

Pushpapātra.—A large copper plate ornamented with flower and foliage patterns. Made in the above places. Used to hold flowers and other offerings intended for worship.

Paoli.—A copper water-vessel like the Lotá, also called Ghati. Made chiefly at Navadwip.

Ghará.—A large copper water-vessel used for storing water for sacrificial purposes. Made chiefly at Calcutta. Up-country people also employ it for domestic purposes, but in Bengal Ghārās for household use are always made of brass.

Panchapātra.—A tumbler-like copper water-vessel, with foliage patterns scratched outside. This utensil is mostly imported from Benares. A tiny little spoon accompanies it.

Kamandalu.—A prehistoric water-jug, with a handle and a spout. In shape it is a copy of the gourd-shell so often mentioned. It is made either of pure copper or brass, or half of it of copper and the other half of brass. Chiefly imported from Benares.

Sankh.—A copy of the conch-shell in copper. Made in Calcutta and other places. Used as an accessory of worship, but not for blowing.

Bāti.—Cup made of copper, used for holding offerings. Smaller cups, called Chandan-bāti, are made to hold sandal-paste. Copper cups, called Katorās are used by Muhammadans for domestic purposes. Hindus use those made of brass and bronze.

Sinhāsān.—Throne for idols, made of brass, sides perforated and ornamented with figures of birds, etc. Chiefly imported from Benares. Sīhāsar
as the name implies, is really a "lion-seat"—i.e., a throne supported by a lion. This kind of Sinhasan, consisting of a lion supporting a lotus, on which the god is placed, is made at Saptipur.

Garurasa.—Or the "eagle-throne." Garura, the heavenly bird, is the vehicle of Vishnu. He is represented as a man with wings, the beak of a bird, and clasped hands, supporting a lotus, on which the copper plate, called Tad, is placed, with the god in it, when worshipped. Made of brass at Saptipur.

Padmasa.—Or the "lotus-seat." A stand with a lotus on the top. Used as above. Made of brass at Saptipur.

Bishasa.—Or the "bull-seat." A bull supporting a lotus. Used as above. Made of brass at Saptipur.

Chhpeya.—An open circular frame supported by six legs, which are decorated in the middle by a single flower and the lower part by a conventional figure of the peacock. Used to hold the copper plate, called Tada, with the idol, when worshipped. Made of brass at Saptipur.

Tepa.—A frame like the above, supported by three legs.

Tripadi.—A triangular frame, on three legs, upon which the conch-shell is placed during worship. Made of brass at Saptipur.

Gilas.—A brass tumbler, the outer surface decorated with foliage patterns. Used to hold water during worship. Chiefly imported from Benares. Gilas is the same as the English word "glass," the European tumbler having been universally adopted for drinking purposes, but instead of being made of glass it is generally made of bronze and to some extent of brass.

Saji.—Flower-basket, imitation in brass of that made of sliced bamboo. Sides perforated, and the handle has a cup on each side for sandal-paste. Used to gather flowers for worship. Chiefly imported from Benares.

Pancha-pradip.—Figure of a fairy holding five small lamps in a line. Lit and waved before the idol at the evening ceremony, called Arati. Made of brass at Saptipur.

Ekadip.—A small single lamp. Used as above. Made of brass at Saptipur.

Dhunachi.—Incense-burner. Imitation, in brass of that made of clay. Used to burn the resin of the Sal tree, called Dhuna, during worship and other occasions. Made in Calcutta and other places.


Ghantai—Bell, with a handle, which is either plain or topped with the figure of the man-bird Garura, or by two Munis or holy men sitting under the expanded hood of a snake. Made at Saptipur both of brass and bronze. Used for ringing in order to attract the attention of the idol when worshipped. Bells for hanging round the necks of bullocks have a ring instead of a handle.

Kansar.—A gong with a high rim on the back side. Made of pure Kansa or bronze on which the black colour the metal received from the fire in the course of manufacture is left intact, except near the edge, where a broad ring is scraped out all round as an ornamental contrast, and also in the middle, where patterns are formed in the same way. Used for beating during worship in order to attract the attention of the idol, or during an eclipse with the object of scaring away the demons that threaten to devour the sun or the moon, as the case may be. Cuttack has a reputation for this article.
Ghari.—A plain solid gong with no rim. Made of bright and pure bronze. Used as above and also to strike the hours. Made at Calcutta.

II.—WATER-POTS.

Jáhá.—A large water-vessel, being a modern imitation in brass of the same made in clay. The price precludes its extensive use. Made in Calcutta.

Ghará.—A water-vessel made of brass in extensive use. It is also an imitation of the clay utensil, but very old, as gold vessels of this kind have been mentioned in ancient books when wealth and splendour are described. Ghará is made both of cast brass and hammered sheet brass. Dhálá, or cast brass, has only one join in the middle. That made of sheet brass has two joins, one in the middle and one in the neck. Cast Gharás mostly come into Calcutta from East Bengal, specially Rájnagar in the Faridpur District. Beaten Gharás are made in Calcutta, at Bándsberia, and in the Burdwan District. A kind of Ghará, called Mele-ghará, a close imitation of the clay utensil, is made at Navadwip. Gharás of a new pattern are made at Budhápára in Burdwan.

Kenre.—A modern imitation in brass of a vessel of this name generally made of clay. It is used for keeping milk and oil. Made at Káligháṭ, near Calcutta.

Ghati.—This is the well-known Lotá of other parts of India. It is made of various shapes and sizes, each kind having a name of its own. A few such names may be mentioned here, though it is difficult to describe the characteristic features of the patterns by which they are distinguished from other utensils of the same kind:—(1) Shámsái, a long brass Lotá made at Bali-Dewanganj; (2) Dhálá-pûlî, a cast brass vessel made at the same place; (3) Pélá-Mathuri, a beaten brass vessel, originally brought from Muttra in the North-Western Provinces, now made at Navadwip; (4) Tukni, an ordinary brass Lotá made at Navadwip; (5) Dhálá-Mirzapur-Rájáshahi, a cast brass vessel, imported from Mirzapur in the North-Western Provinces; (6) Akkalsarâi, brass, imported from ditto; (7) Káshíl, brass, ditto; (8) Kondali Ghati, ditto; (9) Chádar-ghati, made of sheet brass at Simla in Calcutta; (10) Paldár-ghati, ribbed, made of brass, at Chandrakona, Midnapur District; (11) Mungeri-ghati, a lotá of extremely good shape, made of Bharan—i.e., impure bronze—at Monghyr; (12) Chiriádár-ghati, ribbed, made of Bharan, brought from the North-Western Provinces; (13) Hánsgalá-ghati—i.e., “swan-necked” lotá made of Bharan, brought from ditto; (14) Sáhebganj-ghati, a large vessel with two joinings, made of sheet brass at Sáhebganj in East Bengal. (15) Jagannath-ghati, a lotá decorated on the outside surface with foliage and other patterns, made of brass and Bharan in Midnapur, Balasore, Cuttack, and Puri Districts; (16) Kástir-ghati, made of brass, brought from Benares; (17) Rámchandrapur-ghati, made of Bharan, brought from Rámchandrapur in East Bengal; (18) Billo-chambu, made of both brass and Bharan, South Indian pattern; (19) Chádar-châr-mathuri, made of sheet brass at Simla in Calcutta; (20) Dhálá-chambu, made of cast brass at Bálí. Smaller Ghatis are used for drinking purposes.

Gáru.—A brass water-vessel with a narrow mouth and a spout. These are of five kinds:—(1) Nepálï—probably the pattern was originally brought from Nepal—made at Bálí; (2) Hánsgalá, or “swan-necked,” made at ditto; (3) Inter, made at Khánákul; (4) Kusure, small-sized, made at Bándsberia; (5) Pârér, made at ditto.
Badná.—A water-vessel like the above, but with a broader mouth, used by Muhammadans. It is generally made of copper, but sometimes of brass.

Jag.—Imitation in brass of the European jug.

Bhingar.—Imitation in brass of the Persian Aftaba.

Bálti.—Brass tub, made largely at Kálighát.

III.—COOKING UTENSILS.

Degchi.—A large cooking-pot, made of hammered sheet copper, chiefly in Calcutta; used tinned by Muhammadans for cooking food in feasts when a large number of people require to be fed.

Hándi.—A smaller copper vessel. It is also made of sheet brass and is used by Hindus. Rájaagar has a reputation for its brass Hándis. Some of the Hándis have an iron rod inside the rim to give it strength.

Tijal.—A smaller and shallower cooking-pot, made of sheet brass, used for cooking fish, vegetables, and pulses. This and the above vessel are modern imitations in brass of clay articles of the same kind. These have not come into extensive use, as food cooked in them is considered heating and injurious to health. Clay pots are, therefore, still in universal use.

Golkhola.—A round cooking-vessel, made of brass at Dáinhát.

Bharankhola or Bokno.—An old cooking-pot, made of brass at Pátrasáyer and other places.

Batua or Bantloi.—A cooking-vessel, resembling Lótá, but with a wider mouth. Chiefly brought from the North-Western Provinces.

Sará.—A cover for cooking-pots, an imitation in brass of the clay article of the same name.

Dháká and Dudh-chhánká.—Milk-cover and milk-strainer, new imitations.

Kará.—Frying-paan. This article was at first made of clay which was called Káulí. It was subsequently made of iron, large numbers of which are now imported from England. It is also made in brass, but in limited quantities.

Khuli.—A brass pan like the above, generally made in clay.

Khanti.—A flat brass spoon, used to stir food when being cooked.

Hátá.—Spoon. This is chiefly made of iron. Brass spoons are made at Kálighát.

Dábu.—Larger brass spoon with a smaller handle, used to distribute food in feasts.

Chamche.—Spoons of European shape, made at Kálighát.

Gámlá.—Brass basin. It is both cast and hammered from sheet brass, made at Simla in Calcutta. One kind of Gámlá has received the name of Elokeshi in memory of the murdered woman of Tárakeswar.

Beri.—Brass tongs, a new imitation of that made of iron. Made at Kálighát.

Chhántá.—A perforated flat spoon, used for straining articles of food when being fried in oil or butter.

Dhuchuni.—Rice-washer, a long perforated vessel. This is a new imitation in brass of that made of sliced bamboo. Made at Kálighát.

Kulo.—Winnower. A modern imitation like the above. Made at Kálighát.

Chubri.—Basket. An imitation like the above.
Cháluni.—A perforated utensil used for separating the husk from parched rice. An imitation like the above.

Dálkánrá.—An imitation in brass of pestle and mortar. Used to clean pulses before cooking.

Teler-bhánr.—Oil-pot. An imitation in brass of the clay article of the same name.

Chongá.—A hollow brass tube to blow through for kindling fire. An imitation of a similar article made of an entire piece of bamboo.

Chaki.—A circular piece of brass on which flour-cakes are flattened before baking. An imitation of that made of wood.

Belun.—A brass roller by which flour-cakes are flattened. An imitation of that made of wood. Most of these modern imitations are made at Kálighát and the neighbourhood, where they find a ready sale among the pilgrims.

Hamám-distá.—Pestle and mortar made of brass.

IV.—EATING AND DRINKING UTENSILS.

Thálá.—Large plates are called Thálás on which boiled rice is eaten. This is made of copper, brass, and bronze. Copper Thálás are called Nagans, which are used only by Muhammadans, but to a limited extent, as they have no objection to using brass and bronze articles of this kind. Brass Thálás are generally made of hammered sheet brass. Bronze Thálás are both hammered and cast. The following kinds of brass Thálás may be mentioned:—(1) Ordinary large Thál, made of sheet brass in Calcutta; (2) Chánch, made at Bānsberia; (3) Ságari, ditto; (4) Pará, plates with a high rim, brought from Mirzapur; (5) Large Thál, ditto; (6) Májá beli, ditto; (7) Beli, made at Bānsberia. The following bronze Thálás may be noted:—(1) Míhi-kánsa, made at Kharár; (2) Gayeswarí, ditto; (3) Bágí, ditto; (4) Báléeswarí, ditto, an imitation of that made in Balasore and other parts of Orissa; (5) Jaga:náthí Thálá, made at Balasore, Cuttsöak, Puri, and other places in Orissa; (6) Pétá-kánchon, made at Berhampur; (7) Dupit-chhota-Bágí, made at Berhampur, Khánkrá, and other places in the district of Murshidabad; (8) Polwarí, made at Bānsberia; (9) Bhuvaneswarí, a cast plate, made at Pátrasáyer; (10) Dhálá-kánchon, ditto. Smaller bronze Thálás are called Kánsi.

Rekáblí.—Smaller plates and dishes. From the name, which is a Persian word, it appears that this kind of utensil is of Muhammadan origin. It is made of copper, brass, and bronze; those made of copper being used only by Muhammadans. Rekáblís are used for eating tiffins, sweets, fruits, etc. Brass Rekáblís, especially those brought from Benares, are ornamented with patterns: bronze articles are plain. European porcelain dishes and plates have also been copied in brass and bronze.

Báti.—Cups. These are of various kinds, and are mostly made of bronze, though some are made of brass; but to a limited extent. Cups are used for eating vegetables, pea-soup, milk, and other liquid substances, except water, which is drunk in tumblers and smaller Chátis. The following kinds of cups made of brass may be noted:—(1) Málá-báti, made at Dáinhát; (2) Míhi-báti, ditto; (3) Bokno-báti, ditto. The following kinds of bronze cups may be mentioned:—(1) Achá-khánkrá, made at Chandrakona, Pátrasáyer, and other places in Midnapur, Bankurs, and Burdwan Districts; (2) Jíbun-tára, or the “star of life,” made at ditto; (3) Chandrakona, made at ditto; (4) Namuná-khánkrá, ditto; (5) Phul-posháki, or the “fashionable flower,” ditto; (6)
Sarposhadar, or "cup with cover," ditto; (7) Tala-polish, or "bottom-polished," ditto; (8) Chiseveydol, or "china cup," ditto; (9) Bit-khankrai, ditto; (10) Manas-piydol, or cup sacred to the goddess of snakes, ditto; (11) Dilkhush, or "heart-pleasing," ditto; (12) Gayar-bati, pattern originally received from Gaya; (13) Elokshhi-bati, in memory of the woman of the same name; (14) Khature-bati, from Sri-Kshetra, or the "sacred spot," another name of Puri, the abode of Jagannath, where it is made; (15) Bateswari, made in Orissa; (16) Gaddadar-bati, made at the same name; (17) Ranejaner-bati, made at Rangpur; (18) Chiridahkandar-bati, made in many places; (19) Krishnakanti-bati, or the "beauty of Krishna," made at Patisa; (20) Birabini-bati, ditto; (21) Menmohini-bati, or "mind-charming" cup, ditto; (22) Chand-veydol, or the "moon-cup," ditto. Cups, called Katoras, are also made of copper, which are mostly used by Muhammadans.

Paoili.—A smaller drinking-vessel than the Loti. Paoilis are of many kinds, such as Mokanpuri, Khankrai, etc., taking their name from that of the place where they are made. These are mostly made of Bharan and bronze.

Abharora.—A drinking-vessel of a peculiar shape, probably of Muhammadan origin. Generally made of Bharan in Bardwan, Bankura, and Midnapur Districts. One pattern of Abharora, called Jahan, is largely sold in Calcutta.

Chumki.—A drinking-vessel like the Ghati. This is an old utensil, but going out of fashion since the introduction of European tumbler-shaped drinking-cups. In all these old-fashioned vessels the uppermost edge is turned outwards, rendering it difficult for the drinker to put his lips on the cups. While drinking he must move his head backward, hold the cup with his left hand, raise it a few inches above his mouth, and pour the water down his throat. To drink by applying his lips to the cup was not considered clean in a caste point of view. Hence, utensils were made out of which water could be easily poured. But the caste rule in this respect has had to give way, as tumblers have been found to be a more convenient drinking-vessel.

Gilas.—Tumblers of European shape. These have now come into universal use, and are made in all places, of brass, Bharan, and bronze. Those made at Khankrai in Murshidabad are considered best. The following patterns of Gilas may be mentioned:—(1) Chiridahkand, a ribbed vessel, made at Midnapur; (2) Sarposhadar—i.e., "with cover"—made at Khankrai, Patisa, etc.; (3) Geri-chang, made at Chargaron, Patisa, etc.; (4) Geri-khankrai, ditto; (5) Sej-gilas, ditto; (6) Chong, ditto; (7) Khankrai, made at Khankrai and other places; (8) Paldar, ditto; (9) Tama-khuro, made at Chargaron, etc.; (10) Jalsamades, consisting of three compartments, the uppermost to hold some kind of sweet, the middle water, and the lowest a betel-leaf with spices. It is, in fact, a sort of tiffin-basket; (11) Petah-khankrai, a vessel of the best quality, made at Khankrai.

Dabar.—A vessel to keep entire betel-leaves. Made of brass at Bali.

Bata.—A circular box, with several small cups to hold betel, lime, catechu, and spices, with which betel-leaves are prepared for chewing. This is a very ancient vessel, but somewhat going out of fashion. The following old lullaby to put babies to sleep is still sung in which Bata occurs:—

"Ghum-paari naa-pa naa humber bari jee,
Bata bhore pan dibo gail bhore khee.

"O sleep-bringing aunts let us go to Morphens' hall,
We will give you Bata-full betel, and chew it all."
Bdó is made of bronze at Pátrasáyer, Berhampur, and other places. To a small extent Bdó are also made of sheet brass.

Pán-dán.—A bronze vessel to keep unprepared betel. These are of two kinds, round and almond-shaped, called Baddámi. Made at Kálighát.

Dibé.—Betel-holder. An oval box in which betel leaves, prepared for chewing with lime, catechu, cardamom, and other spices, are kept and offered. Dibé or Dibid are of various kinds:—(1) Bel-dibe, round, resembling the Bel (Égle Marmelos) fruit in shape; (2) Chandrákoná; (3) Pálish-dibe—i.e., highly polished; (4) Mukh-dibe: the upper part consists of a face, one sort with the ears and the other without them; (5) Chándi-dibe; (6) Khánkrá-dibe. Dibés are made of bronze, chiefly at Khánkrá, Chandrákoná, Pátrasáyer, etc.

Gurguri or Farsi.—Smoking-bowl. Made both of brass and bronze. Not much used, except by Mussalmans: ordinarily the people prefer Hukká made of coconuts-shell for smoking the tobacco prepared with molasses or jaggery.

Kolke or Chhilam.—The Dhuturá-flower-shaped pipe in which the tobacco and fire are put. This is generally made of clay, but sometimes copper and brass chhilams are also made.

Sarpsh for Chhilam.—Chhilam-covers of brass are made at Sasseram, but the industry is on the decline.

Baithak.—Brass stand for Hukká, or the smoking-bowl made of coconut-shell. The Baithak ordinarily consists of an open tumbler-shaped vessel on the top, supported by a leg fixed on a plate-base. Baithaks are of various kinds:—(1) Sáp-baithak, top resting on an expanded snake-hood, made at Sántipur and Ránaghát; (2) Pári-baithak, top supported by a fairy and snake-hood; (3) Tepáyapari-baithak, with three legs and a fairy; (4) Chauyá-pari-baithak, with four legs and a fairy; (5) Síváda-baithak, resembling in shape a brass lamp; (6) S-baithak, the leg is in the shape of letter S; (7) Pátdáda-baithak; (8) Deyál-baithak; (9) Rekó-bwala-baithak: this is an old pattern.

V.—OTHER HOUSEHOLD ARTICLES.

Pilsuj.—Lamp-stand, on which boat-shaped triangular lamps, called Pradip, generally made of clay, are placed. The following kinds of Pilsuj may be mentioned:—(1) Babu—i.e., “fashionable”; (2) Chauyá, with four legs; (3) Gol, or round; (4) Padma-pádá, or “lotus-legged”; (5) Sábáda; (6) Pári-pilsuj, with the figure of a fairy. Pilsujs are made of brass, chiefly at Ránaghát, Midnapur, Chandrákoná, and other places.

Pradip.—Boat-shaped lamps, being brass imitations of those made in clay.

Fatilsuj.—Brass lamps of peculiar construction, made at Chatra in Hazaribág District.

Chilamchi.—Washing-basins. Made of brass in Calcutta and other places. Sometimes ornamented with patterns.

Pikdán.—Spittoons. Made of brass in Calcutta and other places.

Báksa.—Boxes. Made of brass at Kálighát and in Calcutta. Also brought from Benares.

VI.—MUSICAL INSTRUMENTS.

Kartál.—Brass or bronze cymbals. Made in Calcutta.

Khanjani.—Smaller cymbals. Made of bronze.
Mandirá.—A pair of bronze cups, used to measure time in musical performances. Made in Calcutta.

Kánsi.—Small gong made of bronze, beat along with native drums, by boys belonging to the lower castes, who are quite ignorant of music. So there is a proverb current in the country to express want of interest on any particular subject:—

"Bhat khús kánsi bájú, ragar dhár dhár ná."

"I eat rice, beat kánsi, and have nothing to do with notes of music."

Singá.—The Indian horn. Made of copper.

Dug-dugi.—Brass horn-shaped small drum. Used by religious mendicants and monkey-men.

Ghingur.—Small round bells, made of bronze, worn by dancing-girls when dancing to produce a jingling sound.

VII.—ORNAMENTS FOR PERSONAL ADORNMENT.

Formerly brass and bronze ornaments were largely worn by women of all classes in all parts of Bengal. With the increase of prosperity, however, not only these, but also those made of silver (except for the feet), have almost been entirely discarded by the upper classes in East and Central Bengal. Those who cannot afford to have gold ornaments would rather go without any than wear ornaments made of inferior metals. Low-caste women in these parts use to some extent gold-gilt brass ornaments of good workmanship, made in exact imitation of the gold jewellery of the same nature, and Calcutta is the chief seat of manufacture of such articles. Large quantities of such articles are also brought from Bompás in the Burdwan District. Rude heavy brass and bronze ornaments are made by the Thaterás in Behar and are worn by women of all classes. They are largely in use in Orissa, as well as among the women of the aboriginal tribes in West Bengal.

The following imitation gold or silver gilt brass ornaments are largely sold in Calcutta:

Sinha.—A chain worn on the middle of the head where the hair is parted.

Jinjir.—Chain to tie up the hair.

Kántá.—Hair-pins, topped with flowers.

Chiruni.—Comb, worn as an ornament.

Nath.—Large nose-ring, worn on the left side.

Nákhábhá.—Stud, worn on the left side of the nose.

Mákrí.—Nose-ring either worn on the left side or through the cartilage of the nose.

Nolok.—A small ring with a pearl worn through the cartilage of the nose.

Dhenri.—A stud worn on the lobe of the ear.

Mákrí.—Large and small earrings.

Mách.—A fish-shaped ornament sometimes attached to the above.

Páshá.—A flat circular ornament, worn through the lobe of the ear. A very old ornament, now going out of fashion.

Jhumká.—Flower-shaped earrings, made in imitation of the Abutilon flower. Now going out of fashion.

Karnaphul.—Literally "ear-flower," a flower-shaped ornament worn through the lobe of the ear.
Kánbálá.—Earring worn on the upper part of the ear.
Kán.—Ornament of the shape and size of the ear itself.
Birbañli.—A broad earring with studs. An old ornament.
Chaudání.—A large earring.
Pipul-páti.—An ear ornament resembling in shape the leaf of the Pipal tree (*Ficus religiosa*).
Dul.—An earring with a coloured-glass pendant.
Chámpá.—An ear ornament resembling the Chámpá (*Michelia Champaca*) flower in shape.
Kanta-mála.—A necklace made of elongated beads.
Mohan-mála.—A necklace made of round beads.
Pánc-náli.—Necklace consisting of five strings of beads.
Sat-náli.—Ditto of seven strings of ditto.
Hár.—Necklaces of various patterns, such as—(1) Tárá, or star pattern; (2) Heé, or snake pattern; (3) Kárringá, or Bilimbí (*Averrhoa Bilimbí*), fruit pattern; (4) Daré, or cable pattern; (5) Hánxuli, or twisted pattern; (6) Got, or chain pattern.
Chik.—Facetted necklace of good workmanship.
Hánxuli.—A collar.
Mardáná.—Wristlet made of beads.
Jabáñá.—Bracelet of beads shaped like barley.
Churi.—Bracelets of various patterns.
Páinchí.—Bracelet of beads. An old ornament.
Bálá.—Ordinary bracelets of various patterns.
Ananta.—An armlet, consisting of a hoop highly wrought.
Báju.—Flat armlet.
Báuti.—An old armlet, which has almost entirely gone out of fashion.
Tágá.—Plain armlet.
Tar.—Used as above; almost out of fashion.
Kankan.—Thin bangles, silver gilt.
Dam-dam.—A twisted form of thin bangles, silver gilt.
Labangakali.—Bracelet of beads shaped like cloves.
Náríkelful.—Bracelet of beads shaped like cocoa-nut flower.
Hát-maduli.—Armlet made of amulet-shaped beads.
Tábíj.—Armlet made of zig-zag pieces of brass.
Jasham.—Armlet made of drum-shaped amulets.
Chandra-hár.—Waist-chain with a moon-like tablet in the middle.
Surya-hár.—Waist-chain, a modified form of above.
Bíche.—Waist chain shaped like a centipede.
Got.—Ditto different pattern.
Batphal.—Waist ornament for children, made of beads shaped like the fruit of *Bot* tree (*Ficus bengalensis*).
Nimphal.—Waist ornament for children, shaped like the fruit of the *Nim* tree (*Melis Azadirachta*).
Bor.—Waist ornament for children, made of round beads.
Komorpáta.—Waist ornament for children, made of zig-zag pieces of brass.
Bánkmal.—A curious-shaped ornament worn on the ankles in West Bengal. It has almost gone out of fashion.
Gol-mal.—Round anklet, silver gilt.
Joren-mal.—Twisted form of above, silver gilt.
Pánjor.—Anklet made of chains and pendants, silver gilt.
Gujrí.—Anklet worn above Pánjor, silver gilt.
Pancham.—Anklet worn above Gujrí, silver gilt.
Benki.—Anklet for children, silver gilt.

Brass and bronze ornaments made in Behar and West Bengal are heavy, unwieldy masses of metal, with little or no pretension to beauty or refined workmanship. The following are the most common:

Tiká.—Made of brass, worn on the forehead.
Jhumká.—Brass earring.
Báí.—Ditto.
Kánpul.—Earring.
Nathni.—Brass nose-ring.
Jhulni.—Ditto.
Hásli.—Bronze collar worn on the neck.
Panwá.—Brass necklace; also made of bronze.
Báju.—Flat armlet like that made in Bengal.
Tabij.—Armlet like that of Bengal.
Churi.—Bangles. A large number of these are worn on the hand, especially by the women of the milkmen caste.

Kará.—Plain bracelets and anklets.
Jasham.—Armlets made of drum-shaped beads, like that of Bengal.
Báutá.—Heavy armlets.
Anguthi or chhalla.—Finger and toe rings with glasses.
Bichítá.—Chain worn on the toes.
Pairi.—Heavy anklets.
Niuri.—Ditto.
Paijeb.—Anklets.

The following ornaments are largely made in Orissa and worn by Uriya women:

Kápo.—Ear-tablet, made of bronze.
Notho.—Nose-ring, same as Nath in Bengal, made of brass.
Mákri.—Earring, made of brass.
Dandigná.—Nose-pendant.
Khárú.—Bracelet, made of brass and bronze.
Tára.—Armlet made of brass.
Katni.—Wristlet, made of brass and bronze.
Gorbálá.—Anklet, made of brass and bronze.
Bankíla.—Anklet.
Mudi.—Rings for fingers and toes.

VIII.—MISCELLANEOUS ARTICLES.

Of late years the manufacture of many new articles in brass has commenced in and around Calcutta, to meet the new wants created with the increase of wealth and love of luxury among the people. Of these may be mentioned—Locks, padlocks, hinges, staples, door-rings, chains, bolts, wrench-bolts, picture-frame hooks, punkha-wheels, gas pendants, gas and water fittings, all sorts of handles, fine wire, castors, brass fittings for harness and car-
riages, boats and ships, such as capstans, indigo-pressing nuts, boiler fittings, chandeliers, fishing-reels, brass mountings for guns, umbrella tubes (which along with the bamboo handles are exported to England, again to be brought back in the completed umbrellas), hat-racks, knobs, cycle fittings, steam-engine fittings, brass seals, badges, ink-pots, pen-racks, scales and weights and scientific balances of great precision, brass cocks, stands and cages for birds, brass railings, wash-hand stands, buttons, syringes, mathematical and survey instruments, scientific apparatus, surgical instruments, etc., etc. The following detailed list of the last three classes of articles has been supplied by Messrs. Dey, Sil & Co., of Calcutta, who are themselves makers and sellers:

(1) **Scientific Instruments.**—Apparatus and instruments illustrating mechanical laws; hydrostatical instruments and apparatus; apparatus illustrating laws; experiments on heat; static electrical apparatus; voltaic electrical apparatus, such as electric bells, indicators, pushers, etc.; telephones, microphones, galvanometers; resistance-measuring instruments; fittings for arc and incandescent system of electric light; small dynamo electric machines, electro-motors, electric fans, and useful electrical toys; pneumatic apparatus, such as air pumps, condensing and exhausting syringes, rain-gauges, wind vanes, etc.

(2) **Surgical and Medical Instruments.**—Splints of all kinds, brass syringes, stomach pumps, enema syringes, catheters, poiver medical appliances of all kinds, knives and scissors, foreceps, speculums.

(3) **Surveying and Mathematical Instruments.**—Aims' compasses, rectilinear compasses, optical squares, plane tables, land-measuring chains, ordinary dividers, parallel rules, rolling parallels.

Among miscellaneous articles may also be included toys, (of which large quantities are also imported from Delhi) brass mirrors, figures of gods, goddesses, men and animals, and models of vegetables and fruits. Toys chiefly consist of miniature utensils which are given to girls to play house-keeping. They are presented specially to infant brides immediately after their marriage by the bridegroom's family. Brass mirrors were formerly made in Midnapur, Orissa, and the jungle tracts of West Bengal, but these have now been almost entirely superseded by cheap looking-glasses imported from Europe. Brass figures and models are mostly made at Kálighát, Gayá, Sabalpur in Mánbhunm District, and certain places in Orissa. Of these the following made at Kálighát may be separately mentioned:

**Gopál.**—Figure of infant Krishna in a crawling posture, with a roll of butter in one hand and an outstretched peacock feather plume on the head. Coloured red and green in parts. Made of brass of various sizes; largely purchased by Sádhus, or religious itinerants, for worship. Other pilgrims purchase it as a house ornament.

**Rádáhá and Krishna.**—Two separate figures. Made of various sizes, sometimes 20lbs in weight. Coloured as above.

**Káli.**—The black manifestation of the Primordial Energy.

**Durgá.**—The ten-handed manifestation of above.

**Ganesh.**—The god of wisdom and success with the elephant's head.

**Lakshmi.**—The goddess of wealth and good fortune.

**Saraswati.**—The goddess of arts and sciences.

**Kártik.**—The god of war.

**Mangoes.**—Model of the fruit, hollow, used by pilgrims to keep water offered to gods, called *Charoñámri* or the "feet-nectar."

**Principal Seats of Manufacture.**—Calcutta itself with the suburb are an important centre of copper, brass, and bronze manufactures. Mr. E. W. Collins, C.S., who in 1890 prepared a report for Government on "The Existing
Arts and Industries of Bengal," wrote as follows on the principal seats of such manufactures in Bengal:

"In almost every town there are shops of braziers, but more than one-fourth of the total number of Bengal are found in the Burdwan Division. There are over 1,300 families of brass-workers in the Burdwan District alone, and the chief seats of the industry are Sáhebganj, Bomplás, Diáimbát, Dewánagánj, Purbastáhi, and Kálíná. From the Bankura District over one and-a-half lakhs' worth of brass-ware was exported in 1887. Pátra-sáyer is the chief seat of the industry. There are a large number of braziers in the Midnapur District, near Ghátál, and Tamluk, and at Balli in the Járánábad Sub-division. The export in 1886 was over 13 lakhs. Kharár in Midnapur employs daily 5,000 men, and is famed for its bell-metal (bronze) ware. In the Hooghly District over 500 families are employed— at Básnería and Khámánpára and the neighbourhood. From Nawábganj and English Bazar in Malda, brass-ware to the value of a lakh of rupees is annually exported. In the Presidency Division, the chief seats of industry are Sántipur, Darmodár, Ránaghat, Mahepur, Daulatganj and Meherpur in the Nadia District, and Bázárpor and Kesalpur in Jessore. In each of these towns some fifty or thirty firms are engaged. Kháríná Bazar near Berhampur is famous for its bell-metal ware, and twenty-five firms are engaged, each employing eight to ten workmen. In Calcutta there are many firms engaged in Kásúripára, where Babú Tárak Náth Parámnik has a large workshop. In Kamarpara brass hinges, locks, bolts, etc., are cast. From Cutta k and Balasore there is a large export of brass-ware. Bálkati in Puri is also a seat of the industry. In the Dacca Division the town of Islampur and Kágmári in the Attia Sub-division of the Mainam-singh District are especially known for their brass-work. Over 300 families are employed, and the yearly outturn is over 2,500 maunds. In Patna it is said that there are about 50 families of braziers, and the yearly outturn is estimated at over a lakh of rupees. In Gya brass-work is carried on in several towns, and the yearly outturn is estimated at Rs.20,000. The elegant brass vessels of Nabasgarh are much in demand. The west of the Province draws most of its supplies from Mírzapur and the North-Western Provinces, but there are a few skillful workmen at Sewán in Chapá and Jhanjhar in Darbhángā."

The following is a more detailed list of the principal seats of brass and bronze manufactures:

**Bákarganj.** Lotás, Ghárás, and other utensils are made here.

**Balasore.** Brass tubs, Lotás, plates, and various other utensils. An oil-bottle of brass and zinc mixed is also made here, which is used for dropping oil on torches during marriage processions, dancing parties, and similar occasions. Another specialty of Balasore is an octagonal betel-dish on four legs. The sale, however, of this particular form of the article is limited, as the price is high and only the rich can afford to purchase it.

**Báli-Dewangánj.** Burdwan District. Noted for its brass and bronze manufactures, which are largely exported to Calcutta. All kinds of vessels are made in this place.

**Bálkáti.** Puri District. Lotás and platos are made here in large quantities.

**Balli.** Midnapur District. All kinds of brass and bronze vessels made.

**Báluchár.** Murshidabad District. Bronze cups, plates, etc., made here.

**Bankura.** Ordinary bronze cups are largely made here. A Lotás with a spout is a speciality of this town.

**Bánsberia.** Hooghly District. A place noted for its brass and bronze manufactures. All sorts of articles, chiefly of sheet brass, are made here.

**Bázárápur.** Jessore District. About thirty firms are engaged in the manufacture of brass and bronze ware.

**Begunkola.** Near Cutwa. Cast tumblers of Bharan are made here in large quantities, as well as Lotás, cups for sandal-paste, betel-holders called Dábors, and brass lamps.

**Belur.** Howrah District. Large píkdnís, spitoons, are made here.
Berhampur.—Murshidabad District. Noted for its bronze manufactures. The very best bronze utensils, such as plates, cups, drinking-glasses, are made here and in the neighbourhood. They are justly sought after for their high polish, and command much higher prices than articles of the same kind made in other places. These articles are generally known as utensils of Khánká or Khágrá, a place in the neighbourhood of Berhampur.

Bhadrak.—Balasore District, and other places in Orissa. Gongs, bells, musical instruments, and household utensils are exported to Calcutta.

Bishnupur.—Bankura District. Cups, plates, tumblers, etc., are made here.

Bompás.—Burdwan District. Ordinary vessels of brass and bronze are largely made here, as well as gun-metal cups and ornaments, which are sent to Calcutta to be gilded. There are about 200 braziers at work here, who annually produce goods valued at Rs48,000.

Budhpára.—Cast-brass vessels, such as Ghavás, Khulis, etc., are made here.

Calcutta.—A quarter of the town, called Simla or Kánsáripára, contains a large number of braziers. The clang of hammering copper and brass, chiefly the former, can be heard here at all times of the day. Kánsáripára is also the place where the richest man of this caste in modern days, the late Tátrak Náth Paramánik, lived, but he was noted not so much for his wealth nor his extensive transactions in the manufacture and sale of brass and copper ware as for his charity and benevolence. Simla is noted for its copper-ware both for sacrificial use of the Hindus and the domestic use of the Muhammadans. Large quantities of sheet-brass articles are also made here.

Chandrákoná.—Midnapur District. A place noted for its brass and bronze manufactures, which are largely exported to Calcutta. Cups, plates and various articles are made here. They are manufactured by people of different castes.

Chattra.—Hazaribagh District. Fatilsuj, or big lamps are made here. These lamps are of peculiar construction and are thus described:—"They consist of three parts. The first part with its plate-base serves as a stand for the other two, and is connected with the second by means of a screw. The third part, resembling a peacock, fits into the socket on the upper portion of the second part. There are also two wings to the lamp fastened on the top of the first part. Common lamp-oil is poured into the receptacles for the wicks and also through the hollow stand of the peacock. When the oil in the burning part is exhausted, an immediate supply is received from the peacock to the hole in its breast, and only in such a quantity as to keep the light burning. This is caused by the air passing through the vacuum between the edge of the peacock's hollow stand and the surface of the remaining oil just after consumption. This process is carried on spontaneously till the oil in the peacock is completely exhausted."

Chilmári.—Rangpur District. Various kinds of brass and bronze-ware made here, specially nests of cups.

Dáníhát.—Burdwan District. A place noted for its brass manufactures. All kinds of sacrificial vessels and household utensils are made here and exported to other parts of the country. It is noted for its bronze plates and large cooking-vessels. It has 300 families of braziers at work.

Darmodar.—Nadia District. Ordinary kinds of brass and bronze vessels made here.
Daudnagar.—Gya District. Metal wares are generally made here of the following:—(1) Pital, or brass; (2) lead and brass mixed, locally called Kánśú; (3) brass mixed with copper, called Bharat; (4) pewter, copper, and silver mixed, called Phulkánsú. About 200 families of Kaserás and 50 families of Thatherás, with an average of four men in each family, are engaged in the manufacture of metal-ware.

Daulatganj.—Nadia District. About 30 firms are engaged in the manufacture of brass-ware. Famous for its small cups.

Dewanganj.—Generally coupled with Bálí, another place in the neighbourhood, and both famous for their brass and bronze manufactures, which are exported in large quantities to Calcutta.

Dhaniákháli.—Hooghly District. Mostly articles of sheet brass are made here.

Dignagar.—Burdwan District. Cups, tumblers, etc., are made here.

Degáchi.—Nadia District. Hukká stands, called Baidhak, with figures of fairies, etc., are made here.

English Bázár.—Malda District. Plates, cups, etc., are made in this place.

Gadáddi.—Good bronze cups are made here, which are largely exported to Calcutta.

Gya Town.—Sacrificial vessels and other utensils and figures of gods made here. Large numbers of pilgrims flock to this place from all parts of the country, among whom these articles find a ready sale. A kind of brass sacrificial water-vessel (Panchpátri) inlaid with copper is made here. Chased copper plates are also largely made which the pilgrims carry away as a memento of their visit to the sacred place.

Ghátál.—Midnapur District. Ordinary vessels are made here, specially the water-vessel called Gáru.

Hát-Basantpur.—Brass utensils of various kinds are made here.

Islampur.—Maimansingh District. Bowls, water-pots, plates, nests of tea-cups, and copper oval spice-holder (Pán-bódtá), are made in this place.

Jabui.—Burdwan District. Dhuchuni, or rice-washer, water-pots, etc., are made. The place is noted for its Gárus.

Janganj.—Balasore District. Cups, plates, betel-holders, etc., are made here.

Jangipur.—Murshidabad District. Brass utensils of various kinds are made here.

Jhanjharpur.—Darbhanga District. Ordinary utensils are made here.

Kágmári.—Maimansingh District. Ditto.

Kalágeche.—Midnapur district. Mostly cast brass-ware is made here, such as Ghurés, Édolés, etc., as well as plates of bronze.

Káliganj.—Cups and water-vessels, called Gárus, are made here which are exported to Calcutta.

Kálighát.—In the suburbs of Calcutta. There is a temple here dedicated to the goddess Káli, a form of the Primal Energy. Large numbers of pilgrims come here all the year round, who go back to their homes with utensils of various kinds. Articles which were hitherto made of basket-work, wood or clay, are now made in brass, and Kálighát and the neighbourhood is the principal seat of such manufactures. Figures of gods and goddesses in brass are also made here. These articles find a ready sale among the pilgrims. A large
number of Kánsáris live at Bhawanipur near Kálighát, but they are now mostly engaged in the manufacture of gold jewellery, silver plate, and surgical instruments.

**Kalna.**—Burdwan District. All kinds of vessels are made. Kalna is also the name of a sub-division, containing several places where brass-wares are largely made. The annual production is estimated at 15,540 maunds, valued at Rs.30,839.

**Kánchannagar.**—Burdwan District. A place noted for its brass and bronze manufactures, which are largely exported to Calcutta. Plates, cups, tumblers, and various other articles are made.

**Kesabpur.**—Jessore District. About thirty families are engaged in the manufacture of brass-ware.

**Khanyán.**—Hooghly District. Various kinds of sheet brass and bronze utensils are made here.

**Khámárpára.**—Hooghly District. Ordinary vessels, brass hinges, locks, bolts, etc., are cast here.

**Khágrábázár or Khánkrá.**—Murshidabad District. Noted for its bronze vessels, which are the finest in Bengal and exported to all parts of the country. There are about 25 firms engaged in the work, each employing eight to ten workmen.

**Kharár.**—A place near Chandrakona in the Midnapur District. Noted for its brass and bronze manufactures, which are largely exported to Calcutta. Capitalists supply the materials and get the vessels manufactured by hand labour, which is cheaper here than in the neighbourhood of Calcutta. Utensils worth about one and-a-half lakh of rupees are annually manufactured at Kharár and exported to Calcutta. The local demand is also considerable.

**Khirpái.**—Midnapur District. Various kinds of Bharan and bronze utensils are made here.

**Krishnagar.**—Nadia District. Water-vessels, called Gárus, are made here.

**Mahespur.**—Nadia District. About thirty firms are engaged in the manufacture of brass-ware.

**Meherpur.**—Ditto ditto.

**Monghyr.**—Good Lotás and other articles are made here.

**Mutíári.**—Burdwan District. Bronze vessels and cooking-pots are largely made here.

**Nabinnagar.**—Gya District. About fifty families of metal-workers reside in this place. The articles are exported to Chutia Nagpur and other places.

**Najumganj.**—Balasore District. Betel-trays and various other articles are made here.

**Nátágarh.**—Twenty-four Parganas District. Brass Lotás and other utensils and locks and padlocks made here. There is a colony of locksmiths in this village. Mr. Collins, who visited the place in 1890, made the following notes in his diary:—“There are fifty families of locksmiths at work, and one factory under Babu Dwárká Náth Karmokár, who has ten men under him. They make English padlocks and keys for sale in Calcutta. The brass pieces are cast in the Sukhpur village, where are five brass-casters. They are finished up
in his shop and fitted with keys. The work is very neat and the lock complex."
Brass locks are also made at Cossipur in Calcutta.

Navadwip.—Nadia District. Copper sacrificial vessels, bronze bells, brass
Lotás, spoons, cups, etc., are made.

Nawabganj.—Maldah District. Plates, cups, Gharás, and brass betel
holders are largely made here.

Patna.—Ordinary vessels. About fifty families are engaged in the work,
and the yearly outturn of utensils is estimated at over a lakh of rupees.

Patra-sáyer.—Bankura District. Noted for its brass manufactures.
All kinds of vessels are made here.

Purbasthali.—Burdwan District. Cups, betel-holders, and other bronze
articles are largely made. The place has 200 families of braziers, who annually
produce Rs30,000 worth of goods.

Rádhánagar.—Midnapur District. Various kinds of Bharan and bronze
utensils are made here.

Rájgar.—Faridpur District. Water-pots, called Gharás, are made here.
These are exported to Calcutta.

Rámjibanpur.—Bankura District. Cast-brass cooking-pots are made
here.

Ránághát.—Nadia District.—Hukká-stands on snakes and fairies are
largely made, as well as images of gods and figures of animals.

Ráni ganj.—Burdwan District. Cups are made here, which are exported
to Calcutta.

Remna.—Balasore District. Lamp-stands (Pilenj). These lamp-stands
are of peculiar construction, not like those commonly found in the country.
They have a peacock-shaped oil-reservoir on the top, with a small hole
opposite the vessel in which the wick and the oil are kept, and a large square
hole below the legs which is fitted in the end of one of the four mouths of
the oil-vessel.

Sabaháganj.—Midnapur District. Various kinds of bronze utensils are
made here.

Sabalpur.—Manbhum District. Sacrificial vessels, figures of gods and
goddesses, animals, such as horse, deer, fish, etc., and fruits and vegetables.

Salempur.—Gya District. Figures of gods and goddesses are made here.

Sántipur.—Nadia District. Noted for its brass manufactures, which are
largely exported to Calcutta. Sacrificial vessels, Hukká-stands, and small
figures are chiefly made here.

Sasseram.—Shahabad District. Cover for smoking-bowl (Chhilam).
There are six Kasera families engaged in this work. Some years ago it was
reported that the industry was declining, and there was only one man who
could manufacture a superior quality of this article.

Sewan.—Sárán District. Brass and bronze tumblers. A kind of brass-
ware called Bedhá is made here. It is of copper and zinc, and made into
Hukká-stands and other articles. It takes a brilliant polish and is largely sold.

Shahganj.—Hooghly District. There are about fifty Kánsári families in
this place who are engaged in making articles of sheet brass.

Sonpur.—Cuttack District. Figures of gods and goddesses are made
here. One peculiarity of these figures is that they are made of a mixture of
copper and brass, but both metals appear separately and distinctly in the same
figure. Brass mirrors, called Suryakánti Darpan, are also made here. If the
face of the mirror be exposed to the sun, and a half-burnt wick of cotton or fibre held opposite to it at a distance of 8 inches, it produces fire. Besides, it has the power of reflecting objects.

Tâkī.—Twenty-four Parganas District. Hukkā bowls and other articles are made here.

Tamluk.—Midnapur District. Ordinary vessels are made here.

Improvement in Brass-work.—Mr. E. W. Collins who was deputed by Government in 1890 to report on the existing manufactures of Bengal and to make suggestions for their improvement, made the following remarks on this subject:

"In addition to what I have said on the subject of designs, the following suggestions are made for the improvement of the various existing industries. Of these, brass work is the most flourishing. It has not yet suffered from foreign competition or the use of machinery. Existing processes, however, are costly, and a great saving of hand labour might be effected by machinery. In spite of the opposition of the braziers, experiments have been made in this direction. The use of dies for stamping the goods to the required shape is, I am told, being introduced by a European firm in Calcutta. Mr. Biprodas Pal Chowdhuri, of Moheshgang, Nuddled, has made the experiment with fair success. This will save the necessity for hammering out the metal. A few dies and a small hydraulic press are not expensive, and there are many wealthy firms of native braziers who, if they could get over their conservatism, could afford to purchase them. It is doubtful if it would pay to polish and file brass articles with a steam-lathe, as it works too fast, but better hand lathes could be introduced, as has been done by Prem Chand Mistri in his cutlery works at Kâncchannagar. The use of imported brass sheets has largely superseded the old plan of making up the alloy in the shops. Punching machines would cause a saving in cutting out the required shape, or the sheets might be rolled into circular pieces in the first instance. I do not think that anything need be taught as to the making of alloys. Native braziers fully understand this business, and the localities where superior brass and bell-metal is cast are well known to the purchasers. In moulding, native workmen do not make their moulds in the ground, but make a separate mould for each casting. If they knew of the system of plate moulding, they would save much time in simple castings. The only place where I saw samples of this work was at the Kâncchârâpâ workshops. The general plan is to prepare a fresh mould on each occasion, and wooden patterns are not used. There are plenty of skilled carpenters who could make the models or patterns in wood, and their use would save time and maintain a regularity of work."

Conclusion.—The manufacture of copper, brass, and bronze utensils is perhaps the only important industry which has not suffered from foreign competition or machine-made articles. Several attempts were made to turn out such articles by the aid of machinery, but they have not succeeded. The industry all over the country may be said to be a prosperous one. Almost every town of note has its braziers to make the articles, and shops where they are sold. Besides, hawkers go about from village to village exchanging, like the lamp-seller in Aladin's story, new vessels for old, or selling bright utensils for cash. Owing to the greater purchasing power placed in the hands of the people by the expansion of the export trade in agricultural produce, every household now possesses more utensils than it did in former times, and a larger assortment of such articles is now presented to the bridegroom on the occasion of every marriage, which the bride's father is bound to do in compliance with ancient custom. The industry is, therefore, a thriving one, and there is no sign of its receiving any kind of check in the immediate future. Although porcelain dishes and cups are gradually coming into fashion and enameled-iron ware has appeared in the market, the use of such articles is extremely limited and does not seem to have made the slightest impression upon the present prosperous condition of the brass and bronze industry.

TRAILOKYA NATH MUKHARJI.
A MONOGRAPH ON IRON AND STEEL WORK
IN THE PROVINCE OF BENGAL.

CHAPTER I.

HISTORY OF THE SUBJECT.

As is well known, the general history of India before the Christian era, or indeed before the Muhammadan conquest of this country, is practically unrecorded, and we are almost entirely dependent for any knowledge of these earlier periods on the Vedas, on Manu's Code, and later on the Puranas. Archaeological investigations have also been of some use in supplementing the knowledge gained from these books.

The Vedas are undoubtedly the first records available. Whilst the date or dates of their production is to some extent uncertain, we may for our purposes assume that they were written about the 14th century B.C. These books contain several interesting references to iron and steel and to weapons. The Vedas must of course be taken to refer to the whole of the country of the Hindus, and the present Province of Bengal will be included. The chief weapons referred to are the bow and arrow (Wilson's Rig Veda IV, 26), swords (loc. cit. II, 156), spears (loc. cit. IV, 25), javelins (loc. cit. II, 292), lances (loc. cit. I, 174), hatchets (loc. cit. I, 120) and the discus (loc. cit. III, 35); and the references to the protective coat-of-mail are very numerous (loc. cit. II, 66; II, 310; IV, 23; IV, 27; IV, 80). That the weapons above enumerated were made of iron is also stated (loc. cit. I, 226, and IV, 27—the latter reference being to the arrow in particular and the former to weapons in general). They are further mentioned as being whetted on a grindstone (loc. cit. II, 33 and II, 310), and polished to enhance their brightness (loc. cit. II, 326). According to Babu Rajendralal Mitra (Antiquities of Orissa), there is also a reference in the Rig Veda to the use of razors, which would be absolutely useless unless made of steel. There is a reference in the Satarudrya hymn of the Vajasneyi Sanhita of the Vajur Veda which shows that coat-of-mail was made of iron (Muir's Sanskrit Texts IV, p. 270). In the Dhanurveda, which is a subsidiary Veda, containing only the rules regarding archery, there is reference to a special arrow, termed the Närācha, of which the peculiarity was its construction entirely of iron, whilst of the ordinary arrow only the head or blade was of this metal. In the Brhat Sanhitā of Varāha Mihira (Chap. IV, which will be found translated by Kern in the Journal R. As. Soc. N. S. VI, pp. 81 et seq.) there is given a most detailed and interesting account of the tempering of swords, which shows that even at this period steel was distinguished from iron, and the nicety of this process of tempering was appreciated, as it was known that very small alterations in the details of the process would materially affect the result. The
various recipes given are recommended by statements as to the capabilities of blades which have been subjected to the described treatments. Thus it is described how to temper a blade so that it will cut off an elephant’s trunk, or so that it will be fit for piercing stones, or so that it cannot be whetted on a stone or blunted by other iron instruments. The chief variations in the tempering process seem to have been effected by using a variety of liquids for the quenching—a means which is employed at the present time. There are mentioned as imbruing materials blood, ghee, water, milk from a mare, a camel, an elephant, a mixture of fish-bile, deer-milk, horse-milk and goat-milk blended with toddy, an unguent compounded of the milky juice of the calotropis (the use of this to be preceded by rubbing the blade with oil), goat’s horn ink, dung from doves and mice, and finally a stale mixture of potash of plantains with buttermilk. From the same source we may infer that the workmen of this period were able to impart a really high finish to the weapons they manufactured, for we find that a king was enjoined not to look at his own face in his sword—an act he would scarcely have attempted in any but a very highly polished blade.

From Manu’s Code, which is supposed to have been written about 900 B.C., we learn the manner in which the people were divided into castes at this early period. We find that the present division was not then in force, but that there were four chief castes and minor mixed classes resulting from the inter-marriage of members of the four original castes. Many artisan trades were specially assigned to these minor mixed classes, but there is no definite mention of the blacksmith’s trade being assigned to any particular class. At the same time there are various passages in the book which show clearly that the use of iron was very common, not only for the manufacture of weapons, but for other purposes such as for tipping the share of the plough, for bedsteads, and for personal ornaments.

From B.C. 150 onwards we are able to separate to some extent the history of Bengal from that of the rest of India—at least so far as our subject is concerned. We are able to get very valuable information for the period B.C. 150 to A.D. 400 from a study of temples built in Bengal during this period and which still remain in good preservation. The most important of these are the rock-cut temples of Udayagiri Hill, Orissa (circa B.C. 150), Buddha Gaya (B.C. 100–100 A.D.) and the Amravati tope in Orissa (A.D. 300–400). On and about these temples are many well preserved sculptures of warriors wielding swords, daggers, spears, bows and arrows, battle-axes, shields, etc., and from these we are able to get very valuable information as to the shape and design of these weapons. That the weapons depicted are those which were used in Bengal at this period we may safely conclude from the fact that the temples are built in Bengal, and that the weapons were chiefly if not entirely made of iron or steel, and thus of direct interest to us, we may conclude from the frequent mention of iron and steel weapons in the Vedas (vide supra) at a much earlier period.

In Plate I are a number of drawings of weapons taken from the hands of warriors in the sculptures at Udayagiri, Barhut, Buddha Gaya and Amravati. The drawings are all made to a uniform scale of one inch to one foot (on the assumption that the length of a man’s forearm is 18
inches). Almost all the sculptures which are of interest to us have been very carefully photographed or lithographed to illustrate Fergusson and Burgess, "Cave Temples of India," Fergusson's "Tree and Serpent worship," Cunningham's "Stupa of Bharut," and Rajendralal Mitra's "Antiquities of Orissa" and "Buddha Gaya"; also there are casts of some of the more important in the Archaeological Gallery of the Indian Museum in Calcutta.

We may note the two widely different types of shield depicted at Udayagiri and at Amravati respectively [Plate I, Figs. 11 and 9 (a)]—the one exceedingly massive and apparently circular, the other very long and narrow and of slight construction. The swords are of many shapes and sizes. That depicted in Fig. 3 is a barbarous looking weapon, and reminds one somewhat of the sacrificial knives at present used in Bengal for cutting off the heads of goats. Figs. 1, 2, 3 and 4 are all characterised by their massiveness. Figs. 1 and 4 recall somewhat the shape of the short Roman sword, but they are very much longer than the Roman weapon. A sword somewhat similar to Fig. 1 was used by the Assyrians, and the Greeks of the historic age used a sword somewhat similar to that depicted in Fig. 2 (a). Spears do not occur at Udayagiri or Buddha Gaya. Fig. 1 (a) is similar to an Assyrian spear. A careful comparison of these weapons with those used by other nations at or before this period would no doubt be a very interesting historical study.

The weapons are certainly the most interesting objects portrayed at Udayagiri, Buddha Gaya and Amravati so far as we are concerned, as they were almost certainly all made of iron or steel. There are, however, other objects which were probably in part made of iron, e.g., the implement used by the mahout in prodding his elephant [Fig. 5 (a)], which is of almost identical pattern with the implements at present used for this purpose. The wheels of chariots were probably bound with an iron tyre. On one of the friezes at Amravati [see Plate xcvii, "Tree and Serpent Worship" by J. Fergusson] agriculturalists are depicted at work using *kodalis* very similar to those now employed.

We are almost entirely dependent for our knowledge of this period B.C. 150 to A.D. 400 on the temples already mentioned. I have, however, found one weapon in actual existence which is supposed to have been made before the Christian era. This is a spear or lance known as *Peshro bulum*, which belongs to the Nawab of Murshidabad and is always carried at the head of processions as a trophy. It is said to have originally belonged to Vikramaditya and to have been taken by the Muhammadans from the Hindus. It is made of beautifully tempered steel inlaid with gold, and bears on the blade the image of Vishnu on the one side and of Goroor on the other. The character of the ornamentation on the blade bears very marked resemblance to much of the carving and ornamental work on the Orissan temples, and it appears probable to me that this spear was made in Bengal. If so, it is at the same time the oldest and the finest piece of work in steel which Bengal can boast. This spear is depicted in Plate III, Fig. 2 (a).

The Orissan temples of Bhuvanesvar (650 A.D.) and Kanarak (1237 A.D.) are very rich in well preserved and highly detailed carvings, and from these we can continue our study of the weapons of Bengal. Plate II and Plate III,
Fig. 1, are taken from Rajendralal Mitra’s “Antiquities of Orissa” in which the Orissan temples of this period are described in detail. Again, the careful comparison of these weapons with those of other nations would form a very interesting study. There is depicted here a short broad sword or dagger [Plate II, Fig. 1] which is exceedingly like the Roman sword, even to the severely rectilinear outline of the guard. There is another weapon which has been frequently described [Plate II, Fig. 22]. It is in the hand of a kneeling figure, armed also with a very small circular shield and preparing to receive a blow from his antagonist, who is mounted on an elephant. This weapon has been described as like a *kukri*, and it has been suggested that this figure represents one of the aboriginal inhabitants of Orissa. It appears to me, however, that this weapon is quite unlike the Sikkim or Nepalese *kukri*, but is similar to a kind of dagger which is said to come from Bhutan. A shield [Plate III, Fig. 1] from the temple at Kanarak is specially worthy of note for the elaborate ornamentation it carries. “It is nearly 2¾ feet in diameter, bound round the edge with a metal rim and decorated with an outer band formed of circular plates of metal bearing impressions in relief of men, horses, elephants, deer, fishes, birds, tortoises, lizards and floral scrolls, and having a scollopied inner edge. A medallion of a chaste design covers the centre and to it is attached a thick bushy yak tail *chauri*; a second *chauri* of the same kind but with a differently formed handle hangs from the top. For distinctive badges it has two well-formed lizards.”

But Kanarak yields us also something more valuable than sculptures. Here large beams of iron have been used in the building of the Black Pagoda and still remain. The date of this building is fixed by Ferguson in the latter half of the 9th century, but Stirling gives it a later date, viz., 1241. In front of the entrance to the temple, which is on the east side, amongst the stones, lies a bar of iron 23 feet long and 11¾ inches thick and broad. Iron beams are also employed to support the roof in the Jagamohan or porch, now the only part of the temple standing. Mr. Ferguson describes the interior of this building (History of Architecture, page 428), as follows:—“Internally the chamber is singularly plain, but presents some constructive peculiarities worthy of attention. On the floor it is about 40 feet square and the walls rise plain to about the same height. Here it begins to bracket inwards, till it contracts to about 20 feet, where it was ceiled with a flat stone roof, supported by wrought iron beams... showing a knowledge of the properties and strength of the material that is remarkable in a people who are now so utterly incapable of forging such masses. The employment of these beams here is a mystery. They were not needed for strength, as the building is still firm after they have fallen, and so expensive a false ceiling was not wanted architecturally to roof so plain a chamber. It seems to be only another instance of that profusion of labour which the Hindus loved to lavish on the temples of their gods.”

With the possible exception of the *Peshro bullum* already described, the iron beams in this temple are the oldest pieces of iron in the province and are worthy of careful examination. I do not know on what grounds the beams are described as of wrought iron by Ferguson, and I am not aware that any samples of the iron have been taken for chemical analysis
or mechanical tests. It may be noted that the celebrated iron pillar at Delhi is supposed to be of about the same age as these beams or even earlier (A.D. 400, according to Fergusson), and that this has been shown to consist of pure wrought iron by chemical analysis.

Supposed to belong to this period also is a large iron gun [Plate IV, Fig. 1] known as the *Bachawali tope*, now standing on two masonry pedestals on the maidan between the palace and the Imambarah of the Nawab Bahadur of Murshidabad. P. C. Mazumdar in the "Musnad of Murshidabad," 1905, says:—"The gun was made between the 12th and the 14th centuries, probably by the Muhammadan rulers of Gour." In the same place the construction of the gun is described as follows:—"

. . . . consisting of two pieces of different diameters. The smaller portion, which is the chamber, is 3 feet and 7 inches long with a girth of 4 feet and 4 inches; and the larger portion, namely the barrel, is 11 feet and 6 inches long with a girth, at the muzzle, of 7 feet and 9 inches. The diameter of the bore at the muzzle is 1 foot and 7 inches. The touch hole has been plugged with melted iron. Eleven rings bind the wrought iron barrel, the inner surface of which bears ample evidence of the gun's great antiquity. The rim round the muzzle is ornamented with petals, while one of the rings resembles a string of beads. On the upper half of the barrel surface, near the muzzle, fourteen lines, seven on each side, are inlaid with brass. Eight smaller rings are attached at various points. The breech plug is driven until its chamfered end dovetails and fits tightly into the chamber of the barrel, which are tied together with the rings attached to each."

This gun certainly is a most curious article. It is, so far as I am aware, the only breech-loading gun ever attempted until quite modern times. The English were only using muzzle-loaders in 1760. It is difficult to conceive how the gun can ever have been fired without the breech-barrel blowing out. The workmanship of the gun is very rough. As to the method of its construction, I do not think anything can be said with certainty in the absence of tests of the metal of which it is made. On the chamber I noticed the same transverse markings which I shall have to notice later in the great gun called *Jahan Kotha* which also lies at Murshidabad. These markings may perhaps indicate that the tube was built by bending a strip of wrought iron spirally round a mandril, as in the construction of small arms at Monghyr. Within the barrel there are some very curious markings. There are two lines which run longitudinally down the barrel, one on each side. These make it appear at first as though the barrel had been cast and these were the lines at which the two halves of the mould met. In places corrosion has occurred along these lines showing quite a thin innermost layer and beneath this rib-like transverse pieces about 3 inches wide at intervals of about one foot along the barrel.

Rajendralal Mitra (Antiquities of Orissa) has pointed out an indication of the universal use of iron in Bengal in this period. Most of the Orissan sculptures, depicting women, are ornamented with bracelets precisely similar to the *khāru* of the present day. The most essential point now is that the *khāru* must be made of iron, and probably this has been the case so long as the *khāru* in its present form has been worn.
A reference to another use of iron in a book of this period may be noted. In the Kālikā Purāṇa it is stated that a plate for food made of magnetic iron is most beneficial in overcoming anasarca, jaundice and anaemia.

After the conquest of Bengal by the Muhammadans it is certain that all the methods of working in iron and steel and of the armours' trade known to the Muhammadans were introduced into Bengal. There is no doubt that the native smiths learnt much from the experts who came with the Muhammadans, and that the work produced in Bengal suddenly improved in technique; but at the same time we may deplore the Muhammadan conquest as having almost entirely effaced any characteristic indigenous designs or workmanship, so much so that it is now very difficult to find any designs of arms or methods of ornamentation thereof which can be said to be peculiar to Bengal. Weapons were made in Bengal, in Patna, Monghyr, Dacca, Murshidabad and Burdwan, which in design and ornamentation cannot be distinguished from the arms of Persia, Arabia and the Punjab. It is well known that the Muhammadan Emperors took the keenest interest in the manufacture of arms of all kinds. Akhbar is himself described as skilful in the making of guns and the casting of ordnance, and the most proficient artisans of Europe were induced to come to the Emperor's court to superintend the construction of arms. About the time of Akhbar great attention was given to the manufacture of guns (small arms), but the cannon appear to have been chiefly cast from brass.

It is difficult to find specimens of arms which one can be sure were made in Bengal in the 15th and 16th centuries. There is a large cannon now lying at Murshidabad, known as the Jahan Kosha, made of iron, which bears an inscription to the effect that it was manufactured at Jehangir Nagar alias Dacca under the supervision of Shere Mahomed and the clerkship of Haraballay Das by Jonardan Karmokar in the month of Jamadinsani of the year 11 of the Joloces, i.e., 1637 A.D. [see Plate IV, Fig. 2]. Another inscription also states that the cannon is made of a composition of eight metals, namely, gold, silver, copper, lead, zinc, mercury, iron and tin, but at any rate it appears to be chiefly iron. The metal is very little corroded, which is remarkable considering its age. Here again the chemical analysis and mechanical tests of a sample of the metal would most satisfactorily solve the problem of the construction of the cannon, but from circumstantial evidence it would appear to be wrought. The barrel shows signs of transverse or rib-like markings, which suggest that it was built by twisting an iron band into the form of a spiral round a central core, so that the successive coils of the spiral were in actual contact and then heating and welding together the coils. From an examination of the muzzle-end of the cannon one might suggest that the barrel is built of two or three tubes, as in modern big guns. The ornamentation on the outer surface of the barrel is evidently wrought work, and the design appears to me to be Florentine or Mediterranean in character. "The cannon is 17 feet and 6 inches long with a girth of 5 feet at the touch-hole end. The diameter of the touch hole is 1\(\frac{1}{4}\) inches. That of the orifice is 6 inches. The weight of the gun is 212
maunds and the powder required for the charge is 28 seers" \textit{(The Maujud of Murshidabad)}.

The weapons of the 18th century are better known, as many specimens are preserved. In the palace of the Maharaja of Burdwan there are weapons of this period of which the exact history is known. In the village of Kamarpura, eight miles from Burdwan, there lived many smiths who made all the arms for the Raja. There is a sword in the possession of the Maharaja, of which the following story is told:—A smith from Kamarpura brought this sword for sale to the Raja (the warrior Raja, the father of Raja Chitra Sen Roy, who reigned about 1700), but asked such a high price that he was ridiculed and dismissed. On going out from the palace he chopped through in one stroke of this sword the trunk of a large tree which stood near the gateway of the palace, but cut it in such a way that the tree remained standing. In a few days the tree began to wither and die. On the Raja making enquiries he discovered the reason of the tree’s withering and purchased the sword from the smith at the original price asked.

There are old matchlock guns in the palace which were made at Kamarpura and used in a battle in 1761 by the army of Maharaja Tiloke Chand Bahadur against the English under Captain Martin White \textit{(Plate V, Fig. 3)}. There are also spears which were ordinarily used by the armies of the Raja at this time. Two of the most characteristic forms are known as \textit{bichhu} or \textit{barchha}, a spear with two corkscrew-shaped prongs \textit{(Plate V, Fig. 10)} and \textit{tighi}, a spear with a flambent blade reminding one of the conventional representation of lighting.

In the armoury of the Nawab Bahadur of Murshidabad are many weapons of this period made in Bengal. Arms for the Nawab of Bengal were at one time largely made at Patna. Monghyr was famous for its guns. In the earlier part of the 18th century these guns were match-lock of the same pattern as those made at Kamarpura. Towards the end of the century guns were also made at Monghyr according to the pattern of those used by the English. The mistries of Bhagalpur produced a sword recognisable by the characteristic end of the blade \textit{(Plate V, Fig. 4)}. The mistries of Burdwan made swords also for the Nawab of Bengal. In the armoury at Murshidabad there is an executioner’s sword (\textit{Tega Burdwan}) made at Burdwan of characteristic shape \textit{(Plate V, Fig. 5)}. It appears that smiths came from Burdwan to settle round the court of Murshidabad, and there are in the armoury many forms of spears which were no doubt employed in the armies of the Nawab of Bengal and manufactured at Murshidabad \textit{(Plate V, Figs. 2, 6, 7, 8, 9, 11, 12 and 13)}.

The chief characteristics of the weapons which we can assign to Bengal at this period are simplicity of design and absence of ornamentation. But as already mentioned there were undoubtedly manufactured in this province many weapons after the pattern of Arabian, Persian and Panjab arms which could not be distinguished from the patterns. There is only one spear in the armoury at Murshidabad which shows ornamentation of some originality, and may have been made in Bengal at this period. This carries a design in low relief of an elephant, a tiger, and an antelope \textit{(Plate III, Fig. 2(8))}.
A peculiar kind of spear named *pata* and used in Muhammadan religious processions is probably characteristic of Bengal [Plate V, Fig. 1].

There were undoubtedly many other places than those mentioned at which arms were manufactured in the 18th century and before. There is a very old cannon 12½ feet in length lying in the jungle which now grows on the site of the old fort of Bishunpur in the Bankura district. This was probably manufactured here when the Bishunpur Raj was at its height between the 11th and 18th centuries. At Suri there are a number of small cannon of unknown age used as ornaments round the Civil Courts. These came from Rajnugger, which was the seat of a Raj of considerable importance. The district report from Gaya says:—“There used to be a considerable industry in these parts in the manufacture of steel weapons and implements, but it has decayed since the death of the late Maharaja Sir Jai Pergash Sing Bahadur, k.c.s.i.” The Collector of Khulna writes:—“Protapnagar (in the district of Khulna) has a history of its own. It is said that all the guns and implements of war required by Raja Protapaditya, who flourished in the first-half of the 17th century, used to be manufactured in this village.”
CHAPTER II.

A STATISTICAL ACCOUNT OF THE PRESENT INDUSTRY.

I.—NUMBER OF PERSONS OCCUPIED IN IRON AND STEEL WORK, THEIR DISTRIBUTION BY DISTRICTS, THEIR CASTE AND RELIGION.

The Census Tables afford us the only statistical information on this subject. The tables which are here given are abstracts or compilations from the volumes dealing with Bengal of the Census of India for 1901. It is perhaps scarcely necessary to repeat here that the Occupation Tables are the least satisfactory part of a census and that they do not admit of profitable examination in detail. Since the division of Bengal is subsequent to the census of 1901, it is almost impossible to prepare statistical tables for the restricted Bengal separate from East Bengal. Something has been attempted in Table II by putting the divisions of Rajshahi, Dacca and Chittagong in italics, and by omitting these divisions from the total an estimate is formed of the total number of workers in restricted Bengal. The difficulty recurs, however, in the statistical examination of the iron and steel trade: the statistics of the trade for 1901 necessarily refer to undivided Bengal. The year 1901 is the latest for which we can get a fairly complete statistical survey both for occupation and trade, and for the sake of coordination and comparison this year has been selected. It must be understood, therefore, that the statistics given in this chapter refer to undivided Bengal, except when the contrary is explicitly stated.

In Table I, abstracted from Table XV, Occupation, Part A of the Census of Bengal, 1901, are given the number of workers in iron and steel in the whole province, the classification by occupation being given in considerable detail, viz., in the groups of the Census Tables.

<table>
<thead>
<tr>
<th>Group No</th>
<th>Occupation</th>
<th>Total number of actual workers in British territory in Bengal</th>
</tr>
</thead>
<tbody>
<tr>
<td>167</td>
<td>Railway and Tramway Factories: owners, managers and superior staff</td>
<td>Males: 64; Females: ...</td>
</tr>
<tr>
<td>168</td>
<td>Railway and Tramway Factories: operatives and other subordinates</td>
<td>Males: 1,363; Females: 44</td>
</tr>
<tr>
<td>225</td>
<td>Machinery and engineering workshops: owners, managers and superior staff</td>
<td>Males: 165; Females: ...</td>
</tr>
<tr>
<td>226</td>
<td>Machinery and engineering workshops: operatives and other subordinates</td>
<td>Males: 6,589; Females: 35</td>
</tr>
<tr>
<td>227</td>
<td>Knife and tool-makers</td>
<td>Males: 720; Females: 14</td>
</tr>
<tr>
<td>228</td>
<td>Knife and tool-sellers</td>
<td>Males: 283; Females: 15</td>
</tr>
<tr>
<td>229</td>
<td>Knife and tool-grinders</td>
<td>Males: 58; Females: ...</td>
</tr>
<tr>
<td>230</td>
<td>Plough and agricultural implement makers</td>
<td>Males: 6,481; Females: 628</td>
</tr>
<tr>
<td>231</td>
<td>Mechanics, other than railway mechanics</td>
<td>Males: 4,285; Females: ...</td>
</tr>
<tr>
<td>232</td>
<td>Machinery dealers, etc.</td>
<td>Males: 5; Females: 2</td>
</tr>
<tr>
<td>233</td>
<td>Sugar press makers, owners and agents</td>
<td>Males: 81; Females: ...</td>
</tr>
<tr>
<td>Group No.</td>
<td>Occupation</td>
<td>Total number of actual workers in British territory in Bengal</td>
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<td></td>
<td></td>
<td>Males.</td>
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<tr>
<td>37.-Arms and Ammunition</td>
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<tr>
<td>235</td>
<td>Arms and Ammunition Factories: superior staff ...</td>
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</tr>
<tr>
<td>236</td>
<td>Ditto ditto: operatives and other subordinates.</td>
<td>455</td>
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<td>237</td>
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<td>238</td>
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<td>240</td>
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<tr>
<td>241</td>
<td>Gun Carriage Factories: managers and superior staff ...</td>
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<tr>
<td>242</td>
<td>Ditto: workmen and other subordinates.</td>
<td>255</td>
</tr>
<tr>
<td>243</td>
<td>Gun-makers, menders, and sellers</td>
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<tr>
<td>244</td>
<td>Ammunition, gunpowder and firework makers</td>
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<tr>
<td>245</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>246</td>
<td>Makers of swords, spears and other weapons</td>
<td>...</td>
</tr>
<tr>
<td>247</td>
<td>Sellers of swords, spears, and other weapons</td>
<td>...</td>
</tr>
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<td>46.-Iron and Steel</td>
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<td>326</td>
<td>Iron Foundries: owners, managers and superior staff</td>
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<td>327</td>
<td>Ditto: operatives and other subordinates ...</td>
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<td>328</td>
<td>Workers in iron and hardware</td>
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<td>328(a)</td>
<td>Iron smelters</td>
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<tr>
<td>328(b)</td>
<td>Lock-makers and sellers</td>
<td>...</td>
</tr>
<tr>
<td>329</td>
<td>Sellers of iron and hardware</td>
<td>...</td>
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<td>58.-Railway</td>
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<td>414(a)</td>
<td>Railway mechanics</td>
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<td>60.-Water</td>
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<tr>
<td>427</td>
<td>Dockyards: workmen and other subordinates</td>
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</tr>
<tr>
<td></td>
<td>All branches of iron and steel work</td>
<td>...</td>
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</tbody>
</table>

The total population of Bengal, exclusive of Native States, was in 1901 returned as 74,744,866, and therefore the number of workers in iron and steel per 10,000 of the population was 15.4 (male) and 0.5 (female) or 15.9 in all. From this table we may also get a rough idea of the number of persons employed in iron and steel works conducted on European lines, for we may assume that groups 225, 226, 232, 233, 234, 236, 241, 242, 244, 326, 327, 328 (a), 414 (a), and 427 are all so employed. The total number of persons in these groups is 20.2 per cent. of the total number of workers in iron and steel.

In Table II, compiled from Table XV, Occupation, Part B of the Census of Bengal, 1901, is given the distribution by districts of the workers in iron and steel. In the case of small branches (groups) of the industry in which only a few persons are employed, the distribution by districts is not given, and therefore the total number of persons returned in Table II is somewhat less than in Table I.
<table>
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<td>1056</td>
<td>283</td>
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</table>
An examination of this table brings out little information which could not be obtained less laboriously in other ways. It shows very clearly the concentration of machinery and engineering workshop operatives and mechanics in Howrah and Calcutta. The iron foundries are also very clearly located in the neighbourhood of Calcutta and Howrah and in the Burdwan district (the Barakar Iron and Steel Works). It will be noticed, however, that no iron foundry operatives are returned in the Monghyr district, but that this district appears to be absolutely singular in possessing 640 iron smelters, whilst only 3 other districts are shown to possess this class of workman, viz., Darbhanga 29, Cuttack 3 and Champaran 2. There can be no doubt that these curious figures merely represent a statistical error and that these 640 iron-smelters are operatives at the East Indian Railway rolling stock works at Jamalpur of much the same class as the workers at Barakar returned as iron foundry operatives in the Burdwan district. No information can be obtained from the table as to the location of that class of iron workers now rapidly becoming extinct—the smelters of iron by the indigenous method. The table shows a concentration of railway mechanics in the Howrah district which is due to the East Indian Railway wagon shops at Liloosah, and in the Monghyr district to the rolling stock works of the same railway at Jamalpur. I cannot understand a considerable concentration at Rangpur. The workers in iron and hardware, group 328, are the village smiths or Kamars. This group forms 70–80 per cent. of the total workers in iron and steel in the province. They are fairly evenly distributed throughout the province, the average number in a district being about 2,000, the minimum 133 in the Chittagong Hill Tracts and the maximum 6,670 in the Shahabad district. The population of the Chittagong Hill Tracts is less than that of any other district and explains the minimum. The returns for plough and agricultural implement makers are interesting as showing very clearly the essentially agricultural districts. The Ranchi and Cuttack districts show the largest returns for this group.

From this table, by omitting the divisions of Rajshahi, Dacca and Chittagong, we obtain 100,487 workers in iron and steel. From the ordinary population tables we find that the population of these divisions amounted to 24,028,878, and therefore the remaining population of Bengal was 50,717,988. In this way we find the number of workers in iron and steel per 10,000 of the population was 10.8 over an area roughly corresponding with the present restricted Province of Bengal.

Very little information can be obtained from the Census Tables as to the caste of the workers in iron and steel in the province, as in the tables dealing with occupation by caste the workers in these metals are classed in part with workers in other metals and precious stones and in part with the caterers for supplementary requirements.

The total number of workers in iron and hardware (group 328 of the Occupation Tables) is 82,443. Of these 49,011 or 59.4 per cent. are Kamars and Lohars and are following their traditional occupation.
The remaining 40-6 per cent. of the workers in this group are of other castes. A few of these are aboriginals, such as the Nepalese Kamis, the Kotes of the Sonthal Parganas and the Agariyas of Chota Nagpur for whom also the traditional occupation is in iron and hardware, but the majority are of castes with other traditional occupations which they have abandoned for this work. On the other hand the total number of working Kamars and Lohars in the province is 208,461, so that of these only 23-5 per cent. have adhered to their traditional occupation.

Concerning the caste of the other workers in iron and steel, the engineering works operatives, the mechanics, iron smelters, manufacturers of arms and ammunition, etc., it is impossible to get any information from the tables.

A sufficient idea of the religion of the workers in iron and steel may be obtained from Subsidiary Table VI of the Census of Bengal, 1901.

The following Table III is an abstract therefrom:

**Table III.**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Distribution by Religion of 1,000 Persons Following Each Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hindu</td>
</tr>
<tr>
<td>Railway and tramway plant</td>
<td>592</td>
</tr>
<tr>
<td>Tools and machinery</td>
<td>791</td>
</tr>
<tr>
<td>Arms and ammunition</td>
<td>493</td>
</tr>
<tr>
<td>Iron and steel</td>
<td>944</td>
</tr>
</tbody>
</table>

The most striking features of this table are the small figures for Musalman workers in iron and steel on a small scale (the sub-order iron and steel in this table is chiefly the workers on a small scale—the village blacksmiths) and the large figures for Musalman workers in the manufacture of arms and ammunitions. As this manufacture is practically only carried on in the Government ordnance factories, it means that about 50 per cent. of the operatives in these factories are Musalmans. Generally speaking, we may say that the Musalman workers in iron and steel are almost confined to factories conducted on European lines and that the Musalman blacksmith working in his own home on a small scale is very rarely found. This agrees with my own observations when on tour.

II.—Production and Consumption of Iron and Steel in the Province.

The production of iron in the province is very small. The Bengal Iron and Steel Company, Limited, of Barakar have for the last few years
produced about 50,000 tons of pig-iron per annum. The actual figures kindly supplied by Mr. McFarlane, Manager of the Barakar Iron Works, are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Fig iron</th>
<th>Castings</th>
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<tbody>
<tr>
<td></td>
<td>Tons. cwt.</td>
<td>Tons. cwt. qr.</td>
</tr>
<tr>
<td>1898</td>
<td>19,719 10</td>
<td>7,833 1 2</td>
</tr>
<tr>
<td>1902</td>
<td>33,180 10</td>
<td>11,499 19 3</td>
</tr>
<tr>
<td>1903</td>
<td>28,816 0</td>
<td>9,644 16 1</td>
</tr>
<tr>
<td>1904</td>
<td>37,882 10</td>
<td>13,958 12 1</td>
</tr>
<tr>
<td>1905</td>
<td>47,411 0</td>
<td>17,741 4 0</td>
</tr>
<tr>
<td>1906</td>
<td>46,877 10</td>
<td>14,487 8 0</td>
</tr>
</tbody>
</table>

Outturn for year

Besides this Barakar pig, the only iron produced in the province is an insignificant quantity produced in the small native furnaces of baked clay in Oriissa, Chota Nagpur and the Sonthal Parganas.

The production of iron per head of the population is about 1.5 lbs.

The consumption of iron and steel cannot be obtained very easily. We may form an estimate of the quantity, however, by considering it as made up of the production in the province plus the imports of iron and steel of all kinds minus the exports of iron and steel of all kinds. The imports and exports of Bengal may be obtained from "Reports on Trade carried by Rail and River in Bengal" and from the "Annual Statements of the Trade and Navigation of British India."

Table V.—Imports into Bengal, 1900-1.

[Compiled from Report on Trade carried by Rail and River in Bengal. 1900-1. Does not include stores imported by Government for Bengal.]

<table>
<thead>
<tr>
<th>Articles</th>
<th>Quantity</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Iron and Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cast</td>
<td>84,046</td>
<td>2,44,970</td>
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<tr>
<td>Unwrought</td>
<td>17,986</td>
<td>39,578</td>
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<tr>
<td>Wrought</td>
<td>9,56,911</td>
<td>64,39,711</td>
</tr>
<tr>
<td>Manufactures</td>
<td>2,61,100</td>
<td>22,19,816</td>
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<tr>
<td>Railway plant and rolling stock</td>
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<td></td>
</tr>
<tr>
<td>Locomotive engines</td>
<td>58,368</td>
<td>15,80,501</td>
</tr>
<tr>
<td>Carriages and trucks</td>
<td>2,60,235</td>
<td>36,38,362</td>
</tr>
<tr>
<td>Steel rails and fish plates</td>
<td>7,09,336</td>
<td>28,35,961</td>
</tr>
<tr>
<td>Sleepers and keys of steel and cast iron.</td>
<td>12,437</td>
<td>42,493</td>
</tr>
<tr>
<td>Total</td>
<td>33,60,403</td>
<td>1,70,31,392</td>
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</table>
### Table VI.—Imports into Bengal, 1900-1.
(Stores imported by Government for Bengal.)

[Compiled from Annual Statement of the Trade and Navigation of British India, 1901, Table 24]

<table>
<thead>
<tr>
<th>Articles</th>
<th>Quantity</th>
<th>Value</th>
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<tr>
<td></td>
<td>Cwts.</td>
<td>Rs.</td>
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<tr>
<td>Hardware and cutlery</td>
<td>...</td>
<td>9,05,681</td>
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<tr>
<td>Machinery and mill-work</td>
<td>...</td>
<td>5,00,410</td>
</tr>
<tr>
<td>Iron (of all sorts)</td>
<td>205,595</td>
<td>16,13,589</td>
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<tr>
<td>Steel (of all sorts)</td>
<td>44,171</td>
<td>4,11,629</td>
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<tr>
<td>Railway plant and rolling stock</td>
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<td>1,30,56,557</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>...</td>
<td>1,64,87,866</td>
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</table>

The quantities in cwts of certain of the Government stores have not been returned, but the total may be estimated as 21,82,682 maunds, making the total imports for Bengal (including Government stores) 45,43,090 maunds or 166,412 tons of the value of Rs. 3,35,19,158.

### Table VII.—Exports from Bengal, 1900-1.

[Compiled from Report on Trade carried by Rail and River in Bengal, 1900-1.]

<table>
<thead>
<tr>
<th>Articles</th>
<th>Quantity</th>
<th>Cost</th>
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<td>Iron and Steel—</td>
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<td>Cast</td>
<td>2,02,629</td>
<td>5,50,210</td>
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<tr>
<td>Unwrought</td>
<td>1,15,418</td>
<td>2,30,836</td>
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<tr>
<td>Wrought</td>
<td>1,20,719</td>
<td>8,21,930</td>
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<tr>
<td>Manufactures</td>
<td>41,658</td>
<td>3,51,312</td>
</tr>
<tr>
<td>Railway plant and rolling stock—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locomotive engines</td>
<td>1,683</td>
<td>62,956</td>
</tr>
<tr>
<td>Carriages and trucks</td>
<td>8,394</td>
<td>1,12,707</td>
</tr>
<tr>
<td>Steel rails and fish plates</td>
<td>49,169</td>
<td>1,91,774</td>
</tr>
<tr>
<td>Sleepers and keys of steel and cast iron.</td>
<td>61,467</td>
<td>1,93,902</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,01,037</td>
<td>25,15,727</td>
</tr>
</tbody>
</table>

The total exports for Bengal 6,01,037 maunds or 21,016 tons of the value of Rs. 25,15,727.

The total consumption of iron and steel is therefore estimated as 195,396 tons in all or 5.8 lbs. per head of the population.
III.—Comparison of the Iron and Steel Industry of Bengal with that of England and Wales.

It has proved interesting to institute a comparison between Bengal and England and Wales as to (i) number of workers in iron and steel per 10,000 of the population; (ii) production of iron per head of the population; (iii) consumption of iron per head of the population:

(i) The number of workers in iron and steel in England and Wales in 1901 has been obtained from Parliamentary Papers, Accounts and Papers 49, Population (England and Wales), Census 1901, Summary Tables, Table XXXV, England and Wales, Occupation of males and females aged 10 years and upwards. A summary of this table is given alongside a corresponding summary from the Bengal Census, and will be useful to show how far it has been possible to compare the different groups in the Occupation Tables of the two Census Reports given for Bengal and for England and Wales respectively.

**Table VIII.—Number of persons occupied in iron and steel industry. A comparison of Bengal with England and Wales in 1901.**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Bengal (British territories)</th>
<th>England and Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>74,744,866</td>
<td>82,527,843</td>
</tr>
<tr>
<td>Workers in iron foundries</td>
<td>1,950</td>
<td>100,556</td>
</tr>
<tr>
<td>Iron smelters</td>
<td>849</td>
<td>85,907(a)</td>
</tr>
<tr>
<td>Workers in iron and hardware</td>
<td>82,589(b)</td>
<td>249,673(c)</td>
</tr>
<tr>
<td>Sellers of iron and hardware</td>
<td>3,468</td>
<td>28,206</td>
</tr>
<tr>
<td>Arms and ammunition</td>
<td>3,417(d)</td>
<td>21,566(d)</td>
</tr>
<tr>
<td>Workers in machinery and engineering workshops.</td>
<td>6,729</td>
<td></td>
</tr>
<tr>
<td>Plough and agricultural implement-makers</td>
<td>7,109</td>
<td>409,668(e)</td>
</tr>
<tr>
<td>Mechanics</td>
<td>4,285</td>
<td></td>
</tr>
<tr>
<td>Workers in dockyards</td>
<td>5,861</td>
<td></td>
</tr>
<tr>
<td>Railway mechanics and workers in railway and tranway plant factories</td>
<td>3,695</td>
<td>23,299(f)</td>
</tr>
<tr>
<td>Total workers in iron and steel and machinery.</td>
<td>119,902</td>
<td>918,870</td>
</tr>
<tr>
<td>Number of workers in iron, steel and machinery per 10,000 of population</td>
<td>15.9</td>
<td>2825</td>
</tr>
</tbody>
</table>

(a) Blast furnaces, puddling and rolling and steel smelting and founding.
(b) Includes lock-makers.
(c) Includes blacksmiths, strikers, tools, niles, bolts, rivets, &c., anchor chains, stove, bedsteads, lock and key-makers and iron-workers (undefined).
(d) It was found impossible to properly separate the manufacturers of explosives only from the manufacturers of ammunition, e.g., shells involving work in steel; and for purposes of more exact comparison all workers in arms and ammunition have been included.
(e) Includes pattern-makers, millwrights, fitters and turners, metal machinists, boiler-makers, other engine and machine-makers, ship-plate riveters, other workers in iron shops, motor and cycle manufacturers.
(f) Railway coach and wagon-makers.
(ii) The production of iron per head of the population for England and Wales in 1901 has been obtained from Parliamentary Papers, Accounts and Papers 32, year 1903, Abstract of Labour Statistics of United Kingdom for year 1902-03, page 19. The total production of iron (pig-iron) in England and Wales for the year 1901 is given as 6,792,000 tons. This reckoned per head of the population is 467 lbs For the United Kingdom the corresponding figure is 426 (op. cit., British and Foreign Trade, p. 369).

(iii) The consumption of iron (pig-iron) per head of the population for England and Wales in 1901 is not available. The corresponding figure for the United Kingdom is 375 lbs. (op. cit., British and Foreign Trade, p. 369). The results of this comparison are here summarized:

<table>
<thead>
<tr>
<th></th>
<th>Bengal (British territory)</th>
<th>England and Wales</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of workers in iron and steel and machinery per 10,000 of the population.</td>
<td>15.9</td>
<td>282.5</td>
<td>... (a)</td>
</tr>
<tr>
<td>Production of iron (pig-iron) per head of the population in lbs.</td>
<td>1.5</td>
<td>467</td>
<td>426</td>
</tr>
<tr>
<td>Consumption of iron or steel per head of population in lbs.</td>
<td>5.8</td>
<td>...(b)</td>
<td>375</td>
</tr>
</tbody>
</table>

(а) Corresponding figure for United Kingdom not available.
(b) Ditto for England and Wales not available.

The percentage 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 the prosperity and civilisation of that country; and the foregoing figures show in a most striking manner the backward state of the Province of Bengal when judged by European standards. Even the least advanced of European countries compare very favourably with Bengal in this respect, e.g., the consumption of iron and steel in Russia is about 17 lbs. per head of the population. On the other hand the iron and steel trade of Bengal compares very favourably with that of any other province in India and with India as a whole. It is the only province in which iron is produced except in insignificant quantities, its engineering firms are the most important in India, and its imports of iron and steel form a very considerable part of the total imports of these metals into British India. It takes about one-half of the total imports of Railway plant and rolling stock and about one-seventh of the total imports of iron and steel in other forms.

IV.—Productive Capacity of the Workers in Iron and Steel in Bengal.

An inspection of the workers in this industry in Bengal produces in one the strongest conviction of the futility of the native blacksmith
working on a small scale in his own home, and of the insignificance of the quantity of material he handles. The gain to the country which would result by his employment in factories under European control would be immense. For under these conditions his productiveness is enormously increased and approaches to that of a European worker. It is, however, very difficult to get any figures which will illustrate the point. A rough estimate can perhaps be formed of the amount of imported material which is taken by the native blacksmiths, as distinct from the large firms controlled by Europeans, from an examination of a somewhat detailed table of imports, such as Table X.

**TABLE X—Showing imports of iron and steel, etc., into Bengal, 1900-1.**

[Compiled from General Table No. 24 of Annual Statement of Trade and Navigation of British India, 1901-1.]

<table>
<thead>
<tr>
<th>ARTICLES</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cwt.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Total hardware and cutlery, including platedware.</td>
<td>...</td>
<td>77,42,066</td>
</tr>
<tr>
<td>Iron—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old, for remanufacturing</td>
<td>1,419</td>
<td>3,583</td>
</tr>
<tr>
<td>Oast (pig)</td>
<td>109,912</td>
<td>3,91,18</td>
</tr>
<tr>
<td>Wrought—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchors, cables, knuckles</td>
<td>6,996</td>
<td>1,04,478</td>
</tr>
<tr>
<td>Angle, bolt and rod</td>
<td>146,585</td>
<td>9,78,285</td>
</tr>
<tr>
<td>Bar</td>
<td>105,555</td>
<td>10,78,362</td>
</tr>
<tr>
<td>Beams, pillars, girders and bridge-work</td>
<td>10,597</td>
<td>1,11,169</td>
</tr>
<tr>
<td>Hoop</td>
<td>36,366</td>
<td>3,27,158</td>
</tr>
<tr>
<td>Nails, screws, rivets and washers</td>
<td>64,977</td>
<td>9,01,784</td>
</tr>
<tr>
<td>Pipes and tubes</td>
<td>53,077</td>
<td>7,42,009</td>
</tr>
<tr>
<td>Rice-bowls</td>
<td>64,762</td>
<td>6,74,627</td>
</tr>
<tr>
<td>Sheets and plates, galvanized</td>
<td>679,887</td>
<td>71,50,006</td>
</tr>
<tr>
<td>Sheets and plates, tinned</td>
<td>108,957</td>
<td>13,53,338</td>
</tr>
<tr>
<td>Sheets and plates, not galvanized or tinned</td>
<td>110,747</td>
<td>8,45,908</td>
</tr>
<tr>
<td>Wire</td>
<td>18,663</td>
<td>2,36,174</td>
</tr>
<tr>
<td>Other manufactures</td>
<td>56,847</td>
<td>8,88,050</td>
</tr>
<tr>
<td>Steel—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle, channel and spring</td>
<td>57,551</td>
<td>4,12,053</td>
</tr>
<tr>
<td>Bars</td>
<td>261,818</td>
<td>17,98,311</td>
</tr>
<tr>
<td>Beams, pillars, girders and bridge-work</td>
<td>187,249</td>
<td>11,63,024</td>
</tr>
<tr>
<td>Oast</td>
<td>9,333</td>
<td>1,29,208</td>
</tr>
<tr>
<td>Hoop</td>
<td>62,963</td>
<td>5,08,604</td>
</tr>
<tr>
<td>Plates and sheets</td>
<td>236,849</td>
<td>20,97,657</td>
</tr>
<tr>
<td>Other sorts</td>
<td>113,410</td>
<td>9,76,737</td>
</tr>
<tr>
<td>Machinery and mill-work (excluding railway locomotives)</td>
<td>...</td>
<td>1,01,81,087</td>
</tr>
<tr>
<td>Railway plant and rolling stock—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carriages, trucks, and parts thereof</td>
<td>...</td>
<td>20,11,988</td>
</tr>
<tr>
<td>Locomotive engines, tenders and parts thereof</td>
<td>...</td>
<td>8,31,149</td>
</tr>
<tr>
<td>Materials for construction—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rails and fish-plates of steel and iron</td>
<td>206,959</td>
<td>10,40,627</td>
</tr>
<tr>
<td>Sleepers and keys of steel and iron</td>
<td>21,352</td>
<td>1,08,342</td>
</tr>
</tbody>
</table>


If we assume that all the small sections, bars, rods, hoop, plates and sheets of iron and steel are taken by the smaller blacksmiths, we shall overestimate the amount of raw material handled by them, for we know that we have taken into account all the material they can use and that in reality a very considerable proportion of the material here specified is taken by the large engineering firms. On this assumption, the total amount of raw material taken by this class of workers in 1900-1 is 1,763,704 cwts. of the value of Rs. 1,54,32,928. We may estimate their total number as 90,380, and this gives us the amount of raw material consumed per head per annum by the workers in iron and steel on a small scale as 19.5 cwts. of a value of Rs. 170. This is an outside limit, and probably half this quantity would be nearer the truth.

We shall not be far wrong if we reckon that in large engineering works in Bengal, the value of raw material handled in a year by each worker runs from Rs. 600 to Rs. 1,000; and thus we see that the efficiency of a worker in a factory is, at least, six times that of the worker on a small scale in his own house.

V.—Statistics of the Industry since 1901.

Complete statistics cannot be obtained for years subsequent to 1901. Trade returns are available, but it appeared that a detailed discussion of the incomplete statistical data available would not give any adequate return. The chief feature has been the growth of engineering firms and factories. The rough figures with which I have been supplied show a very large increase in the number of hands employed in such works since the last census was taken.
CHAPTER III.

PRODUCTION OF IRON AND STEEL BY INDIGENOUS METHODS.

It has already been mentioned in the preceding chapter that the production of iron by the indigenous method is now practically extinct in Bengal. When the industry was in its most flourishing condition and what was the total output of iron for the province at this period we have no means of ascertaining. Before the 19th century we have no descriptions of the processes employed. Probably the first description on record is to be found in "the History, Antiquities, Topography and Statistics of Eastern India," compiled from the Survey Reports of Dr. Francis Buchanan, 1807—1813. Here a detailed account is given of the processes of iron-smelting as carried out by the Kols of the Bhagalpur district. In the forties and fifties a number of notes and papers were contributed to the Journal of the Asiatic Society of Bengal on the methods employed in various parts of the province. Kittoe in 1839 wrote on smelting in the Talcheer, Ungool and Dhenkennal States of Orissa (J. As. S. B., Vol. viii, p. 144); Babington in 1843 sent to the Asiatic Society a clay model of the smelting furnaces as used at the Kutterbagga mines, 20 miles north-east of Sambalpur (vide J. As. S. B., Vol. xii, p. 164); Welby Jackson in 1845 visited the Birbhum district and contributed to the Journal of the Society a short description of the smelting in this district with an opinion as to the quality of the iron produced (J. As. S. B., Vol. xiv, p. 754); and in 1854 Dr. Oldham communicated to the Society a note on the processes employed in the Rajmahal Hills (J. As. S. B., Vol. xxiii, p. 279). About this time the Court of Directors of the East India Company made some enquiries as to the mineral resources of the province. Dr. Oldham was asked to report on the Birbhum district (Selections from the Records of the Bengal Government, viii, 1853). And a report was also obtained of the iron smelting at Sambalpur (Dr. J. Shortt—Selections from the Records of the Bengal Government, Vol. xxiii, p. 184, 1855).

From these papers and reports we may gather that in the first half of the 19th century, iron smelting was carried on in Orissa, Sambalpur and the Bhagalpur districts by almost identical methods. The furnace employed was built of clay and was almost cylindrical, standing from three to four feet high with an external diameter of two to two and a half feet at the top and somewhat wider at the bottom, and an internal diameter of only a few inches at the top, increasing to about a foot at the bottom. A fire-clay pipe passing through the wall at the bottom served as a tuyere and the blast was supplied from a couple of bellows of a peculiar pattern which were worked by a man standing with one foot on each of the bellows and performing a treading action. The construction of this form of bellows will be described in detail later. The furnace was fed with a mixture of charcoal and ore and finally the iron was obtained at the bottom of the furnace as a semifused mass, which was extracted and refined by heating several times at an ordinary forge and hammering whilst hot to force out the slag contained in its pores. We learn that about 300 tons of iron per annum were produced in the Bhagalpur district, but no
estimates are given of the production in Orissa and Sambalpur. The iron smelting at Birbhum differed from the above, the chief difference consisting in the much larger size of the furnaces. Each furnace produced a mass of iron weighing 25 maunds, and Dr. Oldham estimated the total production of the district as 2,380 tons of crude iron per annum.

It was no doubt on account of the larger scale on which the smelting was conducted at Birbhum that the attention of Europeans was especially directed to this district. Soon after Dr. Oldham’s visit in 1852 a Calcutta firm, Messrs. Mackay & Co., started the smelting of iron in this district and erected for this purpose a furnace and plant on European lines. No doubt this furnace attracted the majority of the men who had formerly smelted iron by their own method; and when some twenty years later this enterprise was abandoned, the smelting of iron in the district appears to have absolutely ceased. Some drawings by Dr. Oldham of the native furnaces used in the Birbhum district have been reproduced in the Memoirs of the Geological Survey of India [Vol. xiii, Part 2, page 87]. The furnaces were about 7 or 8 feet high and 5 feet across. Their cross-section was not circular but D-shaped, the flat side being the front and at this side the blast was introduced through the tuyères. The bellows were of much the same pattern as in the other districts but larger, and several men were required to work them. The furnaces were built in a furnace-house and there was a platform round the furnaces on which was placed the fuel and ore and on this stood the workman who fed the furnaces with these materials. The forges at which the crude iron was refined by re-heating and hammering were necessarily large, as the mass of iron to be handled was large. Drawings of these forges were also made by Dr. Oldham. They have been described as furnaces, but from the drawings it would appear that they are merely forges with the back of the hearth built up in rather curious shapes.

In the seventies the mineral resources of the province were re-examined by the Geological Survey, and at this period we have a fresh crop of descriptions of the native processes of iron smelting [vide Mem. G. S. I., Vol. xi, 1874, Geology of Darjeeling District, by F. R. Mallet; Records G. S. I., Vol. viii, part 4, page 120, The Rajbarh and Hinjir Coal-field (Sambalpur), by V. Ball, 1875; Mem. G. S. I., Vol. xiii, part 2, page 87, Geology of the Rajmahal Hills by V. Ball, 1877]. A model of the smelting furnaces used in Chota Nagpur was sent to the London International Exhibition of 1874. Shortly after the appearance of the last of the memoirs above mentioned (in 1881), the third volume of “A Manual of the Geology of India,” dealing with economic geology, was published. This volume contains a useful summary of the papers hitherto published on the subject of iron smelting in Bengal, and in addition the author (Mr. V. Ball) describes in detail the furnaces and processes used by the Agarias in the Palaman subdivision of the Lohardaga district in Chota Nagpur. His description is illustrated by a photograph showing the smelting at work.

Since this date no further accounts of native smelting have been published with the exception of a paper in “The Indian Import and Export Trades Journal” for December 1900, which apparently gives a description
applicable either to the furnaces of Bengal or to those of the Central Provinces.

The district reports (1907) show that the smelting of iron from its ores is still carried on to a considerable extent in Sambalpur and to some extent in some of the Tributary States neighbouring on the district of Cuttack; the industry is almost extinct in Chota Nagpur and in the Sonthal Parganas, but is mentioned in the reports. In Birbhum there is no longer any smelting whatever, and no mention of smelting is made in any of the reports from the Bhagalpur Division.

I had the opportunity of watching (on the 18th April 1907) the process carried out by the Kols in the jungle at a short distance from Dumka in the Sonthal Parganas. It scarcely differed from any of the processes which have been in vogue for the whole of the last century in Sambalpur, Orissa, Chota Nagpur and the Rajmahal Hills. The furnace was built on a small hill under the shade of a banyan tree. It was made of clay and carefully dried before use. In form it was almost cylindrical, height 34 inches, outside diameter 26 inches at the bottom, 22 inches at the top, inside diameter at the hearth about 1 foot, at the top 5 inches. On one side a semicircular hole, 1 foot across, was made in the bottom of the wall of the furnace. Into this hole the tuyère was placed resting on a brick, the tuyère consisting of an already baked fire-clay tube 7 inches in length, about 1 inch across at the wider end and slightly conical. The tuyère was then surrounded by a mass of moist sandy clay, the hole in the wall being entirely filled up with this material. The bellows were then put in place. Each bellows consisted of a short cylindrical piece of wood 16 inches in diameter and 5 inches high, hollowed out from the top to the form of a pill-box, with a goat-skin tied over the mouth. Into the side of the cylinder was fitted a bamboo tube 3 feet in length and fitted at its further end with a small iron tube as a nozzle. Two such bellows were put in place with the iron nozzles pushed into the tuyère of the furnace and the bodies of the bellows close together so that the bamboo tubes were as near in line as possible with the tuyère. In the ground on each side of the furnace a pliant stake 8 or 9 feet in length had been driven. These were now bent over towards the bellows and to the stake on the left-hand side was fastened a string which was attached to the goat skin of the left-hand bellows so that the stake, trying to spring back into place, pulled up the skin on the bellows. The stake on the right-hand side was similarly attached to the right-hand bellows. The skins each had a perforation. Then a man standing on the bellows, with one foot on each, depressed the right-hand stake and at the same moment closed the perforation in the skin of the right-hand bellows with his foot and by means of his weight drove the air from the bellows into the furnace. He then leant over to the left and repeating the operations on the left-hand bellows sent a blast from the left-hand pipe into the furnace; and thus alternately he threw his weight from the right to the left in a series of operations resembling a man on the tread-mill and gave a fairly steady blast into the furnace. Plate VI, Fig. 1, is a photograph of the furnace here described, and Fig. 2 of the same plate is a diagram to show the various parts more clearly. The skins were from time to time sprinkled with water.
The furnace was filled with charcoal (the charcoal used was of sal wood, having been burnt in a hemispherical pit in the ground) and lighted and the blast started. At this time two dabs of vermilion were made on the wall of the furnace just above the hearth, apparently invoking the blessing of the gods on the smelting. Then the charcoal and ore were supplied from the top of the furnace in the proportion of one skip of charcoal to one measure of ore (the measure consisting of a broken earthen water-pot), the blast was steadily maintained and fresh fuel and ore were added as the previous supply gradually worked down into the furnace. The ore employed was a fairly pure haematite in small nodules showing a crystalline fracture. These nodules were crushed to a fine powder before use by an old lady belonging to the family of smelters. Carbon monoxide burnt with a blue flame at the mouth of the furnace and that a white heat was attained within the furnace could be seen by peering down the tuyère. After about half an hour a thin stick was pushed into the moist sandy clay wall surrounding the tuyère, and from the hole thus made a small quantity of slag poured out and solidified. Tappings of slag were made about every half hour. The slag was almost black and vitreous and on cooling generally splintered into a thousand pieces. The blast was continued until no more fuel remained, and, in all, probably 1 maund of charcoal and 20 seers of ore were used. This occupied from three to four hours. The blast was continued some time after all the material had disappeared from the top of the furnace; then the tuyère was removed, the sand, etc., brushed away from the hearth, the charcoals raked out from the furnace and quenched, and ultimately the mass of semi-fused iron was dragged out by tongs with long wooden handles, dragged on to the grass and very gently hammered to express some of the slag. Care was taken not to hammer out too much of the slag as the iron is sold by weight. The iron obtained weighed between 6 and 7 seers. The smelters said that this kutch iron sold at 20—25 seers for the rupee, so that the product of their labours was valued at 4 annas. They said that on being refined this would yield half its weight of puca iron.

With regard to the rationale of the smelting operation, from the appearance of the slag one would pronounce it to be chiefly ferrous silicate $\text{Fe}_2\text{SiO}_3$, and conclude that part of the ferric oxide, being reduced to ferrous oxide, acts as a base and combines with and removes the silica present in the ore as impurity. Thus the process is very wasteful and cannot give a good yield, but at the same time by using only the pure wood charcoal and adding no flux, the iron produced is almost sure to be of high quality, as there is no risk of introducing the objectionable elements, sulphur and phosphorus, along with fuel or flux. It would, however, be quite worth while to confirm this view of the composition of the slag by chemical analysis as it appears that no satisfactory analysis has ever been made of the slag from an indigenous smelting furnace in Bengal. Dr. Oldham (Mem. G. S. I., Vol. I, 1859) discussed the question, but admitted that no satisfactory analysis had been made. He wrote: "Unfortunately there have been no analyses of such products in this country sufficiently detailed to enable a sound opinion to be formed of the real composition of such slags." A rude analysis of slags resulting from similar processes, operating on very similar, though not quite so
siliceous, ores in Birbhum gave to Dr. McNamara 55 per cent. of iron in the slag with nearly 33 per cent. of siliceous matter together with a proportion of lime.

Two specimens of slag were tested, and the results were—

<table>
<thead>
<tr>
<th></th>
<th>Iron</th>
<th>Lime</th>
<th>Residue, chiefly siliceous matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1.—From sandstone ore</td>
<td>55·46</td>
<td>8·18</td>
<td>38·37</td>
</tr>
<tr>
<td>„ 2.—From haematite ore</td>
<td>54·00</td>
<td>8·43</td>
<td>37·57</td>
</tr>
</tbody>
</table>

and since that time no analyses of such slags appear to have been recorded.

As to the quality of the iron produced, the mass of iron on being cut with a cold chisel was seen to consist of a very considerable crust of brittle material, apparently almost entirely slag with an exceedingly slender mesh-work of iron, and an inner portion of tough, malleable iron. The brittle outer portion contained so little iron that it could not be worked up at the forge. The inner portion, however, was worked with great ease at the forge and welded perfectly, behaving as charcoal iron of the best quality.

In fact in all cases which have been observed in Bengal the product of the smelting has been soft iron. Thus of the iron produced at Birbhum, Dr. Oldham wrote: “The quality of the Birbhum iron, owing to the processes adopted and to its being smelted entirely with charcoal, is essentially different from that of English iron, and though not so valuable for the purposes above alluded to, such as railway works, is more so for other work in which toughness and malleability combined with softness are required.” The same geologist also described the iron produced in Orissa as “of excellent quality and highly prized for its tenacity. It is, in fact, like most of the iron produced by the native furnaces in India (when cleaned), charcoal iron of the best quality.” It is true that the crude iron has sometimes been described as brittle; thus Kittoe said of the iron produced in Orissa: “Some of the iron is of a superior and malleable quality, but much of it is very coarse-grained and brittle.” This is explained by the remark of Dr. Oldham: “The iron thus produced by the first process has never been thoroughly fused. It is brittle, owing chiefly to the impurities mixed with it; but these by the continued exposure to the direct action of the blast in the open furnace in which it is cleaned are either melted or burnt out and the repeated hammerings remove the impurities.” This writer left the point somewhat vague as to whether the impurities causing the brittleness of the crude iron were eluted out or burnt out in the refining. The brittleness is, however, quite sufficiently explained by the large amount of slag mechanically dispersed throughout the mass of the crude iron, and it is unnecessary to suppose that the crude iron contains any impurities (such as carbon) which must be burnt out. If an attempt were made to uphold such an hypothesis, it would be difficult to explain the ease with which practically all the carbon can be
removed during the refining process, and in the sample which I have
myself examined I noticed that the inner core of the crude iron which was
comparatively free from slag was tough and malleable before it was sub-
jected to any refining process.

In the Geology of India, Vol. III, page 340, Mr. Ball makes a
remark which appears to me distinctly misleading. He says: "Lastly, it is
distinctly stated that in the large furnaces in Birbhum the iron was
produced in a fluid condition and was run into pigs, which were subse-
quently converted in open hearths into malleable iron." But by carefully
consulting all references to the Birbhum native smelting processes, I can
find no such statement: in fact Welby Jackson remarked that the iron was
taken out in a mass from the bottom of the furnace. It is true that the
furnaces set up at Birbhum by Messrs Mackay & Co., of Calcutta, produced
iron which was poured into pigs, but these furnaces were a European
concern European using methods.

There is, in fact, no recorded observation of the manufacture in
Bengal by native methods either of cast iron or of steel. As to whether
cast iron was ever produced by native methods in this province, I am not
certain; but there appears to be no reason to doubt that steel was produced
here, though why the art has been so completely lost is difficult to under-
stand. It is not probable that the large quantities of steel required to make
swords and spears for the rank and file of the large armies maintained in
Bengal from 1500 onwards would all be imported. Mr. Mallet in descri-
bing the Geology of the Darjeeling district (Mem. G. S. I., Vol. xi,
pt. I, 1874), mentions the smelting of iron at Sikhbar, a place to the
east of the Tista, 5 miles south-east of Kalimpong. He says: "The
micaceous hematite is not used as it is said to yield a soft iron unsuited
to the manufacture of knives. The magnetite is well suited to native
furnaces. The Kamis assert that it yields a steely iron peculiarly well
suited for making kukris and bans." At the present day the kukris obtainable
in Darjeeling which come from Nepal are said to be made of steel
manufactured in Nepal; and a Kami in Darjeeling who made kukris
assured me that for work of the highest class he only used steel which
was brought from Nepal. It does not appear improbable that at the
time of Mr. Mallet's visit a small quantity of steel was made at Sikhbar
by the Nepalese Kamis according to methods introduced from Nepal.

In the district report from the Sonthal Parganas, the manufacture
of steel in this district in former times is spoken of as a well-known
fact: "The manufacture of steel also has died out owing to the disuse
of weapons among the Sonthals and the introduction of imported steel.
The famous Sonthali bullet-proof shields can no longer be manufactured."

In the Rajmahal Hills and the Sonthal Parganas, the iron-smelters
belong to the tribe of Kols. (The man shown
smelting (according to indi-
genous methods) in Bengal. Nagpur also a few Kols are occupied in the
smelting. The exact relationships and history of the Kols it is difficult to
give. They are undoubtedly an aboriginal tribe and closely related to
the Sonthalis. According to some authorities the term Kol or Kolarian
may be applied to quite a number of tribes in Chota Nagpur and the
Rajmahal Hills, including the Mundas, the Hos or Fighting Kols, the
Bhumij Kols and perhaps the Sonthalis. Their language has affinities to Canarese and Tamil, as also has the Sonthali dialect. In facial appearance the Kols and Sonthalis are very similar. In the Sonthal Parganas at the present day the Kol smelters appear to be rather looked down upon by the Sonthalis, who will not work in iron. The smelters in this district in fact appear to possess little spirit. They were described by Francis Buchanan in 1807 as very ignorant timid creatures. Whether the Sonthali looks down upon all Kols, or only considers himself superior to the Kol smelters, I cannot say, but according to an old fable the boot would appear to be on the other foot. This fable relates the origin of the different races. Sing Bonga, or God, created a boy and a girl who grew up to be man and woman, and some time after they had lived together and known each other, Sing Bonga came down and asked them what progeny they had; they said unto him, "Grandfather, we have twelve sons and twelve daughters." These twenty-four lifted up their voices and said, "Great grandfather, how can we brothers and sisters all live together?" Sing Bonga said, "Go you and make preparations and make a great feast, rice and buffaloe's flesh, and bullock's flesh, goats, sheep, pigs and fowls of the air, and vegetables;" and they did so, and when the feast was prepared Sing Bonga said, "Take ye two by two, man and woman, that which shall please you most, and that shall ye have for share, to eat all the days of your life, apart from the rest, so that none shall touch his brother's share." And so when the feast was prepared, the first pair and the second pair took buffaloe's and bullock's flesh, even as much as they could carry; and these became the Kol and Bhumij race; then a pair took the rice; and other pairs, male and female, rice and vegetables, and these became Brahmins, Rajputs, Chutries and other Hindus; and others took away the goat's flesh and fish, and became other kinds of Hindus; the Bhooians took the shell-fish. Lastly, when nothing was left but the pig's flesh, came two pairs and took it away, and these are Sonthais and Koornoes to this day; and when all the feast was cleared away there remained one pair who had nothing, and to them the Kols gave up their share and these are the Ghasses to this hour.

Another story related by the Mundas appears to indicate at the same time the close relationship between the Mundas and the Kol smelters and the antiquity of the smelting industry among these tribes. It is a curious version of the Fall of the Angels. Once upon a time, heaven was peopled by a race of divinities who were attendant on Sing Bonga. One day they happened to come across a mirror, and seeing their faces for the first time found they were made in God's image. Inflated with pride at this newly discovered knowledge they refused further service, declaring themselves the equal of God himself. They were promptly expelled from heaven and cast into the lower world known to the Mundas as Temsi Firhi Ekaibisah. In these lower regions they came across large quantities of iron ore and at once made furnaces and started work smelting it . . . (for the completion of the story see "Chota Nagpur" by F. B. Bradley-Birt).

There is no mention of any particular tribe being employed in the smelting industry in Sambalpur and Orissa, although it has been stated that the smelters are a distinct class and live in separate villages. They
are undoubtedly of Dravidian origin and probably closely related to the Kols of Chota Nagpur and the Southal Parganas.

Although, as already stated, a few Kols in Chota Nagpur are employed in smelting, the chief workers in this industry in this division are the Agarias and the Lohariahs. The Agarias are otherwise called Aparias, Agariahs, Agorias, Agiyas and Asurs. These people live mainly in the upper valleys of the Damuda and Karampura, whilst the surrounding uplands are occupied by Kola and Uraons and the lower valleys of the rivers by Bengalis. They are not related to the Dravidian aboriginal tribes and are probably of Aryan (Hindu) stock. They are miserably poor and their condition is altogether most wretched. They are dependent on the Bengali money-dealers for advances to enable them to follow their calling and are thus virtually the slaves of these capitalists. The Agarias smelt only the crude iron, and this is passed on to the Lohariahs to be refined and made ready for the blacksmith's use. The origin of the name Agariah is somewhat obscure. According to one theory, Ag = fire, Aguri = firemen. According to a second it is a term of reproach used by the Hindus (A = a negative particle, gura = gods), whilst a third theory makes the name almost a term of admiration given by the non-Hindu tribes in consequence of the skill of the Agarias at their trade (Asura a name for God).

The Lohariahs are also a very low class of Hindus.

The workers at Birbhum were quite different from the smelters in the neighbouring Rajmahal Hills, for Dr. Oldham tells us the two operations of smelting and refining were carried on by two totally different sets of people and, what is curious, by people of different religions, those who reduced the ore in the first instance being invariably Mussulmans and the refiners invariably Hindus.
CHAPTER IV.

THE VILLAGE BLACKSMITH AND HIS METHODS.

The typical blacksmith in Bengal is a Hindu of the kamar, karmokar or lohar caste, the caste for which blacksmith's work is the traditional occupation. The figures which have already been given in Chapter II show the preponderance of the kamar caste over all others in the blacksmith trade. The special caste of kamar or lohar is not mentioned in Manu's Code. At this time there were only four proper castes,—the Brahmins, the Kshatriyas or military class, the Vaisyas or merchants and the servile class of Sudras. The Sudra, whose duty was primarily to serve the other classes, might, if other employments failed him, subsist by handicrafts. Besides the four proper classes, a long list of names is given in the Code for the progeny of alliances of one caste with another, or of one of a pure caste with one of a mixed caste, and in many cases artisan employments of definite kinds are allotted to the mixed castes; but it is curious that such an important trade as the blacksmith's is not specifically mentioned. In Bengal at the present time the Baidyas or medical caste come immediately below the Brahmins, then the Kayasthas or writer caste, and after these come nine divisions called the Nobo Sak, i.e., the gopa or cowherd, the mali or gardener, the tait or oilman, the tantris or weaver, the modaka or confectioner, the vayiya or betel cultivator, the kulula or potter, the karnakara or smith, and the vapita or barber. From these nine castes a Brahmin can accept water. Below these come numerous castes, such as the kaivarta or fisherman, sauvarnabani or goldsmith, etc., from whose hands the Brahmin cannot take water. The transition from the old caste system of Manu's time to the present one has been gradual, and it is impossible to say when the caste of kamar was first definitely formed and how it is related to the castes of Manu's time. The probability is that the kamars trace their descent from one of the mixed classes, though there is the other possibility that they may be pure Sudras. The family names most common among the kamars of Bengal proper are Pal, De, Das and Dutt. In Bihar the term lohar is more frequently used than kamar. The district report from Khulna says that the kamars (blacksmiths) are divided into four classes, viz., Jassor, Chogali, Saptgains and Mamobaday.

Nowadays there are Hindus of many other castes who have taken up blacksmith's work, e.g., milkmen and carpenters, and the district report from Burdwan mentions that in the cutlers' shops of that district Brahmins and Kayasthas may even be seen at work grinding and polishing knives and scissors.

In Bengal there is not that clear distinction between the castes which may be found in other parts of India, and it would be very difficult, if not impossible, to distinguish a kamar or lohar from his facial characteristics. The men shown in Plate VII, Fig. 1, Plate VIII, Fig. 1, and Plate IX, Fig. 1, are typical lohars and kamars.

The district report from Burdwan remarks that the trade of a blacksmith or cutler is certainly unhealthy; that the blacksmith lacks the brawny arms and massive chest of a typical smith, is light of build and pale
of complexion, his face bearing traces of organic weakness. These remarks are equally true of the blacksmith throughout the whole of Bengal.

It is very rare to find a Muhammadan blacksmith in any part of the present Province of Bengal. There are many Muhammadans employed in the large engineering firms of Calcutta; and an industry which it is difficult to class, viz., the small industry which has recently sprung up for the manufacture of steel trunks, appears to owe its birth in Patna to Muhammadans from Allahabad. In the course of a tour over a considerable part of Bengal I made constant enquiries for Muhammadans carrying on the ordinary work of village blacksmith, and only in Murshidabad was I able to find a single Muhammadan blacksmith and his sons. This man had come in his youth from the Punjab or the United Provinces with a regiment which had been stationed at Berhampore.

In the Darjeeling district are to be found Nepalese blacksmiths. They are called kamis and form one of the lower castes of Nepalese.

The most common type of blacksmith—the man who has not specialised in any branch of his trade—requires next to no tools or outfit. He has his hearth, and bellows to supply a blast to the fire, and he has an anvil, a few pairs of tongs and a few hammers. A cold chisel may complete his most slender equipment. His work is entirely carried on in a small shanty not more than 10 feet by 10 feet. The hearth (ha'far) is generally on a level with the floor of the shanty. At the back of it there is built a small wall of mud, generally from 6 inches to 1 foot high and from 1 to 1½ feet long. Through this wall or slightly sunk in the ground below it, there passes an iron pipe carrying the blast from the bellows. The bellows (bhatli, bhanti) are like magnified English kitchen-bellows. The upper board is fixed whilst the lower board is moved up and down by means of a wire, chain or rope which is fixed to one end of a lever. The fulcrum of the lever is provided by a horizontal bar either supported by two upright posts or by one post on the one side and the wall of the shanty on the other. The other end of the lever comes almost over the hearth and to it is attached a chain. The blacksmith squatting by the hearth and handling the piece of iron in the fire with a pair of tongs (sauresi sanso) with the one hand, with the other pulls the chain and works the bellows. When the piece of iron has been sufficiently heated it is withdrawn by the tongs from the fire and hammered into shape at the anvil (nhyay, lehai, lehi). The anvil is frequently of English pattern and obtained from Calcutta (imported). Sometimes an old piece of steel rail serves as a small anvil. The hammers used are of various shapes and known as marto, hathuri or hathuli.

The construction of the hearth varies a little within the limits of the province. Sometimes besides the wall of mud already mentioned at the back of the hearth there may also be built another small wall running parallel to this at the front, or again these walls may be built of loosely piled bricks (as at Burdwan) and be as much as 1½ or 2 feet high. Again, the whole hearth may be raised to a height of 1 or 2 feet and the raised hearth may or may not be bounded by higher walls. Plate VII, Fig. 1, shows a blacksmith's shop of the simplest type. In this case a few loose bricks are piled on either side of the hearth. Undoubtedly the nearest
arrangement which I have seen in Bengal was at Dubrajpur in the Birbhum district (Plate VII, Fig. 2). Here a considerable part of the floor of the smithy was raised to a height of 1 or 1 ½ feet, the raised platform being made of mud supported at the sides by stakes. The hearth was built on this platform and was surrounded by four mud walls rising as a sort of furnace 2 ½ or 3 feet high with a base 18 inches square. The front wall had a small hole in it, whilst the side wall was almost cut away by an arched opening through which the work was manipulated in the fire. This rectangular structure was finished at the top by an arrangement which could best be likened to the upper part of a large earthenware jala. Alongside of the hearth on the platform was a seat for the smith, several anvils and several hemispherical bowls sunk in the platform containing water for quenching and tempering; and all arranged on the platform within the most convenient reach of the smith. This was in marked contrast to the ordinary smithy which is grimey, littered with all kinds of odds and ends, and apparently with no order or arrangement whatever.

The smith who finds his occupation in making the iron-work for bullock-wagons or gharis needs a little more space and has generally a kind of yard adjoining the smithy. He needs to store a considerable quantity of iron bar for the tyres of the wheels and he needs a circular pit for the operation of tyring the wheels. This is effected in the usual way by heating the tyre until it fits easily on to the wheel and then quenching it in position.

The preparation of knives, scissors and razors is rather a special branch of the blacksmith's trade. We may call the blacksmith employed in this work a cutler. He requires the usual hearth, bellows, anvils, hammers, tongs and chisels and in addition he requires water for tempering his blades (pan, pahin-halno), vice (bice, pakawasi), file (ret, ooga), drills (bhumar), grindstone and polishing wheels (san). The water for quenching or tempering the blades may be contained in a trough sunk in the floor of the shop or in any handy vessel, such as an old tin canister. In the Darjeeling district a vessel for holding the water is made of bamboo. Some of the smiths recognise the delicacy of the operation of tempering. Probably the best Darjeeling kukris are made of steel which equals or excels in quality any other steel goods produced in Bengal, and the kâmi recognises something of the delicacy of his operations. For the best work he uses only charcoal as fuel for his hearth and he considers the tempering of his blades an operation requiring care and skill. The grindstones and polishing wheels are characteristic tools of the cutler's shop. They are made of sand and lakh or fine grit and lakh, and as generally seen are discs about half an inch thick and about 1 foot or 1½ feet in diameter mounted on a wooden axle or spindle 3 to 4 inches in diameter. The spindle is mounted horizontally in a shallow pit and a deeper pit is cut to accommodate the disc. The disc is made to revolve by a cord passing over the spindle. The cord is often worked by hand or may pass over a large driving wheel worked by a treadle (see Plate IX, Fig. 1). The district report from Burdwan contains an interesting account of the work in probably the best cutlery shops in Bengal:

"The blade of a knife, or scissors, is first of all fashioned by the blacksmith. His implements are an anvil, bellows, a hammer, chisel, and a pair of pincers. He
heats the iron or steel in the furnace and beats it to the required shape and size on the anvil. A skilful blacksmith can thus fashion 72 knife blades during the course of the day, two inches to three inches in length, by a quarter of an inch in breadth. The blacksmith hands the rough blades to the grinders and polishers.

"There are two kinds of hones for grinding and polishing and sharpening blades. The first is of ordinary sand found on the banks of rivers and is used for rough work. The second is of very fine grit, obtained by crushing what appears to be a very close grained sandstone, called locally 'kruish pithar.' As all the specimens were gritty and discoloured, I was unable to identify them satisfactorily. The sand is mixed with jalk, the proportion being one seer of sand to a quarter of a seer of jalk. The ingredients are placed over a fire and mixed. The artizan then shapes his wheel on a board with his hands. The solid wheel is about 15 inches in diameter, and its polishing edge is about a quarter of inch in breadth. The polishing wheel of stone grit is made in practically the same way. The 'kruish pithar' is first of all crushed very fine; it is then carefully strained through a cloth, and only the finest grit is mixed with the jalk, in the proportions already indicated. The wheels are then fixed to a wooden pole about 12 inches in girth and about 2 feet in length. This pole passes through the centre of the wheel, and when force is applied, revolves with the pole. A hole is dug in the floor of the workshop, and the pole and wheel are fixed horizontally so as to allow them to revolve easily. The wheel is of course vertical to the pole. The driving power is applied by another wheel 3 or 4 feet in diameter fixed about 10 feet away. A belt of thin rope passes over the indented rim of the driving wheel and round the pole of the polishing wheel. The driving wheel is worked, as a rule, after the manner of a tread mill, and enables the operator to revolve the polishing wheel with considerable force and rapidity. The iron driving wheel is of European manufacture. Wooden ones made locally are now very rarely used, the European article being more durable and efficient. The cutler squats on his hams over the revolving polishing wheel. He takes the knife or scissor blade in both hands and applies it to the revolving edge of the polishing and sharpening wheel, dipping the blade in cold water, whenever it becomes too hot to hold. The skilled artisan does the preliminary polishing and grinding on the sand wheel. He then makes the blade to a confrere who proceeds to apply it to the 'kruish pithar' polishing and sharpening wheel. When the blade is sufficiently sharp and polished, it is handed over to another artist, who fixes it in a vise, drills the necessary holes, shapes the brass, horn, or ivory for the handle, and fixes the blade thereto. The brass is in thin sheets, and is readily cut with a pair of steel shears made in the workshop. The horn, or ivory, is cut with a saw made locally or imported. It is shaped with a file and fixed to the blade. The horn or ivory is also highly polished by rubbing it in a mixture of brick dust, charcoal and oil. Finally, the knife is again polished on the 'kruish pithar' hone. Inaccuracies of the handle and springs at the back are also ground away, and the article is now bright and beautiful, and ready for sale. In the case of a highly skilled artist the polish is mirror-like, and equal to that of the imported article; the edge is also equally keen and fine. The operation in the case of a scissor blade is somewhat different. The blade and thumbring are polished and rounded on the revolving hones. The blade is then fixed in a vise, and the operator proceeds to polish the ring, and the lower parts, with an instrument called a 'maskolla.' This is a somewhat flat blade of steel rounded at the edges and point and fixed to a wooden handle shaped thus:—

![Image of a scissor blade]

"It is made locally. This instrument is rubbed forcibly against and all round the ring and lower parts of the scissor. It gives the finished article a very high degree of polish, making it smooth and easy to the fingers. The holes for screws and nails are drilled with an instrument called a 'bhumar.' This is a steel drill made in the workshop; it is 2 or 3 inches in length and is fixed to a round wooden
handle about 8 or 10 inches in length. It is a pointed instrument, and when worked with a bow rapidly bores its way through brass, horn, ivory, iron and steel.

"In the case of the razor blade the process is identical. The blacksmith gives it birth on the anvil; it is then passed over to the polisher and the driller. But very few artizans make razors, and only one or two cutters lay claim to be able to fashion razor blades of superfine quality. The brittle nature of the steel, and the delicacy of the blades, demand an exquisite judgment and gentleness of touch on the revolving hone. A good razor blade has also to be manipulated with great patience; the skilled artizan working from morning till evening cannot turn out more than two such blades a day: and his profit is not more than 4 annas per rupee. The price of these blades varies according to size and quality from Rs. 1-4 upwards."

"It may be observed that horn and ivory are scraped with an instrument called a semiar. This is a four-cornered piece of steel, 3 inches in height, fixed to a wooden handle. The final polishing is done with brick-dust, charcoal and oil.

"The revolving wheels last a month and a half in the case of the sand wheel and 3 months in the case of the 'kruish pathar' wheel. In large workshops half-a-dozen such wheels may be seen spinning, so that the blacksmith is frequently under the necessity of making fresh ones.

"Dies for stamping the artizan's name on the heel of the blade are made of steel locally; and I have no doubt that an usurpulous artizan is able to forge the trade mark and name of a European cutler."

In some parts of Bengal there are a few smiths who can chase ornamental patterns on the blades of knives, e.g., the Kâmi of Darjeeling can ornament the blade of his kuku'r and in Dubrajpur ornamental sacrificial knives can be obtained. The pattern is chased on the blade when it is in the annealed state by means of a fine, hardened chisel and a small hammer. A certain amount of brass inlaying on such ornamental knives is also done. The pattern is first chased and the brass is then brazed in.

A specialised class of workers are the gun-makers of Monghyr. There are a few other gun-makers scattered about in Bengal, but Monghyr is quite a centre for this work. Here there are 13 gun-makers' shops and 700 to 800 guns are produced annually.

Gun-barrels of three kinds are made, viz., plain, marked with simple twist (mouw), and damascened. The simple twist is a more or less regular spiral mark running round the barrel, the marking being in the metal just as in damascened work. The damascened barrel is marked all over with small spirals of about ¼ inch diameter. To make a plain barrel a piece of Swedish iron bar is taken and hammered into a strip about 6 feet long, 1 inch wide and ½ to ⅛ inch thick. This is then hammered into a close spiral such as would be formed by winding the strip round a straight rod. Neighbouring coils of the spiral are touching. Thus a rough tube is made, the bore being considerably less than required in the finished barrel. By heating and hammering the coils of the spiral are welded together and the wall of the tube has now become solid. To prevent the iron being spoilt by so many heatings it is generally covered with mud before being put in the fire. In forging the ends of the tube a mandril is inserted into the bore to prevent the lumen closing up. The tube is now bored, and for this purpose an implement is used which may be likened to a large railway carriage key [Plate VIII, Fig. 2 (d)]. The barrel is fixed firmly in position passing through a hole in a large post which is itself firmly fixed in the ground. A man now inserts a borer of small bore into the barrel and gradually bores through the barrel. This operation scrupes the sides of
the lunen and makes the bore slightly greater and more uniform. A slightly larger borer is now inserted and the operation repeated and gradually the bore is made larger and more uniform until the desired size is attained. This operation must be done gradually and generally takes a man three days (Plate VIII, Fig. 1, shows the operation of boring). The outside of the barrel is now filed up to the desired shape. To make a barrel with the simple-twist marking, a number of strips of Swedish iron, say about \( \frac{1}{2} \) to 1 inch wide, \( \frac{1}{2} \) inch thick, and 8 to 10 inches long, are laid alternating with the same number of soft steel strips of the same width and length, the steel used for this purpose being the bands taken from bales of imported cotton goods, etc. About 16 of these strips are piled together and held together by a soft iron strip which is welded round them. We thus have a bundle about 8 or 10 inches long, 3 inches wide and \( \frac{1}{2} \) to 1 inch deep showing the edges of the 16 strips at what may be called the surfaces of the bundles. Several such bundles are displayed in the photograph [Plate VIII, Fig. 2 (b)]. This will make their structure more easily understood. This is now heated and gradually hammered into a strip about 6 feet long, 1 inch wide, and \( \frac{1}{2} \) to \( \frac{3}{4} \) inch thick in such a way that the lines along which the alternate layers of iron and steel have welded run the length of the strip [Plate VIII, Fig. 2 (a)]. This strip is now welded with one of soft iron of similar dimensions and the strip thus obtained is used for making a barrel in the same way as described already for the preparation of a plain barrel. Of course the composite layer is kept outermost. To make a damascened barrel a number (say, 8) of composite strips are prepared in the manner already described, but they are made of smaller size. Each strip is then twisted many times until it looks like a long screw, say 3 feet long \( \frac{1}{2} \) inch diameter and with a \( \frac{1}{8} \) inch pitch. These eight screw-like rods are tied together [Plate VIII, Fig. 2 (c)] and forged out into a long strip about 1 inch wide and \( \frac{1}{4} \) inch thick. This is welded to a soft iron strip of similar dimensions and the composite strip is made into a barrel in the way already described. Of course here also the composite layer is kept outermost. After the barrel has been filed up true and polished on the outside, the markings are brought out by the application of a solution of chemicals known as "English mixture."

The guns usually produced are single-barrel muzzle-loading 12-bore shot guns fired by a cap, the cap-nipple being at the side of the breech-piece. The breech-piece is forged and filed out of one piece of soft iron and is quite a complicated piece of work. This is screwed on to the barrel, the screw thread being made by English taps and dies.

The largest shop in Monghyr belongs to one Burri Mistri, who is somewhat more advanced than the rest of the gunmakers. He can make a very good imitation of almost any gun you will give him—double-barrelled breech-loaders with choke-bores, etc. I noticed in his shop a tool for finally polishing the interior of the barrel which was very similar to the tool used at the Government Small Arms Factory at Ishapore for the same purpose, viz., a hard steel tool with a rectangular polishing edge which is packed with pieces of horn, paper, &c., to fit the bore. He can "blue" plain barrels, and temper the lock, triggers, &c., so that they show a play of colours. The locks are generally chased with ornamentation after English patterns, and I saw many samples in
Burri Mistri's shop which were very fine copies of the pattern from which they were taken.

Lastly, we may describe the methods of the worker in iron plate, and take as a typical instance the making of a ghara or gagra, a vessel used for drawing from the well or for carrying water.

This vessel is represented in Plate IX, Fig. 2 (1). It is seen to be built up of several zone-like strips of sheet-iron rivetted together. The sheet-iron is marked out by a compass [same figure (11)] and cut out by a chisel, and the various zones are hammered until they have assumed their proper curvature by means of a wooden mallet (5 and 6) on an anvil with a concave surface (3). The various zones are put together temporarily and the position of the rivets decided upon and marked. The various pieces are then punched separately and rivetted together in the cold by small rivets made from a thin rod of soft iron. The edges of the various segments are well hammered before they are put together, and after the rivetting the line of junction of two pieces is very vigorously hammered to make a tight joint. For rivetting frequent use is made of the iron clubs (2). These are firmly fixed in the floor of the shop. The ghara, even when nearly complete, can be put over one of these clubs, the head of which forms a hard smooth round surface against which the rivet may be driven home. An awkward rivet just in the last stages may be sometimes driven home by the small club (12) or (13) held in the hand inside the ghara whilst the outside is pressed against the concave anvil. By way of ornament circles are drawn round the ghara by a compass with a chisel-like point (11). The neck is put on last and consists of two sheet-iron collars and a forged iron ring. It would be difficult to explain its structure in words, but this may be readily understood by the sectional drawing (4).

Almost without exception, the iron and steel used by the blacksmiths come from Calcutta, being imported from Europe, chiefly from the United Kingdom and Belgium. In Sambalpur, the native iron is still used and perhaps in parts of Orissa, Chota Nagpur and the Southal Parganas to a very limited extent. In the Darjeeling district steel from Nepal is said to be used for the best kukris. The bulk of imported iron used by the native blacksmiths is in the form of bar, rod, sheets and plates. Mild steel bar is also used to a considerable extent. Of late years, a large proportion of the imported steel of this character has been supplied from Belgium. The mild steel bands used for bales of imported cotton goods, &c., and which are available everywhere as a kind of waste material are largely used. As special qualities of imported material used for special classes of work may be mentioned the Crown Swedish iron used at Monghyr for gun-barrels, and the cast-steel of W. K. Pearce of Sheffield, used for cutlery at Bardwan. The smaller cutlers frequently use old files as steel for their knives and scissors.

It is scarcely possible to make any general remarks as to the price of these raw materials, as the price at any place will depend on the Calcutta rates, on the distance from Calcutta and on the quantities taken by that place. The price of iron and steel in Europe for the last four or five years has remained fairly steady, but within the last few years the war in shipping freights from the United Kingdom and Belgium to Calcutta must have caused
unusual and abnormal changes in the Calcutta rates. Belgium has also of late years been "dumping" steel in large quantities into Calcutta. We may take the rates in 1901 as being more normal than those of the last few years. In this year the average Calcutta rates were roughly Rs. 4.8 per maund for iron bar, Rs. 5.5 for iron sheets and plates not galvanised or tinned, Rs. 5 for steel bar and Rs. 6.2 for steel plates and sheets. At the time of my tour (April 1907) enquiries from the blacksmiths themselves showed that the rates in all the larger cities were much the same, e.g., about Rs. 4.8 per maund for iron bar. In Dumka as might have been expected the price was said to be a little higher, viz., Rs. 5. The rate supplied to me at Darjeeling was probably erroneous as it ran to Rs. 8 per maund. The smelters in the Sonthal Parganas valued their kutcha iron at 20—25 seers per rupee, and said that 2 seers of kutcha iron would give 1 seer of refined iron, making the value of refined native iron Rs. 3.4 to Rs. 4 per maund in the form of bar. In Darjeeling the prices I was given for cast-steel for cutlery appeared excessively high, viz., Rs. 20 to Rs. 30 per maund * for European material and Rs. 40 for Nepal steel.

* This price was also quoted in the Darjeeling District report.

By far the larger number of blacksmiths, the makers of rough agricultural implements, work by themselves in their own homes without any assistance. The women-folk never appear to render any assistance except in the Darjeeling district. Nowadays the finished goods are generally sold for cash. The district report from the 24-Parganas states that the cultivators who are the chief customers of the blacksmith pay him either in cash or kind or sometimes in both. Solid mass iron from Sambalpur is on rare occasions accepted by salt merchants from Cuttack who take it in return for salt. But although the blacksmith himself buys his raw material for cash and sells his finished articles for cash, yet he generally only works to order, not having sufficient capital to lay in any considerable stock of iron. The earnings of such a worker may run as low as 2 annas per diem and as a rule do not exceed 4 annas. The dealers in hardware in the larger towns are men with a certain amount of capital and they will place orders with the small blacksmiths round about. In such cases of course the blacksmith loses the middleman's profits, but he may be assured of a steadier demand for his goods.

Workers producing a finer quality of goods, such as cutlers, naturally earn a somewhat larger sum than their less skilful fellow-craftsmen. From eight annas to one rupee or even two rupees (Bankura) per diem may be earned by this class of workers. Frequently too this higher class of work is carried on in larger shops and the workers are the employees of the master cutler. Such daily workers will earn from Rs. 10 to Rs. 20 per mensum or even Rs. 30 may be paid for a skilful polisher.

An interesting system somewhat analogous to co-operation is reported to be in vogue to some extent in the Sonthal Parganas. The blacksmiths often group themselves into a band of six men to conduct a workshop conveniently situated under a grove or a shady tree in the village, while another man supplies the implements and capital. All the six men go on working the whole day, and out of the seven articles manufactured, each of the labourers gets one, while the seventh one is given to the man who supplied the implements and capital.
CHAPTER V.

THE VILLAGE BLACKSMITH'S PRODUCTIONS.

In this chapter the more common articles of iron made by the native blacksmith will be briefly described. Many of these are figured in the accompanying plates, and these figures will, it is hoped, make a long verbal description unnecessary. Many of these articles have somewhat different names in different parts of the province. In all cases the most common name has been given, and when any quite different word is also used the locality is mentioned in which this second name is in vogue. For convenience of description the following classification will be adopted:-

(I) Agricultural implements, tools, &c.
(II) Cooking utensils and other articles of domestic use.
(III) Tools and other articles used in various handicrafts and professions.
(IV) Weapons.

(I) AGRICULTURAL IMPLEMENTS, TOOLS, &C.

First in importance among agricultural implements stands the plough. In all parts of Bengal this is made entirely of wood with the exception of an iron tip for the share. Quite generally—in Bengal proper, in Behar, in Orissa,—this iron tip [phāl or phār; longal miha (Orissa)] is a straight piece of iron 1 foot long, 1 inch broad, \( \frac{3}{8} \) inch thick, and sharpened at the ends (Plate X, Figs. 1 and 2). It fits into a groove chiselled out for it in the upper surface of the wooden share and projects a little at the tip. It is held in place by one or more iron staples. In Murshidabad and in Bardwan I saw another type of plough-iron (Plate X, Fig. 3) in shape somewhat like the head of a spear, about 14 inches long, pointed at the tip, broadening to about 2\( \frac{1}{2} \) inches in width and then narrowing rapidly (to form a part corresponding to the spear shaft). This iron is also about \( \frac{1}{2} \) inch thick and fitted in a groove on the upper surface of the share, being held in place by a staple driven over the narrow portion.

There is very little iron work about the ordinary bullock-cart. The axle is of iron and there is generally a sort of iron collar (called pandari in Orissa) fitting in the hub of the wheel and forming an axle-bearing. This collar is made by welding together two pieces of iron of this shape — . The hub is frequently bound with two or three thin iron or steel bands. The wheel is retained on the axle by an axle-pin and there are one or two washers which prevent the axle-pin from cutting into the wood-work of the hub. These various parts are shown in the drawing of the hub of a cart-wheel (Plate X, Fig. 5). The wheel has invariably an iron-tyre (hal). It has already been mentioned that the making of tyres for bullock-cart wheels forms a considerable part of the work of village blacksmiths. Except for the axle and wheel the bullock-cart is, as a rule, made entirely of wood. Sometimes the yoke is fastened to the shaft by an iron pin, and sometimes at the ends of the yoke there are iron-hooks to which parts of the harness are attached. Yoke-hooks of the form shown in Fig. 4, Plate X, appear to be characteristic of the Bhagalpur division. They also are apparently termed hal.
Horses and bullocks are shod with iron shoes (nal). As a rule the shoeing of horses and bullocks is a separate branch of the blacksmith's trade and the farrier is called nal-band.

For digging the earth the implement invariably used is the kodali. (In Orissa the name kodai is given to an implement of this kind, and apparently fonda, kori and kuri are tools of the same general character.) The kodali is the implement which takes the place of the spade. The blade is of the same shape and size as that of a spade, but the handle is affixed so that the implement is used in the same manner as a pick or adze (Plate X, Figs. 6 and 7). It is said that on the introduction of the spade by a European planter the natives could not be made to use it except in the manner of a kodali, one man driving in the spade and holding the handle whilst another standing in front lifted the earth by means of a rope attached to the handle low down near the blade. The kodali made by the village blacksmith is of soft iron as a rule and the socket for the handle is very massive and clumsy. Nowadays many kodalis are manufactured in Europe and imported into this country—I have seen many kodalis made by the firm of John Perks & Sons of Wolverhampton. Such imported kodalis are made of steel and last longer than the iron implements of indigenous manufacture.

For digging holes, e.g., for fixing a pole in the ground, a crow-bar is used. This may be of iron or steel (sabai); or the chisel-shaped end may be of iron but affixed to a wooden shaft. Such an implement is known as khanid [baisakh (Bebar); khanaditi (Orissa)]. Pick-axes are also used for such purposes. In Bengal they are generally made with two points (gantit, gainta, gainti) as in Plate X, Fig. 8; in Orissa the one-pointed pick, kunka, is also known—of the shape shown in Plate X, Fig. 9.

For grass-cutting sickle-shaped implements are used. These may be of soft iron or of steel or partly of iron and partly of steel. Those of soft iron are generally filed so that they have a saw-like or toothed edge and are known as kachia or kasha; those with smooth edges, generally containing some steel, are termed haswua. (In Orissa the term da or daa is given to a sickle-like implement.) A number of drawings of these sickle-like implements are given in the plate, showing to what extent the shape may vary (Plate X, Figs. 10, 11, 12, 13, 14 and 15). In the narrow part of the kachia, just in front of the wooden handle, there is generally a kink. Scythes and other large grass-cutting implements are known in Bengal, but are very little used. Frequently grass is torn up by the roots by the men who get grass for horses. For cutting (1) grass in this way an implement known as khurpa is employed. This form of khurpa is something in shape like a trowel (Plate X, Fig. 19). The grass-cutter takes a tuft of grass in his left hand and slides the khurpa along the earth to cut the grass off at the root, but more often than not the result is that the grass is torn up root and all. Another form of khurpa with a long narrow blade instead of a short broad one is used as a weeding tool by gardeners (Plate X, Fig. 20). Other forms of weeding tools are the nironce and bid (Orissa). The nironce is in shape very like a tinker's soldering-bolt (Plate X, Fig. 21), whilst the bid is apparently like an English garden-fork.

The gareer (gourasi, gaardai) is used for chopping straw for cattle. The back of an iron blade about 6 inches long is let into one side of a
heavy wooden mallet (Plate X, Fig. 16), and the implement is used for cutting straw into small pieces, for which purpose the straw is laid on a flat surface such as a piece of wood. The following implements are described in the report from Sambalpur as made in this district for threshing dhan:—Kahali, apparently something like a shepherd's crook, used for tossing about hay when threshing dhan; simi, an iron ring, which is fixed to a pole for husking dhan; and dai, used for threshing dhan.

For cutting down trees and for wood-cutting in general the implement used is the axe or adze (kuradi, kothari, kuchari; tanga, tangi, tangari; basa, basala, basuli). The ordinary axe (Plate X, Fig. 18) is made of one piece of iron, wedge-shaped, and the hole for the handle is forged through the thicker end of the wedge, its axis parallel to the cutting edge of the axe. Such an axe-head is frequently 8 inches long and almost 3 inches thick at the broad end, so that it is a very clumsy looking tool. The large mass of metal gives it, however, considerable momentum when in motion. Sometimes the axe-head is a less massive affair and instead of the handle fitting into a hole in the head, the position is reversed and the axe-head is shaped with a kind of spike or tongue which fits into an iron-socket on the end of the shaft. By this arrangement the axe may be used with the cutting-edge either parallel or at right angles to the length of the shaft [see Figs. 17 (a) and 17 (d), Plate X]. An implement like a crowsbar, kuradi, may be used for splitting timber. For cutting small stakes and billets of wood, for pruning trees, etc., a bill-hook is largely employed. In Bengal this is called dho, in Behar and Orissa katar, and in Chota Nagpur duba. A number of drawings in the plate (Figs. 22, 23, 24, 25, 26, 27, 28, 29 and 30) show the variations in the shape of the bill-hook which occur in the province. The bill-hook is undoubtedly one of the most extensively used implements in this province. It is at the same time an agricultural and a household implement and is useful for a great variety of purposes.

Vessels which are used for drawing water from wells will be described under the head of domestic utensils; for irrigating the fields there is frequently used a canoe-shaped vessel (dhunti, dhumi), swung by ropes from an arrangement of bamboo poles. One end is depressed and is thus brought under the surface in the available water on one side of a band. On being released the dhunti swings up by its own weight and pours the water thus taken up into the dry field on the other side of the band. These vessels are generally made from the dug-out stem of palm-trees, but of recent years sheet-iron has been used to some extent for making them.

(II) Cooking Utensils and other Articles of Domestic Use.

(a) Cooking utensils.

Portable fire-grates made of iron are not used by Bengalis, as all their cooking is done over a hearth built of mud (chulha), but nevertheless a large variety of such portable fire-grates (ungatis) as shown in Plate XI, Figs. 1, 2 and 3, are made by native smiths, perhaps only for use in the houses of Europeans. Such ungatis may be seen in large quantities in the hardware dealers' shops in any of the large bazaars. Besides fire-grates over which a pan or dish may be heated, ovens (tazal) are made
like large pill boxes of sheet iron 20 inches or more in diameter and about 8 inches high, standing on short legs (Plate XI, Fig. 4). Sweetmeats may be kept hot in such an oven, by putting coals both underneath and on the lid. For handling hot coals iron-tongs (chintu) are used. In Orissa a kind of spoon is also used for this purpose (nia kathâ chatu). For baking bread a circular iron plate slightly convex upwards (lōwā) is used (Plate XI, Fig. 5). This is simply placed over the stove (chātuka) with the slightly convex side uppermost and when it is hot the dough covered with flour is placed thereon. Iron frying pans for vegetables, &c., are termed karahi (pithaka chatu, Orissa); large iron cooking pots karah. The large cooking pots for rice, stew, &c., are generally not made of iron but of tinned copper. Covers for cooking pots are sometimes made of iron; they are called dhakā. Iron plates (thalis) are sometimes used. A large spoon used for cooking rice [hātā, kulchhul or cheniche (Behar)] (Plate XI, Fig. 6) is always made of iron. So also are khani (pithapatia, Orissa) an implement made out of one flat piece of iron plate (Plate XI, Fig. 7) and used as a stirrer and for turning cakes when frying; and jhānjhārā (jāchchatu, Orissa) a large sieve-like spoon used for lifting sweetmeats from the oil in which they have been cooked. A jhānjhārā consists of a handle about 1 foot long and a flat disc about 6 inches in diameter perforated with a large number of holes through which the excess of oil can flow away as the sweetmeat is lifted from the frying-pan (Plate XI, Fig. 8); mathachatu (Orissa) is a similar utensil without the holes in the disc. Almost every household in Bengal possesses a banthi (panakhī, Orissa) which is a kind of knife fixed almost upright in a horizontal board (Plate XI, Fig. 11) and used for cutting vegetables and fish. The vegetable to be cut is pressed against the knife. The banthi is frequently made of rather fanciful shapes, and often there is added to the end of it a serrated iron disc which is useful for scraping the cocoanut from its shell. The combined implement is termed kuru. A somewhat elaborate kuru is shown in Plate XI, Fig. 12. Rough knives (chhuri) with straight blades are used for cutting goat's flesh, &c. In Patna I saw many straight knives and choppers, the whole knife, blade, handle and all being forged from one piece (Plate XI, Figs. 9 and 10). I noticed that the butchers instead of using these knives as a European would do frequently held the handle between the toes and thus converted the knife into an improvised banthi: it appears to come more natural to a native of Bengal to cut in this way just as it appears to come more natural for him to dig with a kodali rather than with a spade.

(b) Water-vessels.

In Behar and the upper parts of Bengal where water has to be drawn from wells, the manufacture of water-vessels from sheet iron is an industry of considerable magnitude. The vessels which are most commonly used for drawing from the wells are known as dones or doles. Two types of done are known: the larger one (Plate XI, Fig. 13) may be described as a cylindrical vessel with a conical bottom. The pieces of sheet iron of which it is made are fastened together with rivets which stick out on the outer surface of the vessel like studs. Attached to the top edge of the done are two rings to which a rope can be made fast. These dones are generally about 1 foot in diameter and 18 inches high. They are
of considerable weight and on account of their conical bottoms they at once fill when let down into the well. For this purpose they possess considerable advantage over the English pail or bucket which, having a flat bottom, is very apt to float on the surface of the water and to be filled only with difficulty. From an artistic point of view also the *dole* is very much to be preferred to the English bucket. A smaller type of *dole* (Plate XI, Fig. 14) generally about 8 inches diameter and 8 inches high may be likened in shape to an egg from which the pointed end has been cut away. This type of *dole* has rivets flush with the outer surface and is supplied with a handle somewhat like that of an English bucket. In the centre of this there is a swivel-ring to which the well-rope is attached. Besides the *doles* the *ghara, ghaita* or *gagra* is an iron water-vessel very commonly used (Plate XI, Fig. 15). The manufacture of a *ghara* has been already described in Chapter IV. These vessels may be called pitchers. They are in shape very similar to the earthenware or brass *gharas*. The iron *gharas* made in Bengal are almost all riveted. In Behar many *gharas* may be found in which the joints are brazed, but these are said to come from Mirzapur. In connection with the drawing of water from wells, mention may be made of the *jhugra* which is a bundle of iron hooks so arranged that it bristles with hooks in all directions. This is tied to a rope and used for recovering water-vessels which may happen to have fallen into the well. The vessel is sure to be caught by one of the many hooks on the *jhugra*. A common form is shown in Plate XII, Fig. 8.

(c) Personal.

The razor (*khur, churra, khura*), the nail-cutter (*narun*), the receptacle for the black pomade used for blacking the eyes of children (*kunjal-latia, kajrowta, kajranta*) are iron articles used in the toilet. Razors are made and ground by most cutlers. They are of the same shape as the European article (not hollow-ground), but are generally very rough affairs. The oriental barber who is such an expert as to be able to shave a sleeping man without awakening him is not to be found in Bengal. The *napit* of this province is far inferior in skill to the ordinary English barber and cannot strop to a fine edge either his own country-made razor or one of good European make. The nails are generally pared and cleaned by the barber after the customer has been shaved. The *kajrowta* (Plate XII, Fig. 4) is a small spoon with a lid to the bowl and a hook at the end of the handle for convenience in hanging up the spoon. The black is made by putting a little oil in the spoon and heating over a lamp until it takes fire. This toilet accessory is invariably hung from the bottom of the bed in the lying-in chamber, so that the ointment may be at once applied to the eyes of the new-born infant.

Finger-rings and toe-rings (*angti, anguri*) made of iron are frequently worn by the poorer people. The blacksmith himself very frequently wears an iron finger-ring. The iron bracelet which is worn by all married women has already been mentioned (*vide* Chapter I). Necklaces partly made of iron may frequently be seen worn by men.

(d) Miscellaneous.

For cleaning the *hookah* an iron skewer is used; for handling the charcoal for the pipe, a small tong is used—frequently simply a few
inches of the steel binding from a bale bent into the shape of a tong. For cutting the betel-nut, a special instrument is used [jānti, saratha (Behar), gudadi (Orissa)]. This is in shape something like a nut-cracker, but instead of the broad crushing surfaces, there is on one side a sharp steel edge (Plate XII, Figs. 1, 2 and 3). Fairly good steel is required for this purpose as the betel-nut is very hard. The jānti is frequently to some extent ornamented and its shape may be fantastically varied. The native of Bengal is very fond of keeping birds (generally green parrots) and the bird’s-cage (pinjra, pijra) is made not of wire but of strips, \(\frac{1}{4}\) inch to \(\frac{1}{2}\) inch wide, cut from iron sheet. These strips are put together in much the same way as the wires in an English bird-cage. The result is a very clumsy looking affair (Plate XII, Fig. 5), which must be very much of an iron-barred dungeon for the unfortunate inmate. Such cages are largely made in Calcutta and Patna. Rat-traps built in the same substantial manner (Plate XII, Fig. 6) are more excusable. Perches for birds (udda) are very frequently seen in the hardware dealers’ shops. They are generally hoop-like swinging perches and carry one or two dishes for water and seed. For locking doors, a padlock is generally used either in conjunction with staples driven into the door and door frame or with staples and bar or staples and chain. Many imported cheap padlocks (tāla) are used and many very rough articles are made by the native blacksmiths after the European pattern. In the neighbourhood of Patna, a somewhat fanciful form of padlock is manufactured (Plate XII, Fig. 7) and this type is very largely used in Patna city. In the morning a shop-keeper may be seen going to open his shop with something very like a screw-driver in his hand, which is the key of this kind of padlock.

III.—Tools and other Articles used in various Handicrafts and Professions.

The tools of the blacksmith have already been enumerated; those of the coppersmith, silversmith and goldsmith are similar, but smaller and lighter. The tools of the carpenter are the hammer (hātura), the wood-cutting chisel (rūkhani), the axe (barsi), the plane (randa), the saw (ara, art), the drill (bumar), the screw-driver (pechhas). These are all much after the same pattern as the European articles. The drill is somewhat different, being worked by a kind of bow, the string of which passes once round the shaft of the drill. In building a hut or godown, the following iron articles are generally used:—nails (small—kantha; medium size—parak; large—gazdl), staples, hooks, door-hinges (kabād), bolts (gazdl), door-bars, door-chains (hānabhādi). The nails are of various shapes. In Behar the doors are frequently studded with nails with ornamental heads—star-shaped with hemispherical boss in centre. The door-hinges are invariably of the simplest pattern. In the construction of a boat a special kind of nail shaped \(\frac{1}{2}\) (pāṭāna) is used for holding together and in place the planking of the hull. Large bolts are used for fastening together the keel and the ribs. Boat anchors (nangar) are generally of the shape of grappling irons. The anchor chain (sikli, sikul) completes the list of iron articles in an ordinary native boat. The mason uses an iron or steel implement for cutting and shaping bricks (basuli) and a trowel (karni). The dursi uses scissors (kainchi).
and needles made of steel. All the country-made scissors are evidently made after the pattern of the European article. The shop-keeper uses scales for weighing which generally have iron-pan and often iron beams; and even a small shop-keeper often keeps his money in a safe. Safes are made and repaired by the larger blacksmiths, but no doubt such safes are not particularly burglar-proof, their chief advantage lying in their weight, which prevents them from being carried bodily away and in their having thick iron plate walls which cannot easily be cut through. As a result of the so-called Swadeshi movement, there have started within the last few years several native firms for the manufacture of safes only, and some of these firms claim to manufacture safes equal to the best European articles. At the recent Industrial and Agricultural Exhibition, Calcutta, 1906-07, a native firm offered safes to stand any tests.

IV.—Weapons.

Enough has already been said about the manufacture of guns (banduk) at Monghyr. The number of guns manufactured in other parts of the province is negligible. Pistols are also manufactured by the gun-makers of Monghyr. These same mistris also manufacture sword-sticks which are in imitation of the European articles. The only part of Bengal in which at the present day anything of the nature of a sword or dagger of indigenous design is manufactured is the Darjeeling district. Here the Nepali kami manufactures kukris and kataris (Plate XII, Fig. 11), the former being by far the more common of the two. The kukri blade is generally about 1 foot long, though occasionally much longer blades are produced. The very characteristic shape of the blade is too well known to need description (Plate XII, Figs. 9 and 10). Probably also a few Lepcha knives (kān) (Plate XII, Fig. 12) are made in this district. In the bazaar of the town of Darjeeling many interesting knives, daggers, swords, &c., are exhibited by the curiosity dealers. These are always said to come from Tibet, Bhutan and Nepal. I made special enquiries to see if these articles actually did come from the places mentioned or if they were manufactured in the bustis around Darjeeling. It appears that they are not manufactured to any extent in the Darjeeling district. A few kukris which are said to come from Nepal are no doubt manufactured here, but that is about all. The explanation of this lies in the fact that the present Darjeeling district before it was taken over into Bengal was almost uninhabited, and all the Nepalis, Bhutias and Lepchas to be found here are quite recent immigrants, and consider it natural to import articles from Nepal, Bhutan and Sikkim, rather than manufacture themselves. Mention has already been made of the special Nepal steel with which the best kukris are supposed to be made. Undoubtedly many kukris which can be bought in Darjeeling are made of very fine steel. The inferior quality kukris which can also be bought are probably all manufactured from European steel round about Darjeeling. The blade of an ordinary kukri is not ornamented. Sometimes a little ornamentation is chased on the blade, the design consisting of lines of small semicircles or dots or sinuous lines of which the constituent parts are circles, or patterns composed of straight lines (Plate XIII, Fig. 1). The straight line, the dot and the circle are the only constituents of the patterns of the Nepalese
kami. The patterns on an ornamented kukri may also be inlaid in brass. A very common inlaid pattern is apparently an image of the rising sun (Plate XIII, Fig. 2). I found a kami in Darjeeling who was able to make for me an ornamental kukri, equal to any from Nepal, but as a rule he had no demand for such articles and never thought of making them unless he was given a definite order.

Large knives for sacrificial purposes (kara, dao) are manufactured in several places in South-East Bengal. These knives are kept in Hindu temples and are used for striking off the heads of sacrificial goats. The knives themselves are sacred. There are two types of such knives. The one is very similar to the ordinary bill-hook and is about 2 feet long. The other type (Plate XII, Fig. 15) has a very characteristic shape. It is identical in design with sacrificial knives manufactured in Assam and East Bengal. Probably the pattern originates in Assam or the very eastern districts of East Bengal, as there is some resemblance between this pattern and that of another type of sacrificial knife used in Assam and Bhutan. It is characteristic of the weapons of the Mongolian races, that the blades broaden at the end. Moreover, at the present time knives of this type appear to be more nicely made in these eastern districts than in Bengal. Hill Tippera and Sylhet are especially famous for them. In Bengal the best examples are made in Nadia and in Dubrajpur (Birbhum district). These knives are large and heavy, being often 3 feet long, with an average width of blade of 4 or 5 inches. They are ornamented with brass inlaying and with ordinary chasing. At the end of the blade an eye is frequently drawn and the handle is commonly ornamented with an elephant's head, the blade projecting from the mouth of the animal. The back of the blade is ornamented with strips of inlaid brass. In several examples from Dubrajpur the blades were ornamented with chased floral patterns (Plate XIII, Fig. 9).

Battle-axes are still manufactured in Chota Nagpur and Orissa. The most common forms are shown in Plate XII, Figs. 13 and 14, but many variations from this are found. These axes are now used as weapons of self-defence against wild animals and are carried by people going into jungles. They are also used to some extent as ordinary hatchets and for sacrificial purposes. These axes frequently bear some slight chased ornamentation, the pattern of which is invariably composed solely of straight lines, dots and portions of circles (Plate XIII, Fig. 5).

Bows and arrows are still frequently seen in the Sonthal Parganas, in Chota Nagpur and in Orissa. The arrow heads are of iron (Plate XII, Figs. 16, 17, and 18). The Sonthaliks are said to be exceedingly good shots with these weapons, with which they do all their hunting. Even tigers and bear are hunted with the bow and arrow, and the arrow can be shot with such speed as to penetrate the thick hide of the wild pig. For birds and smaller game, a blunt-headed arrow is used (Plate XII, Fig. 20). Even fish and aquatic animals are killed with the bow, and Plate XII, Figs. 19 and 21, show the missiles used for this purpose. The three-pronged arrow is for gariyals, the fish-eating crocodiles. Spear-heads of iron are also made in Chota Nagpur and Orissa. The spear-heads are pointed and not blade-like. The round shields of Bengal
are scarcely made nowadays. It is not, however, so many years since steel or iron circular shields were made in the Sonthal Parganas and in Chota Nagpur. Plate XII, Fig. 22, shows such a shield. Again, it will be noticed that the constituent parts of the ornamental pattern are straight lines and parts of circles and that no other curve occurs. This, the absence of any but the simplest curve, appears to be a characteristic feature of ornamentation designed by any of the aboriginal tribes of Bengal.
CHAPTER VI.

A SHORT ACCOUNT OF THE MODERN INDUSTRY.

The insignificance of the iron and steel industry of this province has already been emphasised; and from a study of the art of working in iron and steel as practised by the native blacksmith very little has been found in favour of this branch of the industry. The native blacksmith generally works only to order, and is thus frequently idle; even when at work the amount of material he can handle is very small; and the products of his handiwork are neither noted for their durability nor for their beauty. Nowadays many of the articles he produces are inferior imitations of European articles.

The only pleasing side of the industry in this province is what we may call the "modern industry," iron and steel work carried on in large works according to European methods. This industry is of course quite small, but it has developed very greatly within recent years, and its condition and future prospects appear very hopeful. And although there are only a few such, this province can boast engineering works which in size and equipment compare very favourably with all but the largest works in England; and the Bengal Iron and Steel Works produce pig-iron in blast furnaces of the most up-to-date pattern. In this branch of the industry Bengal compares very favourably indeed with the rest of India. This is the only province in which pig-iron is produced, and the importance of the private engineering firms can be judged from the fact that of a list of nine firms in the whole of India, which are considered by the Government of India of sufficient size and importance to be allowed to tender for Government work, seven are Bengal firms.

The following list gives the more important iron and steel and engineering works in the province:

The Bengal Iron and Steel Co.'s Works, Barakar.
Messrs. Burn & Co.'s Engineering Works, Howrah.
Messrs. Jessop & Co.'s Bridge Works and Foundry, Howrah.
East Indian Railway Engineering Workshops, Jamalpur.
East Indian Railway Workshops of the Carriage and Wagon Department, Lillooah.

Eastern Bengal State Railway Engineering Workshops, Kanchnapara.
Government Gun and Shell Factory, Cossipore and Ishapore.
Government Rifle Factory, Ishapore.
Messrs. J. H. King & Co.'s Engineering Works, Howrah.
The Hooghly Docking and Engineering Co., Ltd., Howrah.
The British India Steam Navigation Co.'s Docks and Engineering Workshops, Howrah.

The Ganges Engineering Works, Howrah.
Messrs. Turner, Morrison & Co.'s Ship-building Yards, Shalimar.
Besides these, there are a large number of smaller firms, e.g., Messrs. Butler & Co. of Muzaffarpur and various firms under native management in and near Calcutta. Some idea of the number of these smaller firms may be obtained from a directory. Messrs. Thacker, Spink & Co.'s Calcutta Directory for 1907 returns—

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler-makers</td>
<td>2</td>
</tr>
<tr>
<td>Cutlers</td>
<td>4</td>
</tr>
<tr>
<td>Electrical Engineers</td>
<td>20</td>
</tr>
<tr>
<td>Mechanical Engineers</td>
<td>20</td>
</tr>
<tr>
<td>Structural Engineers</td>
<td>16</td>
</tr>
<tr>
<td>Engineers and Contractors</td>
<td>87</td>
</tr>
</tbody>
</table>

The following table, giving figures to show the magnitude of some of the larger works, must be considered as only a very rough approximation. It may be taken as applying to the period 1905-06:

<table>
<thead>
<tr>
<th>Works</th>
<th>Number of men employed</th>
<th>Amount of raw materials used per annum</th>
<th>Value of products per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengal Iron &amp; Steel Works, Barakar</td>
<td>3,000</td>
<td>...</td>
<td>36,00,000</td>
</tr>
<tr>
<td>Messrs. Burn &amp; Co., Ltd., Works, Howrah</td>
<td>4,500</td>
<td>26,00,000</td>
<td>40,00,000</td>
</tr>
<tr>
<td>Messrs. Jessop &amp; Co.'s Works</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garden Reach</td>
<td>1,300</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Calcutta</td>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Howrah</td>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>East Indian Railway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Workshops, Jamalpur</td>
<td>10,000</td>
<td>...</td>
<td>54,00,000</td>
</tr>
<tr>
<td>Wagon Shops, Lilgroah</td>
<td>3,500</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Eastern Bengal State Railway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering works, Kaneenrapara</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Gun and Shell Factory, Coasipore and Ishapore</td>
<td>6,000</td>
<td>36,75,000</td>
<td>...</td>
</tr>
<tr>
<td>Government Rifle Factory, Ishapore</td>
<td></td>
<td>6,50,000</td>
<td>...</td>
</tr>
<tr>
<td>The Hooghly Docking and Engineering Co., Howrah</td>
<td>200—1,000</td>
<td>2,50,000</td>
<td>5,50,000</td>
</tr>
</tbody>
</table>

These figures show 30,000 men employed in seven works only; the total number employed in iron and steel and engineering works may be roughly estimated as at least 40,000.

The following brief accounts of some of the more important works are written after a personal visit to the works concerned. I must here offer my best thanks for the facilities which were in all cases extended to me:
The Bengal Iron and Steel Works, Barakar.

These works are situated on the grand chord line of the East Indian Railway, a few miles from Asansole. They consist essentially of blast furnaces and a foundry. There are three blast furnaces, which are all of the same type, with cup-and-cone arrangement for feeding and closing the mouth, and the hot blast is supplied by five tuyères to each furnace. The blast is heated by Cowper stoves, of which there are eight. At the time of my visit, two furnaces were in blast and two stoves were in blast and six in gas. The size of the furnaces may be judged from the production. When three furnaces are in blast, this amounts to 6,000 tons per month. The coke for the furnaces is at present largely obtained from Jheria, though it is seriously under consideration by the firm to make all their own coke so as to ensure uniformity of quality. The large percentage of ash in Indian coal and coke is one of the difficulties which beset the producer of pig-iron in this country. The ore is obtained over a considerable area in the Bengal coal-fields, and very different grade ores are obtained from the various workings. The ores all contain the iron in the form of Fe₂O₃; and some, e.g., the Kalimati ores, are high grade and contain as much as 65 per cent. iron. The majority, however, contain a high percentage of silica, often as much as 20 per cent. With the present system of working, the various ores are mixed so as to feed the furnace with a material of constant proportions. The Company are, however, prepared to work with purer ore in one furnace so as to produce a hematite pig suitable for acid-hearth steel-making, if there is sufficient demand. The limestone used comes from Sutra.

The ordinary foundry pig produced has the following composition:—

(Analyses kindly supplied by the General Manager of the Works.)

<table>
<thead>
<tr>
<th></th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si</td>
<td>3.40</td>
<td>3.00</td>
<td>2.75</td>
<td>2.40</td>
</tr>
<tr>
<td>Mn</td>
<td>1.40</td>
<td>1.50</td>
<td>1.75</td>
<td>1.80</td>
</tr>
<tr>
<td>P</td>
<td>1.20</td>
<td>1.30</td>
<td>1.40</td>
<td>1.40</td>
</tr>
<tr>
<td>S</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>C (graphitic)</td>
<td>3.40</td>
<td>3.20</td>
<td>3.00</td>
<td>2.90</td>
</tr>
<tr>
<td>C (combined)</td>
<td>0.23</td>
<td>0.26</td>
<td>0.30</td>
<td>0.40</td>
</tr>
</tbody>
</table>

which, the Company claim, shew that their pig compares favourably with the best English foundry pig.

The foundry which is close to the blast furnaces produces about 15,000 tons of castings per annum and is capable of making from 25,000 to 30,000 tons. The Barakar pig only is used for the foundries. The bulk of the castings are pipes and pot-sleepers, but at the time of my visit I saw a number of small and intricate castings being made also.

At Barakar there is also a steel-producing and rolling plant (two 25-ton basic open-hearth furnaces and rolling plant to correspond) which was put up and commenced work in 1904, but was closed down and is now lying idle. (A discussion on the general question of steel-production in Bengal will be found in Chapter VIII.)

A large number of the workers at Barakar are housed by the Company, and great care is taken that the dwellings shall be kept in a perfectly sanitary condition. Distilled water being produced in quantity in the
works is supplied to all. The Company's own medical officer systematically inspects the lines, and a thorough system of control is in vogue.

Messrs. Burn & Co.'s (Ltd.) Works, Howrah.

These works are situated on the Howrah side of the Hooghly and have the advantage of a considerable length of river-front for ship-building and for taking in and despatching goods. They are also well connected with the railways. The works may for convenience be divided into four sections—(a) the foundry, turning, fitting and engine-shops; (b) the bridge and girder-shop; (c) the wagon-building yards; (d) the ship-building department. Besides these, there are also large store godowns for the storage not only of materials for construction, but also of goods which are sold by the Company as dealers.

The ship-building department is necessarily on the river front; the bridge-shop runs at right angles to the river front right away back from the river to the public road on the Howrah side. It is a very large shop, 1,200 feet in length, and is fitted up in the most modern fashion for systematically turning out large quantities of work. It has overhead electric cranes, multiple electrically-driven drills and hydraulic and pneumatic riveters. The wagon yards run parallel to the bridge-shop on the one side, and on the other side are the turning shops, fitting shops, foundry, etc. The whole works are conveniently fed by a system of rails running from the river-front.

At the time of my visit the works had on hand a considerable amount of bridge-work, 500 jute wagons for the Bengal-Nagpur Railway; a small ocean-going steamer being built under Lloyd's survey, a number of ferry boats for the Rangoon service, a floating waste-pipe for the steam dredger Sandpiper for the Calcutta Port Commissioners, the erection of a number of steam ferries also for the Port Commissioners, as well as a variety of work in the engine shops.

Messrs. Jessop & Co.'s (Ltd.) Works.

The works at Howrah are essentially bridge and roof works. There is one long bridge-shop which comes up to the river-front at one end and is supplied with electric overhead cranes, multiple drills, hydraulic riveters, etc. The foundry is also here, having been lately transferred from Calcutta. The chief work on hand at the time of my visit was for the new jetties and godowns for the Calcutta Port Commissioners—steel and reinforced concrete structures. There was also a large order under execution for mill-work—pillars, roof-work, shafting, pulley-drives, journals, etc.

The Phoenix Works at Calcutta are the engine-building shops. Here a number of small winding engines for the Bengal collieries were under construction. A number of jute presses were also being built.

In the Rolling-stock Works at Garden Reach all parts of a wagon are manufactured, except wheels, axles and axle-boxes. At the time of my visit they had on hand an order for 500 wagons for the East Indian Railway and 600 wagons for the Bengal-Nagpur Railway. The works were fitted with all the most modern appliances, e.g., for rapid cutting of heavy steel
sections, for cutting plates, multiple punching, die-stamping, pneumatic rivetting, etc. In the case of the wagons for the East Indian Railway, the order for which was placed owing to emergency, the springs and drawbars were being made, although the Railway Board had decided that these parts could not be made in this country and must be imported.

The Government Gun and Shell Factory, Cossipore and Ishapore.

The size of this factory can be judged from the large number of hands employed (6,000). At the time of my visit the factory was producing 50 18-pounder quick-firing field guns and 180,000 shells per annum. On account of the necessity of using very special steel for the construction of guns and shell, a steel-producing plant is an important part of the factory. There are at present two 10-ton acid open-hearth furnaces, and the material used for these furnaces is scrap-steel, haematite pig from Cumberland, and a very small quantity of ore. These furnaces can produce 40-60 tons per diem, which is a much larger quantity of steel than required by the factory itself in time of peace, and the Factory Superintendent is at present trying to find a market for the excess production. The shell-making shops cover a very large area. The size of this branch is being very much increased and is being transferred from Cossipore to Ishapore. The large steam-hammers and hydraulic presses are a feature of these shops. The making of guns has only recently been taken up again at Cossipore. In the shops devoted to gun and gun-carriage making, the work is of a highly specialised character requiring highly skilled workmen. The castings and forgings required are of a highly complicated character, and the subsequent machining requires not only exceptional and ingenious machine tools, but also tools capable of working to an exceptional degree of accuracy. The shops devoted to fuse and gauge-making are instructive examples of automatic shops.

Since the Boer War, it has been decided that the ordnance factories in India must be enlarged sufficiently to supply all the warlike stores required by the Indian Army, and consequently Cossipore and the Ishapore branch of the factory will be greatly enlarged.

Although the labour required in many parts of the factory must be highly skilled, yet practically all the workers have been entirely trained in the factory. The labour as recruited is generally quite untrained. A notable feature is the large proportion of Muhammadan workers. In the automatic tool shops the men earn 5½ annas per diem, whilst the highest trained mechanics can earn Re. 1-8 to Re. 1-12 per diem. The officers in charge of this factory claim that they have done a great deal for the iron and steel industry of the province in the way of training mechanics, who frequently leave to find employment with private firms. Most of the workers at the Ishapore Factory are housed in dwellings provided by the factory, and great care is taken that these quarters shall be clean and sanitary.

The Government Rifle Factory at Ishapore.

This factory is close to the Ishapore branch of the Government Gun and Shell Factory. It is scarcely yet in full working order, but
during the next year it is expected that 80,000 rifles will be manufactured here. A visit to this factory leads to an appreciation of the accuracy of the work required in a regulation rifle and to the conviction that the native of India, under proper supervision and guidance, is quite capable of doing even the highest class of work.

* The Engineering Workshops of the East Indian Railway at Jamaipur.

The workshops are equipped with all necessary accommodation and appliances for building locomotives and the manufacture of railway plant and material of all classes (except rails). The iron foundry turns out over 2,000 tons of castings, the steel foundry about 300 tons, and the rolling mills about 400 tons of iron and steel bars per month . . . . The works cover 99 acres, of which 19 are roofed over.

* The Rolling-stock Works of the East Indian Railway at Lillooah.

The workshops and staff quarters cover an area of some 200 acres and about 3,500 men are employed in the construction and repair of rolling stock.

CHAPTER VII.

INSTRUCTION IN THE TECHNIQUE OF THE INDUSTRY.

Very little has been done in the province in the way of imparting a knowledge of the technique of the iron and steel industry in professedly educational institutions. At the Civil Engineering College, Sibpur, there is a department of mechanical engineering with well equipped foundry, smithy and turning shops, and all the students as a matter of course pass through this department. The native students are of the Babu class and in practice it has resulted that the majority of the successful students of the College have obtained appointments in the Public Works Department of the Government and that few have taken up mechanical engineering as a career. This class of students are of too high a social standing to work as mechanics; they have as a rule no money to start concerns of their own; European firms will not employ them as foremen, because Europeans are considered much more satisfactory in handling labour, and up to the present the number of native engineering firms who might employ them in this way is exceedingly limited. Naturally, therefore, the majority of the successful students are attracted to the Public Works Department of the Government which can find them employment.

At the Civil Engineering College there are a limited number of Europeans and Eurasians taking the same courses as the native students, and some of these after passing satisfactorily through the College obtain employment as foremen in the European firms.

There are also at Sibpur a few artisan pupils who belong to the mistri class. These come at an early age and pick up their education in the shops. They are given a small salary, Rs. 3 to Rs. 5 per mensem, to compensate their parents for their labour, and as they grow older they obtain employment as mistris in some of the Calcutta engineering works.

In the following institutions which are affiliated to the Civil Engineering College, Sibpur, the students receive a course of manual training which includes a certain amount of work in iron and steel:

| The Dacca Engineering College. | Dacca Collegiate School. |
| The Belhar School of Engineering. | Rangpur Technical School. |
| Patna Collegiate School. | Pabna | ditto. |
| Midnapore | ditto. |
| Ranchi | ditto. |
| Bhagalpur School, (B classes). | Rampur Boalia School (B classes). |
| Victoria School, Kurseong. | Mymensingh School | ( ditto ). |

All the students in these schools are of the Babu class (except at the Victoria School, Kurseong, which is reserved for Europeans and Eurasians), and are even less likely than the students of the Sibpur College to find a career in the mechanical branch of the Engineering profession.

With the growth of the Swadeshi movement, there is some possibility of these students starting small concerns of their own or managing small concerns financed by small native capitalists or of finding employment in larger native concerns if such are started, but even the keen advocate of
the Swadeshi movement does not seem willing to put his money into the industrial development of the country, and such native concerns are not springing up as one might have expected.

The Reformatory Schools of Alipore and Hazaribagh teach blacksmith's work and cutlery.

It does not appear, however, that for the artisan classes employed in the iron and steel industry any more efficient education is required than they naturally acquire in the factories and workshops in which they are employed. The work of the mechanics in these shops is satisfactory, and with proper training in this practical manner, the native can perform satisfactorily the most difficult mechanic's work. And the higher class of employés in the Engineering firms under European control will always be obtained from Europe. So that for the proper development of the modern iron and steel industry in the province it does not appear that any further direct educational measures are necessary.
CHAPTER VIII.

PROSPECTS OF THE IRON AND STEEL INDUSTRY IN BENGAL.

The development of the modern iron and steel industry on the factory system would be undoubtedly to the advantage of the province, especially if it were made imperative on the factory management to provide sufficient thoroughly sanitary house accommodation for their workers. The province would gain, as a larger number of the inhabitants would be occupied in a thoroughly profitable manner, instead of wasting their time either from want of work or want of knowledge and training, and whether the capital by which the factories were financed were European or Bengali, it would not affect the result, viz., that the province would be richer by the market value of the additional work done. The province being richer would be less likely to suffer from famine. The development of the iron and steel industry could not be objected to on any similar ground to that on which complaints against the jute mills are sometimes based, viz., that owing to the high price which can be obtained for jute, large areas previously under rice are now given over to jute cultivation, consequently the rice crop is diminished and the price of foodstuffs is raised. There would no doubt be some difficulty in inducing any very large number of the people of the province to adopt the factory system and leave the villages of their birth and the land to which they are attached. But if hand in hand with the development of the factory system the native could be taught improved methods of agriculture, many men could be spared from the land for factory work without any decrease in the crop production. There would probably be still further difficulty in inducing the workers to live contentedly in clean and sanitary quarters supplied by the factory management. But such a system would do a great deal to improve the health and physique of the race. And this taken in conjunction with the mental development which would also result must be considered as a very strong argument in favour of the factory system. There is, however, some objection to the congregation of too many factories around one centre such as Calcutta and Howrah, as in the neighbourhood of a large city it would be difficult to compel the workers to live in factory quarters, and unless this could be done, the result of the congregation of factories around the cities would simply be that a considerable proportion of the population would move from the country districts to the native quarters of the cities where the sanitation is even worse than in the villages. For the sake of the working classes it would be preferable for the factories to be more or less distributed along the lines of railway and for new factories to be started away from already existing native cities so that the housing of the workers could be properly tackled at the start in each case.

It will of course be always necessary for a certain number of blacksmiths to work in their present style in the small villages to make repairs in the agricultural implements of the raiyat population, to shoe the cattle and so on; and probably the number of workers of this kind which will always be required is not much less than the present total of native blacksmiths. There appears, however, no reason why the number should increase,
nor does it appear desirable that this should occur. Agricultural implements, such as kordals, sickles, bill-hooks, etc., can be made more economically and of better quality in factories than on the "cottages" system, and with increase of railway communication, the distribution of factory-made articles of this class will be effected more and more cheaply, so that the scope of the village blacksmith will in time be reduced down to repair work only.

The development and future prospects of the industry on the factory system depend on a large number of different factors, e.g., on the advantage which the local industry can count on securing over the European trade on account of freight costs, on the growth of the local demand, and especially in this country on the support of Government. In discussing the matter we must consider that the local industry is in competition with European rivals which have slowly developed, and as the result of long experience have in many directions come very near perfection. There are many specialised branches of the trade into which the local firms can scarcely hope to enter, e.g., the manufacture of engines of high power, of electrical machinery or of boilers. The demand for such articles in this country is limited and their manufacture requires a large special plant and special experience. Again in such a trade as the manufacture of nails, nuts, bolts, rivets, washers, etc., the local firms cannot compete. This class of goods can be shipped out for much the same cost as the raw materials required for their manufacture, and the local industry is in this case not at all helped by the shipping tariff.

The direction in which it appears there is most chance of success is in heavy work, such as bridge and mill-work, etc., for here a high degree of specialisation is not necessary, a developing country has considerable requirements in this direction, and the shipping rates are a considerable help. The assistance derived from the shipping rates comes in this way:—The rate per ton increases enormously with the weight of the smallest parcels into which the goods can be packed. Thus quoting from shipping rates kindly supplied to me by Messrs. Burn & Co.:—

January 1906.—Machinery—Glasgow—Birkenhead to Calcutta.

<table>
<thead>
<tr>
<th></th>
<th>a.</th>
<th>d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 1 ton lifts</td>
<td>13 6</td>
<td>per ton weight or measurement.</td>
</tr>
<tr>
<td>1 ton and under 2 ton lifts</td>
<td>15 0</td>
<td>ditto</td>
</tr>
<tr>
<td>2 ditto</td>
<td>3 3 ditto</td>
<td>20 0</td>
</tr>
<tr>
<td>3 ditto</td>
<td>5 ditto</td>
<td>28 4</td>
</tr>
<tr>
<td>5 ditto</td>
<td>8 ditto</td>
<td>42 6</td>
</tr>
<tr>
<td>8 ditto</td>
<td>10 ditto</td>
<td>57 6</td>
</tr>
<tr>
<td>10 ditto</td>
<td>15 ditto</td>
<td>85 0</td>
</tr>
<tr>
<td>15 ditto</td>
<td>20 ditto</td>
<td>125 0</td>
</tr>
</tbody>
</table>

Local firms manufacturing this class of goods will import their raw materials at a much cheaper rate than the finished article can be shipped into the country.

The recent freight-war in the shipping trade from Europe to Calcutta has been to the general disadvantage of the iron and steel industry of
the province. The rates from Glasgow or Liverpool to Calcutta dropped in 1905 to less than half the figures ruling in 1900. Thus:

January 1900—Glasgow to Calcutta.
Iron and steel, 20s. per ton and 10 per cent. primage.
April 1905.
Iron and steel, 9s. 6d. per ton.

with a corresponding drop for other classes.

This of course means that the area over which the Bengal firms can compete at an advantage due to tariff becomes more limited, for during the same period the railway tariffs have remained practically unchanged.

In this country the local industry is specially dependent on the Government, as with the Public Works and almost all the railways directly under its control, it is by far the largest consumer of all classes of iron and steel goods. This can be seen at a glance from Tables V and VI, Chapter II, which show that Government takes at least as much as the total private trade. Government has gradually given to the local firms a larger share of its orders, though the protracted deliberation before each concession has been made—and this only after the earnest protestation of the firms concerned—has produced in many quarters the feeling that Government has not really at heart the welfare of such local firms, but would prefer to continue as of old to place all its orders in England through the Stores Department of the India Office. The Government Resolutions giving a share of Government orders to the local trade were issued in the years 1888 and 1898; in 1891 a Resolution was issued which was regarded in many quarters as a drawback from the policy inaugurated in 1888, but since 1898 the policy adopted has been more liberal. In 1900 an extension of the concession of 1898 was made which was much appreciated in certain quarters. Since that date local firms have been allowed to compete for a certain fraction of the wagon-supply for Government and guaranteed railways.

The problems of pig-iron and steel production must be considered separately. There is still a very large quantity of pig-iron imported into the Province for foundry purposes, and the local firm producing foundry pig could legitimately hope to secure the greater portion of this trade. There is, however, among the local engineering firms an objection to the Barakar pig, on the ground that fine and intricate castings cannot be made with any certainty in this iron. On the other hand the Barakar firm itself makes fine and intricate castings with ease from its own iron, and the management is quite willing to show the representative of any engineering firm over the foundry to see such castings being actually made there; and it also maintained that the analysis of Barakar pig shows it to be quite suitable for the finest class of foundry work.

For the demand for foundry pig there is a limit: if, however, the manufacture of steel once had a proper start in this country, the limit of the demand for pig-iron would then be enormously extended. The production of steel in Bengal already has a history. A small Siemens acid-lined furnace was first erected at Cossipore in 1892 under the direction of Major-General (then Captain) Mahon, R.A., and since that date steel has
been successfully manufactured at Cossipore. Recently the productive capacity has been increased by the erection of two 10-ton furnaces of the same acid open-hearth type, and now the factory is capable of turning out from 40 to 60 tons of steel per day. This amount is, as a matter of fact, not at present produced, as the factory itself does not always require this quantity, and arrangements have not yet been made for the disposal of the excess. At Jamalpur also a certain amount of steel is produced by the acid open-hearth process. This process cannot, however, be considered as the proper one for the thorough development of the iron and steel industry of the country. What is required is a steel-making process, using country-made pig as the chief material; and owing to the quality of the average ores of Bengal, the average pig produced is not sufficiently pure for use in the acid-hearth furnace. The basic open-hearth type is undoubtedly the furnace required for the production of high class steel in large quantity in this province, as by this process the country-made pig can be used as the chief material for the furnace charge and the steel can be made systematically and certainly with a composition lying between very narrow limits. The Barakar works attempted the manufacture of steel by this process in 1904 putting down a plant capable of producing 20,000 tons per annum, but after the loss of more than £50,000, the experiment was stopped. There appears in this case to have been initial difficulties especially in getting suitable foremen from Europe for the work, but the General Manager of the work explains the failure of the experiment as largely due to its not receiving the expected support from the Government. He says:

“In 1901 our Home Board opened negotiations with the India Office with proposals to put down a steel plant to make 20,000 tons per annum of basic steel provided that quality of steel would be accepted and support be given by Government in the disposal of the product of the plant. It was expected that the bulk of the work which would be turned out at the steel works would be rails, that being the largest requirement of the Government of India, but the advisers of the India Office were opposed to large section rails being accepted if made of basic steel, and we were therefore limited to metre-gauge rails and under. Subject to the steel produced being of suitable quality, Government promised substantial support to the undertaking and encouraged the Company to put down the plant. A subsidy of £1,500 was paid to us, but a rebate of Rs. 3 per ton had to be given to Government on all steel purchased up to the equivalent of the subsidy.

“A plant to make 20,000 tons per annum was accordingly laid down, and operations were commenced at the end of 1904. An excellent quality of steel was made of which early samples were sent to Shibpur and Jamalpur workshops (East Indian Railway) to be tested, and in each case was most favourably reported upon. But although our steel was made to the best home specifications and was actually passed and accepted on a par with such, the support given to us by Government was so meagre that to find an outlet for our production we were compelled to go into a line of work, viz., miscellaneous small merchant sections, which was unsuitable for many reasons and at once brought us into competition with foreign ‘dumped’ steel. During the period that the mills were running, 136 different sections in all were rolled.

“We had expected that, looking to the large quantity of rails annually imported into India, we could safely reckon on getting orders for the major part of the output of the steel works in the shape of rails of suitable sections to allow of the mills being kept on one section for a reasonable length of time. We did not get a single order for rails during the whole time the steel works were working! Instead
we received orders from Government for about 600 tons of steel in all, from first to last, and to roll off the orders nearly 70 charges of rolls had to be made, and our cost of执行ing such orders was out of all proportion to their value.”

The great advantage to the country which would result from the proper development of steel production cannot be too strongly emphasised. At present the engineering firms of the province import practically all their raw material, certainly all their wrought-iron and steel, and thus the country pays shipping tariff on all its iron and steel work, whether it is executed by local firms or not. The establishment of the manufacture of steel on a proper footing would of course prevent all this. The whole of the iron and steel work required by the province might come from iron ore found in the province itself and available at a much cheaper rate than in Europe. It could be converted into pig-iron in local blast furnaces, and subsequently into steel in local steel furnaces, giving a large additional field for labour, and saving for the country all the money now lost on shipping tariff. In fact, the production of steel from country pig appears to be the advance which is now required in the local industry above all others. This would give a satisfactory basis to the industry, and the different branches could then develop with a much greater feeling of security.
APPENDIX.

Sources from which information has been obtained.


II.—Tour in the province, including visits to Hooghly, Burdwan, Barakar, Monghyr, Bhagalpur, Dumka, Suri, Dubrajpur, Hetampur, Murshidabad, Patna, Darjeeling.

III.—Reports of District Officers.

IV.—Information especially communicated by W. Steele, Esq., of Messrs. Burn & Co., Ltd., W. MacFarlane, Esq., General Manager of the Bengal Iron and Steel Co., Ltd., and Major Bell, Superintendent, Government Gun and Shell Factory, Cossipore, for which I tender my best thanks.

V.—The Economic Section of the Indian Museum, Calcutta, (a) the collections, (b) the files, which were kindly placed at my disposal by the Superintendent, J. H. Burkill, Esq.; the Archeological Gallery, Indian Museum.

VI.—The following books and papers:—

Monograph on Indian Arms and Armour by B. H. Baden Powell, c.i.e. (No. 53 of the Journal of Indian Art, vol. VI).
Indian and Oriental Armour by Right Hon’ble Lord Egerton of Tatton.
The Antiquities of Orissa by Rajendralal Mitra.
Buddha Gaya by Rajendralal Mitra.
The Stupa of Barhut by A. Cunningham.
Tree and Serpent Worship by J. Fergusson.
The Cave Temples of India by Fergusson and Burgess.
The Musnad of Murshidabad by P. C. Majundar.
Murray’s Hand-book to India, Burma and Ceylon.
Wilson’s Translation of the Rig Veda.
The History, Antiquities, Topography and Statistics of Eastern India, compiled from Survey Reports by Dr. Francis Buchanan, 1807–1813.
The Rajahar and Hingir Coal Field by V. Ball (Records of the Geological Survey of India, vol. VIII, 1875).
Chota Nagpur by F. B. Bradley-Birt.
Ethnology of India by R. G. Latham.
History of India by Hon'ble Mountstuart Elphinstone.
Manu's Code, translated by Sir W. Jones.
Indian Agriculture by R. Wallace.
The Farm Manual by A. C. Williams and D. J. Meagher.
Census of Bengal, 1901.
Reports on Trade carried by Rail and River in Bengal.
Annual Statements of the Trade and Navigation of British India.
Various Parliamentary Papers (United Kingdom).
Public Works Department Code from 1883 up to date.
East Indian Railway Time-Table, February 1907.
EXPLANATION OF PLATES.

PLATE I.—Ancient weapons copied from sculptures at Udayagiri, Barhut, Buddha Gaya and Amaravati.

Fig. 1.—Sword in sheath, worn by door-keeper from the Rani Nur Rock Cut Temple, Udayagiri Hill, Orissa. Original sculpture in Archaeological Gallery, Indian Museum, Calcutta. Drawing in "Antiquities of Orissa" by R. L. Mitra. Plate XXIV, Fig. 94.

Fig. 2.—Sword in hand of a warrior from frieze in Rani Nur Rock Cut Temple. Cast in Archaeological Gallery, Indian Museum, Calcutta. Photograph in "Cave Temples of India" by Ferguson and Burgess. Plate I.

Fig. 3.—Sword from same frieze as Fig. 2.

Fig. 4.—Sword in sheath worn by warrior. From Barhut. Cast in Archaeological Gallery, Indian Museum, Calcutta. Photograph in "Stupa of Barhut" by Cunningham. Plate XXXII, Fig. 1.

Fig. 5.—Sword in hand of Bhairava from Buddha Gaya. Drawing in "Buddha Gaya" by R. L. Mitra. Plate XXVI, Fig. 2.

Fig. 6.—Sword in hand of Savita from Buddha Gaya. Drawing in "Buddha Gaya." Plate XXXI, Fig. 1.

Fig. 7.—Sword from hand of a Goddess at Buddha Gaya. Op cit. Plate XXXI, Fig. 3.

Fig. 8.—From same statue as Fig. 7.

Fig. 9.—Sword in hand of Bhairava from Buddha Gaya. Op cit. Plate XXXI, Fig. 4.

Fig. 10.—Sword in hand of Vagisvari Devi from the temple of Vagisvari Devi, Buddha Gaya. Op cit. Plate XXXII, Fig. 2.

Fig. 11.—Shield from same frieze as Fig. 2.

Fig. 12.—From same statue as Fig. 5.

Fig. 13.—Discus from same statue as Fig. 5.

Fig. 14.—Battle Axe. In statue of Maya Devi from Buddha Gaya now in Indian Museum, Calcutta. Op cit. Plate XXIX.

Fig. 15.—From same statue as Figs. 7 and 8. Battle Axe.

Fig. 16.—Bow taken from sculpture on a pillar at Buddha Gaya. Cast of pillar in Archaeological Gallery, Indian Museum, Calcutta. Photograph in "Buddha Gaya." Plate L.

Figs. 1a to 9a.—All from sculptures in the Great Outer Rail of Amaravati Toph, and illustrated in "Tree and Serpent Worship" by J. Ferguson.

Fig. 1a.—Spear. Op cit. Plate LXIX. Photograph.

Fig. 2a.—Sword. Op cit. Plate LX. Photograph.

Fig. 3a.—Sword or dagger. Op cit. Plate LXI. Photograph.

Fig. 4a.—Bow. Op cit. Plate LXI. Photograph.

Fig. 5a.—Op cit. Plate LXI. Photograph.

Fig. 6a.—Sword or dagger. Op cit. Plate LXVI. Lithograph.

Fig. 7a.—Spear. Op cit. Plate LXVI. Lithograph.

Fig. 8a.—Javelin. Op cit. Plate LXVI. Lithograph.

Fig. 9a.—Shield. Op cit. Plate LXIX Lithograph.

PLATE II.—Ancient weapons from sculptures at Bhuvanesvara (copied from Antiquities of Orissa by Rajendralal Mitra. Plates XXIX, XXIII and XX).

Fig. 1.—Lancet-headed dagger from Bhuvanesvara. Op cit. Plate XXIX, Fig. 184.

Fig. 2.—Dao or bill-hook from Bhuvanesvara. Op cit. Plate XXIX, Fig. 200.
Fig. 3.—Straight sword in scabbard, common in Bhubanesvara. *Op cit.* Plate XXIX, Fig. 182.

Fig. 4.—Double-bladed sword from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 178.

Fig. 5.—Double-bladed sword from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 179.

Fig. 6.—Broad straight sword (broken) from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 180.

Fig. 7.—Jagged sword, straight-blade and handle from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 181.

Fig. 8.—Straight sword, lancet-head, from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 182.

Fig. 9.—Nepalese knife or kukri from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 186.

Fig. 10.—Deer-head handled dagger from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 186.

Fig. 11.—Ganesa's battle-axe from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 187.

Fig. 12.—Battle-axe broad blade from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 188.

Fig. 13.—Curved bladed battle-axe from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 189.

Fig. 14.—Discus from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 190.

Fig. 15.—Short club from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 201.

Fig. 16.—Long club from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 202.

Fig. 17.—Triangular dagger from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 205.

Fig. 18.—Bow from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 203.

Fig. 19.—Warrior clad in coat of mail and helmet from Amravati. *Op cit.* Plate XXIII, Fig. 91.

Fig. 20.—Club from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 206.

Fig. 21.—Short javelin from Bhubanesvara. *Op cit.* Plate XXIX, Fig. 204.

Fig. 22.—Copied from Plate XX, No. 65. Cast of same in Archaeological Gallery, Indian Museum, Calcutta. Short sword or dagger.

Fig. 23.—Copied from Plate XX, No. 65. Cast of same in Archaeological Gallery, Indian Museum, Calcutta, described by R. L. Mitra as a Khandi or broad Indian sacrificial sword.

**PLATE III**

Fig. 1.—Pageant shield from Kanarak, copied from Antiquities of Orissa. *Plate XXX*, Fig. 218.

Fig. 2.—Two spears in the armoury of the Palace of Murshidabad—

(a) Peshro bullum, a famous spear supposed to have been made before the Christian era, and taken by the Muhammadans on conquering the country.

(b) Spear probably made A. D. 1700–1750, ornamented with design in low relief of elephant, tiger and leopard.

**PLATE IV**

Fig. 1.—"The Bachswali Tope," an old gun lying at Murshidabad and supposed to have been made A. D. 1200–1400.

Fig. 2.—"The Jahan Kosh," an old gun lying at Murshidabad and made in 1637 A. D.

**PLATE V**—Ancient weapons from the armouries of the Palaces of Murshidabad and Burdwan

Fig. 1.—Pata, a spear used in Muhammadan festival processions (Murshidabad Palace).

Fig. 2.—Saung, a kind of spear (Murshidabad Palace).

Fig. 3.—An old gun made at Kamarpura near Burdwan and used in a battle against the English in 1761 (Burdwan Palace).
Fig. 4.—Sword made at Bhagalpur (Murshidabad Palace).
Fig. 5.—Tega Burdwan, an executioner’s sword made at Burdwan (Murshidabad Palace).
Figs. 6, 7, 8, 9, 11, 12 and 13.—Spears in the armoury at Murshidabad.
Fig. 10.—A spear known as bichhu (Burdwan Palace).

PLATE VI.—Iron smelting by the Native process near Dumka in the Sonthal Parganas—

Fig. 1.—Photograph of the furnace in blast showing method of working the bellows, etc.
Fig. 2.—Diagrammatic bird’s-eye view of the furnace.

PLATE VII—

Fig. 1.—Blacksmith’s shop at Monghyr, showing simplest form of hearth and bellows. The blacksmith is a typical Lohar.
Fig. 2.—Blacksmith’s shop at Dubrajpur, district Birbhum, showing more elaborate hearth.

PLATE VIII.—Gun-making in Monghyr—

Fig. 1.—Boring a barrel.
Fig. 2.—Showing various stages in the making of a gun—
(a) The hammered-out-strips used for making a barrel with the simple-twist marking.
(b) A bundle of alternate iron and steel strips to be hammered out into a strip.
(c) Twisted strips for making damascened barrels.
(d) An assortment of borers and handle.

PLATE IX—

Fig. 1.—A cutler’s shop at Burdwan, showing grinding-wheel and method of driving this. The cutler is a typical Kumar.
Fig. 2.—The tools used in sheet-metal work, e.g., for making a ghara—
(1) A completed ghara.
(2) Iron club fixed in ground used as a rest for tightening rivets.
(3) Curved anvil for hammering sheet into shape.
(4) A completed ghara in vertical section to show structure of neck.
(5) and (6) Wooden mallets for hammering sheet into shape.
(7) and (8) Iron hammers.
(9) Hammers for work inside the ghara.
(10) Pincers or pliers.
(11) Chisel-pointed compass for describing circles on the ghara.
(12) and (13) Small iron clubs held in the hand for hammering down a rivet from the inside of the ghara.

PLATE X.—Agricultural implements, commonly made by the village blacksmith—

Fig. 1.—Iron tip for plough share—usual type.
Fig. 2.—Ditto seen from edge.
Fig. 3.—Ditto another type.
Fig. 4.—Iron hooks for yoke of bullock-cart.
Fig. 5.—Hub of bullock-cart wheel, showing parts made of iron (shaded).
Figs. 6 and 7.—Kodatis.
Fig. 8.—Pick-axe with two points, gainti.
Fig. 9.—One-pointed pick, kanka.
Figs. 10, 11, 12 and 13.—Various forms of kachia, sickle-shaped implement with teeth.
Figs. 14 and 15.—Haissa, sickle-shaped implement without teeth.
Fig. 16.—Garaser, an implement for chopping straw.
Figs. 17 (a) and 17 (b).—An axe which can be used in two ways—kurdli or tanga.
Fig. 18.—The ordinary axe, kurdli or tanga.
Fig. 19.—An implement for cutting grass, kurpa.
Fig. 20.—A form of kurpa for weeding.
Fig. 21.—Nirone, a weeding tool.
Figs. 22, 23, 24, 25, 26, 27, 28, 29 and 30.—Various forms of the bill-hook or dāo.

PLATE XI.—Cooking utensils, commonly made by the village blacksmith—
Figs. 1, 2 and 3.—Different forms of portable fire-grate or ungāti.
Fig. 4.—Portable even, tezāl.
Fig. 5.—Tawa, for baking bread.
Fig. 6.—Large spoon, kulekhul, used for cooking rice.
Fig. 7.—Syrup used in cooking, khauti.
Fig. 8.—Juňjan, perforated spoon for lifting sweetmeats from the frying-pan.
Figs. 9 and 10.—Knives for cutting goats' flesh, etc., chhuri.
Fig. 11.—Implement for cutting vegetables and fish, banthi.
Fig. 12.—Ditto ornamental, with coconut scraper, kuruni.
Figs. 13 and 14.—Dole, vessels for taking water from the well.
Fig. 15.—Ghara or guyra, water-pitcher of sheet-iron.

PLATE XII.—Weapons and miscellaneous articles prepared by the blacksmith—
Figs. 1, 2 and 3.—Betelnut cutter, jānti.
Fig. 4.—Kajrowa, small spoon with lid, for preparing and keeping black ointment for eyes of children.
Fig. 5.—Bird-cage, pinjra.
Fig. 6.—Rat-trap.
Fig. 7.—An ingenious padlock, tāhā.
Fig. 8.—Jaugra, a bundle of hooks, used to recover water-vessels which have dropped into wells.
Figs. 9 and 10.—Kukris—Fig. 9, especially large and ornamented.
Fig. 11.—Katar, a weapon made in Darjeeling.
Fig. 12.—The Lepcha knife or bān.
Figs. 13 and 14.—Battle-axes.
Fig. 15.—Sacrificial knife (very large), khaura.
Figs. 16, 17 and 18.—Arrows.
Fig. 19.—A three-pronged arrow used for catching gariyal.
Fig. 20.—Club-headed arrow for hitting birds.
Fig. 21.—Arrow for catching fish.
Fig. 22.—Circular shield of hammered steel, Southāl, copied from The Journal of Indian Art. Vol. VI, Plate 84, Fig. 11.

PLATE XIII.—Ornamental designs executed on steel weapons by Bengal blacksmiths—
Fig. 1.—Ornamentation on the large kūkri, shown in Plate XII, Fig. 9 (chased).
Figs. 2, 3 and 4.—Brass inlaid designs on a small kūkri made by a Darjeeling kāmi.
Fig. 5.—Chased ornamentation on a sacrificial axe.
Figs. 7 and 8.—Designs on old sacrificial knives kept in temples on the estate of the Raja of Hetampur.
Fig. 9.—Ornamentation on a sacrificial knife recently made by a blacksmith in Dubrajpur, district Birbhumi.
Fig. 1. THE BACHAWALI TOPE, 1200-1400 A.D.

Fig. 2. JAHAN KOSHA, 1537 A.D.

Survey of India Office, Calcutta. February 1900.
Fig. 1. IRON-SMELTING IN THE, SONTHAL PARGANAS.

Fig. 2. BIRD'S-EYE VIEW OF FURNACE.
Scale: 1 inch = 1 foot.
Fig. 1. GUN-MAKING IN MONGHYR.

Fig. 2.
ORNAMENTAL DESIGNS ON STEEL.
A MONOGRAPH

ON

WIRE AND TINSEL INDUSTRY IN BENGAL.

Antiquity of the Art.—No definite information regarding the early history of the industry is available, but it is certain that this industry has been in existence in India from very ancient times.

There is a legend amongst the Wire and tinsel workers of Patna and Calcutta that Joseph, son of Jacob, was the inventor of this industry. He was, so runs the legend, in the habit of spending his leisure hours in embroidering handkerchiefs with tinsel and wire. To this day the novice offers nias (offerings) to the memory of Joseph when he begins to learn the art and all persons engaged in the industry offer nias to his memory on the last Wednesday of the Muhammadan year.

The antiquity of the industry may be gathered from the old Hindu epic Ramayan. Therein we learn that Sita on the occasion of her marriage with Rama was dressed in a rose pink sari richly embroidered with gold. There is a record of the industry having been known to the world at the time of the siege of Troy, and there is mention of the Egyptian mummies having been found wrapped in garments wrought with thin strips of gold.

The art in India.—There is no doubt that the Hindu Rajas of the pre-historic period used apparels set with gold, but it is doubtful whether the “tinsel industry” proper was known to them before the Muhammadan period. This must be certain that the industry flourished in towns which were ancient Muhammadan capitals and even now it is generally in the hands of the Muhammadans.

IMPLEMENTS AND WORKING METHODS.

Implantes.—A request to a tarkash (wire-drawer) to show his tools is generally answered by the production of a small rude table, one or two reels a pair of scissors, a small hammer, a pair of forceps and a few pieces of scrap iron. Technical skill is by no means wanting, and it is often astonishing to see how these men, working with simple and crude tools in little huts, turn out articles of high polish and extreme fineness. Some of the plates give the idea of those used in Calcutta.

The process of wire-making.—Wires used in this industry are made of silver; the yellow ones are those coated with gold. The yellow of gold is obtained by getting a silver bar coated with a layer of gold in the following manner. 40 to 60 tolas of silver (1 tola = 180 grains) are first melted and moulded into a bar tapering at one end to the shape of a candle. The bar is next wrapped up with very thin gold leaves and tied over firmly with silk threads. Then the bar is gradually heated on the fire till the gold leaves lie firmly on the silver bar. Gold weighing annas 10 to 12 (one anna = 11.25 grains) is generally used for coating a silver bar weighing 40 to 60 tolas. The quantity of gold used varies with the colour and quality of the tinsel ultimately required. If but little gold is put on, the tinsel will be of pale yellowish colour; if a large quantity, it will be of rich gold-red.

The bar thus prepared is technically called passa or kandla and the class of men who prepared kandlas are called kandla-kash.

Copper coated with silver is often used and the articles made of it are called jhuta or false; whereas those made of silver alone are called suchha or pure.

The passa or kandla is then made over to the wire-drawer known as tar-kash, who by the aid of a simple apparatus called ghawa forces the gold plated bar (kandla) through a series of holes on a stout steel plate, one after the other. Each succeeding hole is narrower and finer than the one before; so that when the kandla is passed through the last hole, it is reduced to the
thinnest of a wire of a very narrow gauge. The wire thus obtained is coiled round a reel about three inches in diameter shaped like an ordinary reel of thread, technically known as *pairee*, which is fixed at one end of a small table about a foot high by a spike running through the centre (Plate 1); at the other end of the table is similarly fixed a larger reel about 6 inches in diameter. This is called *pairea*. At the middle of the table is fixed firmly by means of wedges driven into notches in the table a steel plate called *jantar* or *jantri* having graduated holes. One end of the wire coiled on the *pairee* is filed down and laid through a hole in the *jantar* and fastened to a hole on the upper edge of the *pairea*. The *pairea* is then turned round by an iron rod, and a wire of the desired thinness is coiled on it by being led through a graduated hole. To obtain a still thinner wire, the wire obtained as above is coiled back on the *pairee* and led through a narrower hole in the *jantar*. By repeating the process described above, a wire of any desired thinness is obtained. Wires as fine as hair may be drawn by this process.

Usually a *tola* of a metal is drawn into 600 to 1,200 yards of wire. The gold or silver coating becomes closely fixed by means of this process; and the wire has the appearance of bright gold or silver.

The Jantar.—In Patna the steel plate or *jantar* is now practically ousted from the market by the introduction of European-made gold plated discs about an inch in diameter and of the thickness of a rupee, having a series of holes, each succeeding hole being narrower and finer than the one before. The principle of working is the same; the difference merely being the replacement of a rude but cheap implement by a costly but neat one. The Calcutta people do not use the European *jantar*. They prefer their native tools.

**Salma.—Salmas** are of two varieties:—
(a) *Kora salma* or coiled round wire.
(b) *Dobha salma* or coiled flat wire.

*Kora salma*, is described below. *Dobha salma* will be described later on with *badia* from which it is prepared.

**Kora salma how prepared.**—At one end of a small table a wheel is fixed.
A few inches away through holes in two pegs an iron rod is fixed horizontally. Another round iron spindle is joined at one end with the rod by a piece of bamboo, the other end being free. At the other end of the table is fixed a reel of gold or silver wire. The wheel is then joined with the iron rod by means of a string. When the wheel is turned, the rod is set on rapid motion. The spindle to which it is joined by an end of the wire from the reel, is also set in motion; and thus the wire is coiled round the spindle, being guided by the fingers of the workman. Thus a *salma* of any length is made. By changing the iron spindle mentioned above *salmas* of different fineness are obtained. Plate No. 11 is an illustration of this apparatus.

**Preparation of Badia or Lanetta.**—The fine wire described above is flattened in an extremely delicate and skilful manner. The workman, seated before a small and highly polished steel anvil, about 2 inches broad with a steel plate in which there are two or three holes set opposite to him and perpendicular to the anvil, draws through these holes as many wires,—two or three as it may be,—by a motion of the index finger and the thumb of his left hand, striking them rapidly but firmly with a steel hammer, the face of which is also polished like that of the anvil. This flattens the wire perfectly; and such is the skill of manipulation, that no portion of the wires escapes the blow of the hammer, the action of drawing the wire, rapid as it is, being adjusted to the length which will be covered by the face of the hammer in its descent. No system of rollers or other machinery could perfectly ensure the same effect, whether of extreme thinness of the flattened wire, or its softness and ductility."

Generally the following kinds of *badia* are used:—
(a) *Dewali*—Somewhat broad.
(b) *Kasore*—Thin and light.
(c) *Kamdani*—For stitching on linen or silk.

From *badia* the following are prepared:—
1. *Dobha*—Salma or coiled flat wire.
2. *Kankai* or pearl wire.
4. *Kallabatoon*. 

...
Preparations of Dobka Salma and Bullion.—Dobka salma is prepared in the same way as the kora salma; the only difference is that the gold or silver wire is not round but flat. Preparation of kanki is similar, but the spindle used for this is not a round one but triangular or rectangular according to choice. Bullion is also similarly prepared, but the badla used for this is curved and not a flat one. The curvature is obtained by passing the badla through the hole in a jantar in which a round fine wire is fixed leaving a semi-lunar narrow space. The badla thus obtained is wound on its concave side round the spindle.

Preparation of Kallabatoum. It is prepared by twisting a flattened gold or silver wire round silk thread. The following description by Captain Meadows Taylor of the process by which kallabatoum, is manufactured in India will be read with interest:

"The silk is very slightly twisted, and is rolled upon a winder. The end is then passed over a polished steel hook fixed to a beam in the ceiling of the workshop, and to it is suspended a spindle with a long thin bamboo shank, slightly weighed to keep it steady, which nearly touches the floor. The workman gives the shank of the spindle a sharp turn upon his thigh, which sets it spinning with rapidity. The gold wire, which has been wound on a reel as it passes behind the maker, is there applied to the bottom of the silk thread near the spindle and twists itself upwards, being guided by the workmen as high as he can conveniently reach or nearly his own height, upon the thread; but it is impossible to describe in exact terms the curiously dexterous and rapid process of the manipulation. The spindle is then stopped; the thread now covered with wire is wound upon the spindle and fastened in a notch of the shank when the silk thread is drawn down, and the spindle is again set spinning with the same result as before. Certain lengths of the gold thread ‘kallabutton’ are made in skeins, and so sold or used by weavers."

Preparation of Chumki or Spangles.—This is very interesting and worthy of notice. A wire is coiled round an iron rod of about $\frac{3}{4}$ to $\frac{1}{2}$ of an inch in diameter. The coil is then taken out and cut into rings with a pair of scissors. Then one by one they are dropped on a highly polished anvil with the aid of forceps and hammered by a polished hammer. With every stroke of the hammer a chumki is produced. Plate III illustrates the preparation of chumki.

Utility of the Products.—The articles described above were in great demand in former times. They were chiefly used for the rich who used them for—

(a) Decorating Hindu idols during the Pujas.
(b) Decorating garments, caps, turbans, shoes, etc.
(c) Embroidery and brocades.
(d) Trappings for horses and elephants.

In Calcutta itself the dresses for dancing girls and itinerant theatrical players are decorated with wire and tinsel articles.

Tinsel for Images.—It is impossible to ascertain from what period the images of gods and goddesses of Hindu worship have been decorated with tinsel ornaments. But there is no doubt that the practice has been in vogue for a very long time; for we find the poet Ram Prosad, who lived about 200 years ago, denouncing the tinsel decorations in the following terms:—"The mother (goddess) who adorns the world with gold and gems—shame to you who want to adorn that mother with wire and tinsel." Preparation of tinsel ornaments was the hereditary occupation of a sect of the Hindus called matalkars or the garland and pith (soia) decoration-makers. But it has now been taken up by all castes, both men and women.

Kumartali and Machuabazar in Calcutta are the centres of this industry, but there is also a shop at Bhawanipur. At each of those two places there are about 10 shops with 125 workmen, besides 300 women helping them in the industry by doing in-door work. The workers are paid by piece-work; each man earns about 4 to 5 annas a day in the slack season and 10 to 12 annas in the busy season, namely, during the Pujas. Almost all the women doing this work are members of middle class Hindu families who devote their leisure hours to this work. There are also some poor women who depend on it for their livelihood, earning daily from 1½ annas to 2½ annas.

Krishnagar, Sharpur and Dacca are also the chief centres of manufacture of tinsel ornaments,
Work of the decorators are divided as follows:—

(1) Decoration of the frame in which the image is put.
(2) Preparation of moskoot or tiara or crown.
(3) " of anchnla or scarf.
(4) " of necklace, bajoo or circular ornament worn on the upper arm, bracelet, anklet, etc.

The images are set up in a frame which is called marth. This marth is covered with thick pieces of tinsels which are highly ornamental, and about a foot or 14 inches in width. Each of these is called a kalka.

The pattern of the kalka and anchnla is almost the same. The following are the principal requisites for ornamenting these works:—

(1) Kap—thin slices of sola cut out by sharp knife.
(2) Paste—prepared with wax and gandha biraj (scented resin).
(3) Angji—prepared by coiling lametta round an iron wire by means of a charka.
(4) Jamira—thin plates coloured red or green and called “ruby” or “emerald” foil.
(5) Tale.
(6) Chumki or spangles.
(7) Bicha chaki—cup-shaped spangles prepared from white or ruby foils.

The malakars supply the kap to the decorators who, in order to obtain an impression of the design, press it with the foot or elbow on a mould previously made by setting thick cotton thread on a kap with the paste. A mesh work of angtis is then laid on the surface of the kap, and the impression is thus obtained. The kap is then made over to the women workers who cut out some of the intersices by means of narvas which are iron rods about 8 inches long with sharp flattened tips. The opening thus made are then closed with pieces of ruby foils from behind. The interspaces are pasted over with chumki, bicha chaki, pieces of tale or coloured paper as the case may be. Plates V and VI show the image decorators at work.

For the preparation of the crown (moskoot) the following articles are required:—

(1) An iron wire frame.
(2) Ruby foil.
(3) Tale.
(4) Kalka, an inch of angti the two ends of which have been tied together by means of a rooka or a piece of twisted lametta 1½ inches long.
(5) Bakul—an oval piece of pith enriched with lametta.
(6) Chumki.
(7) Bicha chaki.

The iron frame is covered with lametta and is set with bakul, kirkir chumki, etc. Plate V illustrates the preparation of a moskoot. The preparation of bracelets, bajoo and necklaces is similar. The frame is made of pith on which is spread gum coloured according to design; and on that foils are pasted.

Garment decoration.—Chumki, salma, kankri, kaddi and bullion are used in ornamenting garments, caps, turbans, jackets, shoes, belts, etc. Velvet, silk or linen embroidered with them are called zaroudi work, and the workers are called Zardooz. Both men and women do this work, each earning eight annas to one rupee per day: Plates VII and IX are illustrations of such work.

Embroidery.—In Murshidabad and Patna gold and silver embroidery or karchab work is done with kallabateen thread. Elephant jheel, horse trappings, canopies with fringes, palaquin covers, gowns, jackets, dresses, bodices, prayer carpets, caps, slippers, money-bags, belts, etc., are embroidered with karchab or karchikan work. Embroidery is either worked in the loom or wrought with the needle. Some of the best embroidery is wrought on a velvet ground or on English broadcloth. The heaviest kind of gold embroidery is called kinkhab. It is done by fixing the fabric to be embroidered on a frame work. The patterns are lightly painted or printed on the fabric with some kind of coloured material; and these patterns the embroiderer follows in laying the kallabateen thread. Gold and silver embroidery on cotton is called kamdani.
Brocades and cloth of gold and silver.—Silk fabrics with raised patterns are called brocades. Gold or silver cloth, i.e., silk woven with gold or silver thread are known in India by the name of kinkhab (kinchab). Silk brocades are made wherever silken stuffs are manufactured on an extensive scale. Murshidabad, Benares, Ahmedabad, Surat, Multan, Poona, and Aurangabad are the places most noted for silk brocades. Benares saris still maintain their old reputation; but it is the fabric with gold and silver flowers that is mostly sought after. The Bengali ladies are very fond of those saris and there is a considerable demand for them throughout this province.

In 1890 the Hon'ble Mr. E. W. Collin, I.C.S., made the following remarks regarding gold and silver embroidery in his report on Arts and Industry in Bengal:—

Gold and silver embroidery is chiefly applied to caps and to the trappings of horses and elephants. Murshidabad and Patna have several skilled embroiderers, and there are altogether about 1,000 men engaged in this work in the latter town. Gold and silver wire (Kallabatoom) is made in Patna and Murshidabad in small quantities, but most of the gold thread comes from Benares and the North-Western Provinces.

Lace.—Gold and silver wires are used in lacemaking, lace ribbons, borders and edgings for Indian use and are known as Gota, Kinara and Anehal respectively. They are of various breadth and patterns and are woven in a tiny loom with silk thread for the warp and gold and silver for the woof, or vice versa. Dacca, Murshidabad, Patna, Benares are the principal centres of the Indian lace manufactures. Gota and Kinara are chiefly used as borders for female garments.

Head-dresses.—Amongst the rich gold woven ribbons called seerpuch are worn on the head by bridgroom, as also plumes made of finely cut silver leaf. The distinction of wearing seerpuch belongs by right to the king, but as in the East the bridegroom is considered the king of that day, he is allowed to bedeck himself with royal robes.

The topore or cone-shaped pith hat decorated with tinsel is, however, invariably used on marriage occasions. The preparation of the topore is a monopoly of the malakars.

The Rev. Lal Behary Day made the following remarks in his popular work, Bengal Peasant Life:—

A costly dress for the bridegroom had been purchased; the village malakar was ordered to prepare as gaudy a crown as he could make, for all Bengali bridegrooms, however poor, put on tinsel crowns at the wedding; equally gaudy shoes, embroidered with silver, had been brought up from Calcutta."

Shatka or Hooka-snake.—The hooka-pipes called shatka are invariably adorned with gold and silver wires. Kallabatoom and laces are used for the costly pipes and false (shata) lace is used for the common ones. The pipes called "snakes" by the old Anglo-Indians are manufactured in all the large towns in Upper India.

Tinsel printing.—Silver and gold tinsel prints on coloured cloth (saris) are made in some places. These gay clothes are worn specially by women of the poorer class on festive days, e.g., at weddings and tamashas.

Gold and silver leaves.—Imitation gold and silver leaves are at present not prepared in Calcutta. It is said that there was a factory at Maniktala, which went into liquidation and was purchased by the shajwallahs (image-decorators) of Kumartuli. They could not work it satisfactorily, as they could not compete with the machine-made foreign goods which were far cheaper; and hence it failed.

Pure gold and silver leaves are, however, prepared at Chitpore. There are four shops. Nazir Hossain, of Patna, who holds a shop at 88, Lower Chitpore Road, is an expert. He has a workman named Mahamed Taki who is a good worker. He earns Rs. 20 a month.

The preparation of these leaves is interesting. Sheets of gold or silver are first prepared. One tola of gold sheet is then cut into 160 pieces and silver sheet into 140 pieces. There are leather cases (6" × 4") containing 140 or 160 as the case may be, made of dried jhulli or membrane of deer. Pieces of gold or silver are thus placed between two dried membranes, and the cases thus filled up are treated in the following way instead of putting them under a hot press.
The leather cases are hammered for a long time on a slab of stone till the foils measure 4\" x 5\". There is no chance of any injury while they remain packed between the two layers of deer membrane. One hundred and sixty leaves of gold, weighing one tola, are sold at Rs. 28 and 140 silver leaves of the same weight at Rs. 1.8.

Present condition of the industry in Patna.—Like many indigenous industries the "wire and tinsel" industry has now deteriorated. The compiler of the Patna District Gazetteer remarks: "Nowhere is the decline of Patna as a manufactury centre more noticeable than in the matter of hand industries. Practically every kind of industry is carried on; but none of them are of special importance or extent, and few of the products are exported." Some families made this industry a hereditary occupation, but their number is gradually decreasing.

The undermentioned are the more noted wire and tinsel factory owners and their addresses:

- Fajju Mian
- Ali Ahmad
- Hazi Akbar
- Haji Mohamed Ismail
- Abdul Rahaman, son of Haji Tagiram
- Doulat Mian
- Soopan Mian
- Abdulla

{Fasat Ka Maidan.

- Mughalpura.
- Kalu Khan Ka Bagh.
- Sadargali.

The people themselves ascribe their fall from their former state to want of encouragement, their idea of encouragement being that intending purchasers should place orders and make them advance on account before they take the work in hand. Whether this idea is due to poverty or to want of enterprise, it is difficult to say with certainty; probably it is due to both. Certain it is, that there is no likelihood of the local industry regaining its lost position; for intending buyers can obtain their requirements from Benares where ready made articles are stocked, and the finish of the work is much superior. The outturn of the Patna district is small and export is confined to Bihar.

Condition of the industry in Calcutta.—About 33 years ago this industry was in a very flourishing condition in Calcutta. There were about 9 big shops at Machuabazar, each shop having 20 to 25 expert workmen, and each of those workmen used to earn Rs. 2 to Rs. 5 a day.

In or about the year 1877, a German manufacturer came to Calcutta and took away samples of each of these products. The next year after that machine-made articles were imported from Germany. Though the price of the German produce was much less than that of the Calcutta produce, still the industry in Calcutta thrived till 1897 because the finish of the German articles was not so good as that of home-made ones. In 1897 very fine and well-finished machine-made articles were imported from Germany; the skilled hand labour of the native workmen could not cope with the machine-made articles; and hence within a very short time the whole native industry has almost ceased to exist.

There are at present only three shops at Machuabazar. Sheik Kalu has a shop at 138, Machuabazar Street, and he is an old expert in the art. He has only one expert workman, named Moshaheb Ali. These workmen, however, find very little work for them. There is no longer that demand for fine country-made wires, but as the imitation silver spangles of Germany are not highly polished nor of good finish, there is still some demand for chumki (spangles), and hence these three shops eke out a miserable existence.

The German goods have thus displaced to a great extent the country produce. "A proof of the superiority of the Indian over the European gold and silver wire as usually manufactured, was afforded at the Dublin Exhibition a few years ago (prior to 1887), during the progress of which the chief exhibitors of the Irish poplins in which gold and silver thread was used, had to change their specimens on account of becoming tarnished; whereas the metal embroidered fabrics of India, shown on the same occasion, retained their colour and lustre throughout." Indian Art Journal.
A MONOGRAPH ON PAPER AND PAPIER-MÂCHE
IN BENGAL.

Introductory.

Paper consists of a compacted web or felting of vegetable fibres usually, as we know so well, in the form of a thin flexible sheet. The fibres are reduced to a pulp by grinding, beating, etc., and are diluted with water in a vat. Pulp from the vat is then dipped up in a mould from which the water drains away leaving a foiled sheet which is then pressed and dried.

Papier Mâché is made of paper-pulp reduced to a paste and then boiled with a solution of gum Arabic or of size to give tenacity to the paste. Articles such as trays, picture-frames, jars, boxes, etc., are shaped by moulding and then ornamented and varnished. Sometimes instead of paste several sheets of paper are glued together and given the required shape. There is no papier mâché industry in Bengal.

The chief difference between hand-made and machine-made paper is that while the former is made in separate sheets of limited sizes, machine-made paper, though limited in width, runs off from the machine in long rolls frequently more than a mile in length without a break. Although the use of machines is all but universal now in Europe and America for ordinary papers, some of the more costly descriptions—drawing paper, for instance—are still hand-made.

Espano grass, straw and wood are now largely used in the fabrication of pulp suitable for printing paper; bagging, canvas and old rope are used for brown, and other coarse papers; but hitherto no substance has been found to supersede or even to satisfactorily supplant rags for the finer kinds of paper (writing and drawing).

In China and Japan even to the present day paper is made by hand. The Japanese paper is chiefly made from the bark of a kind of mulberry (Morus papyrifera sativa) and is known as kadji. In China almost every province, if not every district, is said to have its own peculiar paper material.

Historical.

In ancient times various materials were employed in India for writing. Stones, bricks, wooden boards, chips of bamboo, metal plates (especially those of copper), and above all palm-leaves and birch-bark, bhurja (Bacula bhojpatra) were all in use. The last is even called lekhana or "The writing material," and written documents go by the name of bhurja. The art of preparing the bark for use has now been lost. But birch-bark manuscripts are said to be still common in the libraries of the Kashmiri pandits. They are, however, very rare in the Kathmandu Library in Nepal, where most of the ancient manuscripts are found written on palm-leaves.

Skins of animals so common in other countries were not much in vogue in India, probably on account of their being ritually impure. Alberini, who visited India with Mahmud of Ghazni and gave a detailed account of the manners and customs, science and literature, arts and industries of the people of this country, expressly says, "The Hindus are not in the habit of writing on hides like the Greeks in ancient times." A reference to this practice is implied in the reply given by Socrates when he was questioned as to why he did not compose books: "I don't transfer knowledge," said he, "from the living hearts of men to the dead hides of sheep."

The use of well-beaten cotton cloth as a writing material by the Hindus is mentioned by Nearcuss who was one of the generals of Alexander the Great. The Kanarsse traders still use for their books of business a kind of cloth, called kajatam, which is covered with a paste of tamarind seed, afterwards blackened with charcoal. The letters are written with chalk or steatite pencils, and the writing is white on black (Mysore or Coorg Gazetteer, 1877, 1, 408).
The paper-reed or rush *Cyperus Papyrus* (*Papyrus antiquorum*) afforded to the ancient Egyptians and through them to the Greeks and Romans a convenient and inexpensive writing material. The reed is almost extinct in Egypt now but still abounds on marshy river banks in Abyssinia, Palestine and Sicily. The papyrus was prepared by cutting the central pith of the reed into longitudinal strips which were laid side by side with another layer of strips laid at right angles. The two layers thus prepared were soaked in water, then pressed together to make them adhere, and dried. For books the papyrus was formed into rolls by cementing together a number of sheets.

It will be seen that the fundamental difference between old papyrus and true paper, as we now know it, is that in making paper the raw material is first reduced to pulp, that is, the natural structure is thoroughly broken down so as to separate the component fibres which are then re-arranged to form a new web.

Though as Pliny truly says, "the remembrance of past events depends upon paper (papyrus)" with the irony of fate paper has failed to record its own origin, and much of the early history of the art is matter only for conjecture.

While papyrus was of African origin true paper, in the modern sense of the term, was essentially an Asiatic invention. In China and the neighbouring countries of Eastern Asia, paper was used certainly before the Christian era. The reduction of the natural materials to pulp was done partly with hand tools and partly by soaking or boiling them in lyes. The process of preparing the pulp has undergone much modification in Europe and America, but is essentially the same as was originated in the East some 2,000 years ago.

The manufacture of paper in Europe was first established by the Moors in Spain. In Italy also the art of paper-making was no doubt in the first place established through the Arab occupation of Sicily. Paper, however, continued to be made by hand till at the close of the 18th century. Louis Robert, a clerk in the employment of Messrs. Didst, of the celebrated Essones paper-mills near Paris, invented machinery for making the process continuous. This was the greatest advance in the history of the industry and modern paper-making may be said to date from that time.

The first authentic account of paper-making in India dates from the time of the Emperor Akbar, when the art is said to have been introduced into Kashmir. It spread rapidly all over India and displaced the birch-bark and palm-leaves that were previously used for writing. The Persian word for paper, *kaga'i*, has been adopted in most Indian languages. This also points to the Mahomedan introduction of the industry. The Sanskrit word for that which is used for writing upon is *patra*, the same as *pata* in Bengali. The word occurs in the compound *bhurja patra* which does not mean the leaf of the birch tree, for we know that it was not the leaf but the bark of the tree that was used for writing. The word *bhurja patra* simply means the writing materials made of *bhurja* or birch bark.

It is probable, however, that the art of paper-making came from China to the inhabitants of Eastern Himalaya long anterior to the introduction of the paper industry into Kashmir by Akbar. Rajendra Lala Mitra asserts that a "letter writer," by king Bhoja of Dhāra proves its use in Malwa during the 11th century A.D. (Gough's papers, 16). This king, it may be mentioned, reigned from 1106 to 1142 (?) and was one of the Hindu Chiefs who fought Mahmud of Ghazni. At any rate paper had not yet become common in India, unlike in Mahomedan countries, at this time. Alburin, who has already been quoted, notices the absence of paper and speaks only of *bhurja* bark and palm-leaves as used by the people for writing. He was familiar with paper and expressly says that it was in China that paper was first manufactured. "Its fabrication was introduced into Samarkand by Chinese prisoners and thence it was made known in various places to meet the existing demand." This was at the beginning of the 8th century A.D.

Paper manuscripts, dated Vikrama-Samvat 1384 and 1394 (A. D. 1327-28 and 1337-38), the leaves of which are cut according to the size of palm-leaves, have been discovered by Peterson at Anhilvād Pāṭan. It is very doubtful if any of the ancient manuscripts from Kashgar, which are written on a peculiar paper, covered with a layer of gypsum, are of Indian origin; Dr. Hörnle
believes that all of them were written in Central Asia. (Indian Paleography by Johann Georg Bühler, Indian Antiquary, volume XXXIII.) During his recent visit to Kathmandu Pandit Haraprasad Shastri acquired a Sanskrit manuscript belonging to the 11th century A.D. written on Nepal paper.

It may be interesting to mention that paper is made in Nepal partly from bamboo and partly from the bark of a small thorny shrub known as Mahadeva’s flower (Daphne cannabina). The surface is made glossy by rubbing with a smooth piece of stone. The Daphne paper is generally very thick and is made thicker and stiffer by being coated over with a paste made from the boiled kernel of tamarind seed. It is coloured yellow on one side, probably with turmeric. Thus prepared the paper becomes very hard and looks almost like a piece of hide. But the use of the paste from tamarind seed makes the paper unfit for the transcription of sacred texts. As we shall see later on, in Bengal and perhaps elsewhere in India, a solution of starch made by boiling sunned rice is used for sizing paper. This operation is called tilat. Paper which was subjected to this process was avoided by the old pundits for writing their pithis.

Excepting in the case of correspondence with the outside world, the Nepal Government never uses any machine-made foreign paper.

The Daphne paper, though commonly known as Nepal paper, is really mostly made in Bhutan. But the Bhutias also use the bark of another plant locally known as Dias for paper making. The process followed is just the same as in China and Japan.

Present Condition.

Paper making is a dying industry in the province. Only a generation ago it was still in a flourishing condition. Within this short period it has completely disappeared from many districts. At present the industry, such as it is, exists only in three districts in Bengal: in Hooghly, Howrah and Murshidabad. In Howrah the industry is confined to a single village named Mainah, three miles from Amta Railway Station in the Uluberia subdivision. In Murshidabad it is confined to two villages named Krishnapur and Sirampur, in thana Samserganj in the Jangipur subdivision. In the Hooghly district it is made at Manad and Gosainmalpara in the Polba police-station, at Nalna in the Pandua police-station, at Shabazar and other villages in the Dhanahkali police station and at Bali Dewanganj in the Arambagh subdivision.

It is in the hands of a class of Muhammadans known as Kajjis or paper-makers. The sight of a Kajji village is most melancholy. So far as the paper industry goes the crude hand tools in use in this country have apparently no chance whatever against machinery. At Mainah near Amta in the Uluberia subdivision, Howrah district, out of 100 families that carried on the industry 30 or 35 years ago, only half-a-dozen families still desperately stick to their old profession; the rest having either turned cultivators or labourers or having left the village. The Kajji villages in the Hooghly district are, if possible, only in a worse plight, having been devastated by malaria in addition to the havoc caused by the competition of machine-made paper. Paper making used to be carried on at Nasirganj in the Shahabad district, but the industry ceased to exist some years ago. The Collector of Cuttack reports that about 30 years ago a small paper-making industry was carried on by some Muhammadans of Hariharpur. There are still 7 men who can make paper, but the industry is dead. The paper was made from straw and though rough and coarse was formerly used in the Collectorate Record-room for fly-leaves, but its use has been discontinued for some years.

At Shabazar near Tarakeswar (district Hooghly) in place of 70 dhenkis (as the mortar-and-pestle arrangement for producing the pulp is called) only two are still in use. The large pieces of stone that once served as mortars for the dhenkis lie scattered about, sometimes serving only as steps for their houses. The people sorrowfully point to the large tanks their forefathers had excavated from the profits of paper and which have now become silted up containing only a little dirty water.

The only material now used by the Kajjis of Hooghly and Howrah for making paper is waste or refuse paper. Book-binder’s shavings are a particularly valued material. Formerly old san sacking and old fishing nets
were also used for the manufacture of brown paper, but it has ceased to pay
and is no longer used. In the Jangipur subdivision, Murshidabad district,
however, jute cuttings are still used for making a kind of brown paper.

But if the essence of the art of paper making be, as already mentioned,
the minute subdivision of the raw fibrous material with a view to obtaining
the pulp the small industry as still carried on in the province hardly deserves
to be called paper making at all. It is a mere recasting of the old material
like the production of glassware from broken glass.

The paper produced is a kind of coarse stuff used by Indian merchants and
zamindars for keeping their business accounts. This paper is almost exclusively
used, for instance, in the office of the Maharajadhiraj of Burdwan. It is also
used by astrologers for writing people’s horoscopes. For, though coarse,
it is believed to resist the ravages of insects and climate better than machine-
made paper. Towards the close of the Bengali year, when new account books
are prepared for the coming year, this paper is a good deal in request. After
this during the rest of the year, the demand is small. It appears that the
new anwadeshi movement has done very little to stimulate interest in this
industry. The Kagjis think that while people are to a large extent patronising
handloom products in the matter of clothing, so far as paper goes they
content themselves with the products of the European factories in the country.

An explanation may lie in the fact that unlike clothes a good deal of the
paper in ordinary use is devoted only to a very ephemeral purpose where
the quality of long endurance has no place to warrant the payment of the much
higher price demanded for hand-made paper. Besides, the supply of hand-
made paper is too small at present to meet the demand. But soon the present
pace of workmen who still know the art will be gone, making a revival of
the industry or its improvement impossible.

The Kagjis declare it would be very easy for them to produce thicker or
thinner paper than they now make if there was a demand. Paper, a little
thicker than what is now known as Baleswari, would be very suitable for being
made into post-cards and tramway or even railway tickets. Again if the paper
is left unsized, it would make good enough blotting paper. The mats upon
which the wet sheets are put out to dry, being of very uneven surface, produce
a corresponding unevenness in the sheets, but with a slight improvement in the
arrangement for drying this could surely be most easily remedied.

Manufacturing Process.

The process of manufacture is as follows:—

Waste paper is mixed with lime and steeped for a week or ten days in a
large earthen vat. The lime used is at the rate of three or four seers per maund
of waste paper. When sufficiently softened, the mass is pounded under a dhenki
over a stone mortar. The dhenki used for this purpose is very much like that
used for husking paddy, only somewhat larger and heavier and the head of the
pounder is more strongly bound with iron. The stone mortar is only slightly
grooved and consists of a large piece of basaltic stone, some three feet long,
one and-a-half feet broad and a foot high.

The paste produced after pounding with the dhenki is next kneaded
thoroughly in another vat by trampling under feet like potter’s clay.

The paste is now washed thoroughly in water over a piece of cotton cloth
until all impurities are got rid of and a soft pulp obtained. This is now diluted
with water in a large vat. The contents of the vat are constantly stirred with
a rod to prevent the pulp settling down, and a little is dipped up at a time in a
rectangular skeleton mould, called deele, resting on a fine sieve. This sieve is
made of very thin bamboo slips strung together with horse-hair. The sieve
is known as chhapri, measures 23" by 18" and looks something like a piece of
ordinary verandah chak, only very much smaller and finer. The chhapri or
sieve is stretched over a wooden frame and is held firmly in position by the
deele or rectangular mould pressing on its four edges. On withdrawing the
mould from the vat in a horizontal position the water within the deele drains
off, leaving the chhapri covered with a thin film of fibres, the operator mean-
while shaking the mould so as to evenly distribute the film.
The chhapri covered with the thin film of paper is now taken off from the frame and inverted over a slanting piece of stone covered with a piece of gunny cloth. The chhapri is now rolled away, leaving the film of paper on the stone. The process is repeated and film after film laid down one above another forming a pile. This work is generally done in the morning and the pile is left untouched for the water to drain away till the following day when the sheets still wet are taken up one by one and laid separately on mats to dry in the sun.

After their edges have been trimmed the sheets are next sized or starched one side at a time, and again dried. The starch is obtained by boiling sunned rice in water and is applied with the spongy fibrous shell of a dhawul, renua or vural (Lufa ægyptiaca with the outer skin removed. Some blue stone or copper sulphate is dissolved in the starch to improve the lasting quality of the paper. The starching being light work is generally done by women.

After the sheets have been dried, they are exposed to the night dew to soften them slightly, and next morning they are pressed over a plank with the help of a piece of smooth stone or a conch shell. This, too, is generally done by women. The paper is now ready.

The paper produced is generally white, but is sometimes coloured blue or yellow. The blue colour is imparted with indigo dissolved in the pulp vat from which the films are dipped up with the chhapri. The yellow colour is given by dissolving turmeric in the starch. Yellow paper is only produced in the Hooghly district.

The implements used, it will thus be seen, are of the crudest kind possible; they consist of some earthen vats, a dhenki for pounding the waste paper, a wooden mould, a bamboo sieve (chhapri), a wooden frame for supporting the chhapri, some mats for drying the sheets, some dhundul fruits for applying the starch, and a piece of plank and a smooth stone for pressing the paper. The chhapri alone is a rather delicate thing. It is procured from Berampore in the Hooghly district where it is made. It costs from Re. 1-4 to Rs. 2, and each piece lasts from 2½ to 3 months.

The dipping up of the pulp with the chhapri is an operation requiring some skill. One man can on an average produce 175 to 290 sheets per day (7 to 8 quires). One woman can size one side of 16 or 20 quires and polish about 12 quires of paper per day. The workmen receive from Rs. 6 to Rs. 10 or Rs. 12 per month according to their skill and outturn of work.

One maund of waste paper makes about 30 seers of country paper.

Paper is made in several sizes:

<table>
<thead>
<tr>
<th>Description</th>
<th>Price per Re.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bāra ruhi (the width of 12 fingers laid side by side)</td>
<td>12 quires.</td>
</tr>
<tr>
<td>Sola ruhi or jangri (the width of 16 fingers laid side by side)</td>
<td>4 or 5</td>
</tr>
<tr>
<td>Bhārī (generally used in zamindari sarishtas)</td>
<td>8 or 9</td>
</tr>
<tr>
<td>Balewadi white or blue (a thick paper only made at Amta, district Howrah)</td>
<td>2</td>
</tr>
</tbody>
</table>

**CONCLUSION.**

In this country hand-made paper has apparently no chance against paper made by machine. But in England the most expensive writing and drawing papers are still made by hand. Some 60 or 70 tons of it are said to be made in every work in Great Britain, and on account of its superior strength there is a steady demand for it. In America, however, papers of great strength are manufactured by machinery and not much hand-made paper is produced.

Even in the case of hand-made paper the pulp is always made with machine, only the finest qualities of rags being used for the purpose. The chhapri, instead of being made of bamboo slips, consists of a fine wire cloth. The sheets of paper as they leave the mould, instead of being filed up in direct contact with each other, are separated from each other by felt placed between one sheet and the next. The sheets are dried with particular care and the sizing is done with gelatine. The glazing is done by machine as in the case of other paper. The greater strength of hand-made paper is supposed to be due partly to the time allowed to the fibres to knit together and partly to the fire expansion permitted them during drying.
But in China and Japan common paper is said to be still made by hand. It would be interesting to ascertain under what conditions this has so long been possible, and what the prospects of the industry may be. It is superfluous to say that there is a good deal in common between the industrial conditions of those countries and India, for instance, the low wages of labour, the simplicity of tools, the general absence of the factory system, etc. Some of the students lately sent to Japan by the Society for the Industrial and Technical Education of Indians, might look into the problem. Government might also obtain a report from some authoritative agent on the subject. Poor, ignorant and broken-spirited, it is hopeless to expect the Kaghias to make any improvements in their time-honoured ways without some help from outside. It is impossible to say without an enquiry abroad whether the industry has any chance of being saved at all. The few men who are still engaged in it will soon disappear and their descendants will be forced to betake themselves to other lines of life as best as they can. And then it will be too late to make any effort to revive the industry.

APPENDIX.

SABAI GRASS.

Though not used in the manufacture of indigenous paper this wild grass is extensively used in the paper mills of this country where European machinery has been set up. At one time it was proposed to export it to England as a paper material but it could not compete with Esparto grass obtained from Spain.

It is also used for making ropes. Sabai ropes are not very strong, being inferior even to jute in this respect; but they are very cheap. The best sabai is said to be grown in Nepal, but by far the largest quantity is produced in the Rajmahal subdivision of the Sonthal Parganas district, and is exported from Sahebganj.

The quantity annually exported from this railway station is between three to four lakhs of maunds. Monghyr and the districts of the Chota Nagpur Division, especially Singhbhum, also produce this grass in the hills and jungles, but it is nowhere systematically cultivated to any extent except in the Rajmahal subdivision of the Sonthal Parganas district. The area under sabai grass in the Rajmahal subdivision is estimated at between 20,000 to 25,000 acres.

Like many other grasses sabai produces a feathery ear consisting of minute seeds with hairy appendages. These last are nature's device for the wide dissemination of the seeds by winds, etc.

Sabai rejoices in a dry weather and a high open situation. In a year of heavy rainfall the growth is too poor and what is worse, the fibre is too soft. The grass does not grow on the level ground where the soil is water-logged. It is often found growing luxuriantly on steep hill slopes which are practically unfit for ordinary crops. It does not thrive under shade.

The hill sides are thoroughly cleared in the dry season by fellowing and burning, and the seed is scattered broadcast in the rains without any preparatory ploughing or spading. The seed must be sown from Jeth to Sraban—Bhad is too late for sowing. As the jungle comes up again, two weeding are given, one in Sraban and the other in Aswin.

The plants should be about 18" apart from each other. If the seedling is found to be too thick in any place the plants should be thinned out. If, on the other hand, the stand is anywhere too poor, the gaps should be filled up with seedling taken from where they are too many.

All this is done in the first year. The grass comes up only a foot or eighteen inches high. This first year's growth is of no value and is not cut, care should also be taken that the field is not burnt this year.

In the second year, too, as in the first, the fields receive two weedicings. The grass grows three feet high, and is used to some extent both for paper and for ropes, but it is still very weak.

It is in the third year that the grass attains its maturity. It becomes strong and grows six to seven feet high. From now the fields receive only
one weeding every year—any time between Jeth to Sravan. Nothing must remain in the fields but sabai, no trees or scrub jungle nor any other kind of grass. Beyond this annual weeding the fields receive no other attention.

The grass is cut only once a year, any time from the end of October to the end of January. After it is harvested the grass remains dormant, so to say, till the rainy season sets in, when in about a couple of months it shoots up to the height (as already mentioned) of six or seven feet.

The outturn varies a very great deal, some fields giving only 2 or 3 maunds per bigha (½ acre), while others giving no less than ten times as much. But 12 maunds per bigha may perhaps be taken as a fair average. (See below. Fifteen maunds would probably be nearer the mark.)

In the dry season every year after the grass has been cut the fields are burnt. But this practice should be condemned, as it reduces the outturn of the next year. It is best not to burn the fields at all.

Cattle are very fond of sabai and must be kept off the fields from Asarh till the grass is harvested and removed.

A sabai plantation practically lasts for ever. Many fields are quite fifty years old. In fact once established the grass takes such a hold of the land as to defy eradication. But the outturn continues good for 15 or 16 years only and then gradually falls off. When the yield becomes so small as to be no longer worth troubling about, the fields are abandoned. And it is only when in the course of time from want of weeding a jungle re-establishes itself that the sabai dies out and a fresh plantation becomes possible.

Sabai is grown in the hills which belong to the paharias or hill tribes. They pay no revenue to Government, but receive rent from men who cultivate the lands under them. These cultivators are known as sabai mahajan. They are up-country men who have to pay Rs. 10 every year to Government before entering the hills and who are debarred from acquiring any right to the lands they cultivate under their paharia landlords. The rent is settled by annual agreement, though its amount is practically fixed. After the agreement has been renewed and the rent paid, the mahajan has the fields weeded and watched, and when the crop is ready has it cut and carried away to Sahebganj. There the grass is made over to certain balers who bale and deliver it to the various paper mills under contract. The baling is done with the help of hydraulic presses, each bale being 3½ maunds in weight. The balers or contractors have nothing to do with the cultivation of the grass. They pay to Government a royalty of one anna per maund of the grass exported out of the district.

The rent the mahajan pays to the paharia varies from Rs. 2 to Rs. 8 per bigha (¼ acre) depending upon the quality of the field and its distance from Sahebganj. The average may be taken as about Rs. 5 per bigha.

Taking the outturn of the grass from a bigha as 12 maunds, the mahajan's expenses and profits are said to be as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent paid to the paharia</td>
<td>5.0</td>
</tr>
<tr>
<td>Cost of weeding</td>
<td>0.8</td>
</tr>
<tr>
<td>Do. cutting</td>
<td>1.0</td>
</tr>
<tr>
<td>Do. tying into bundles and carrying to Sahebganj</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8.0</strong></td>
</tr>
<tr>
<td>Price of 12 maunds of grass at 12 annas per maund</td>
<td>9.0</td>
</tr>
<tr>
<td>Net profit per bigha</td>
<td>1.0</td>
</tr>
<tr>
<td>Ditto acre</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Calculated per maund the mahajan's net profit comes to 1 anna 4 pies only.

This account obtain from a man who was himself a mahajan (although the largest mahajan at Sahebganj) was frankly given as showing the minimum profit the business would yield. Obviously it does not err on the side of showing the profit too high. The average outturn of the grass per bigha should probably be taken as 15 maunds instead of 12 maunds. Else, to use a popular saying, the game would hardly be worth the candle.

The contractors deliver the grass at the paper mills on an average price of from Re. 1-3 to Re. 1-4 per maund. Allowing for the price they pay to the
mahajans and the cost of cleaning and baling of royalty and railway freight they make a net profit of 2 annas per maund.

The Collector of Singbhum reports:

Sabai grass is not at all cultivated in this district except rarely by villagers in Dhalbhum for the purpose of converting it into ropes. But it grows naturally in abundance in the valley between two adjacent hills. The Government forests and the forests of the Thakur of Anandpur are full of it. It should be burnt in the hot weather, and then it grows abundantly in the rains. But it cannot be burnt in the reserve forests without risk to the trees. Again in the reserved forests the object is to get the area stocked with trees which kill out the grass altogether.

Hence the sabai revenue is a diminishing quantity in the reserved forests of their district. The present lessee has undertaken to pay Rs. 51,000 for the three years ending 30th June 1909, against Rs. 1,10,000 paid for the three years ending 30th June 1906 and Rs. 1,20,000 paid for the previous triennium.

As sabai grass is dying out fast in the reserved forests, it is expected that when the present lease expires so little will be offered as to render it undesirable to grant another lease owing to risk of fire to the forests by the coolies who cut the grass.

In the forests it is only found scattered here and there and causes much waste of time in collection. The grass should succeed admirably cultivated on the bare hills all along the railway. Under cultivation it will be easily and cheaply harvested. The planting of sabai for profit by villagers is well worth cultivation.

D. N. MOOKERJI,

Deputy Collector on special duty.
Tanning, and Working in Leather in the Province of Bengal.

CHAPTER I.

THE ORIGIN OR INTRODUCTION OF THE INDUSTRY.

One of the earliest inventions of primitive man was covering for his body, and for this purpose no material could be obtained more easily and none could be more suitable than the skins of animals. The use of skins began so early in the history of the human race that it is impossible to fix any date as to its commencement, although it may generally be said that it began when man made his first attempts after civilization. The art of leather-making is of course of a later date, but it could not have originated later than two or three centuries after man began the use of skins. There is, however, no data from which the date of the origin of the art can in any way be calculated, and the art may rightly be said to have sprung into existence from the misty depths of antiquity.

The origin of the industry or its introduction into this Province is likewise lost in obscurity; and although there are a few legends on the subject, they do not seem to fix any period when it originated. There is hardly a village which has not its Muchis and Chamaris; but ask them how, and whence, their industry came, and you will get the same reply everywhere, namely, that their forefathers in past ages were initiated into the mysteries of the art, by the deity. The Chamaris allege that their common ancestor was one Rui Das, or Luidhar, or Ravi Das, and although some say he was an historical personage, who lived in the 14th century and was a follower of Ramanand, a famous Hindu religious teacher, we have no historical record of his life and doings. The common forefather of the Muchis is alleged to have been one Muchi Ram Das, presumably a purely mythical being of whom even myth furnishes us with a very poor record.

The following are some of the legends regarding the origin of the industry.

In Singhbhum, the legend goes, that Mahadeo, the god of destruction, made a mridang (drum), but as it gave out no sound he kept it by. One day it so happened that he threw on it the remnants of his meal, and the drum thereupon began to give out a sound resembling the utterance of the name of Ram. The business having thus become unclean, was abandoned by Mahadeo and was taken up by Rui or Ravi Das, the legendary forefather of the Chamaris.

In Bankura, the legend is that, whenever the divine being would require shoes, he would call upon Luidas to supply them, granting him permission at the same time to take off sufficient skin, for the purpose, from the body of a living cow. Under the direction of the god, the skinless part was plastered over with cowdung, which caused it to be covered with new skin and the wound to heal. On one occasion Luidas, out of avarice, took off more skin than was needed, and the prescribed method of treatment consequently failed. The cow complained to the god, and the latter cursed Luidas saying:—“Your descendants shall have to earn their livelihood by working in hides and skins of dead animals. Henceforth the people will learn the use of articles prepared from hides and skins, and your descendants shall supply mankind with these articles, and shall have to treat the raw hides with lime, Amla leaves and barks of the Asan tree, before they can manufacture shoes, etc., out of them. Thus your progeny shall have to follow an abominable profession, and shall occupy a very low position in human society.” Luidas pleaded for forgiveness, and the god relented and told him that his descendants would worship him, and that Brahmin priests would assist in the ceremonial. So he is worshipped to this day. Being an ascetic, Luidas did not require the services of barbers and washermen, and so, to this day, his descendants shave themselves and wash their own clothes.

In Mymensingh, instead of a myth we have what seems to be a fact. It is said that some fifty years ago one Bodhi Muchar came there, from his native district of Shahabad, with 116 pairs of shoes and as the latter found a ready
sale he started the business of manufacturing shoes and working in leather. Since then many of his countrymen have established themselves in the same business in the district.

In the 24-Parganas, legend ascribes the origin of the industry to the same Rui Das mentioned above. Under the instructions of Biswakarma (the Vedic of Hindu mythology), Rui Das skinned Mahadeo's sacred bull to provide Kartikeya (the god of war, who waged war with the Asuras) with shoes.

There is one fact that may be noticed here, namely that the industry was known in the United Provinces and North-West Bengal long before it came to be known in Lower Bengal. From enquiries that have been made it appears that in many places in Lower Bengal the Chamars and Muchis have emigrated from the United Provinces and Bihar, and this is the conclusion also arrived at, at the recent census. The industry was at one time in a flourishing state in those parts as may be gathered from the ancient history of the land, particularly the Ramayana, which gives a vivid picture of the good old days of the kings of Mithila and Ajodhya. The Mithila and Ajodhya of the Ramayana were, it is understood, contiguous—Mithila covered the area now known as Tirhut, and Ajodhya what is known as Oudh, together with the tracts between the latter and modern Bihar. Leather articles are often mentioned in literature still more ancient than the Ramayana, from which it is inferred that the art and industry came into India with the Aryan race some 3,500 to 4,000 years ago. References have been furnished in another chapter in support of this view.

CHAPTER II.

EXTENT OF THE INDUSTRY.

To form an idea of the extent of the industry, it is essential that we should know (a) the percentage of the population engaged in the industry, (b) the extent to which imported (foreign) and indigenous raw materials are used, and (c) the approximate quantity, or money value, of articles manufactured. Unfortunately, the information available under these heads is extremely meagre; but it is clear that the industry is at present very much limited in extent. The tanners and the manufacturers of leather articles form an infinitesimal part of the total population, and regular tanneries exist nowhere excepting a few in the metropolis and its suburbs. The material condition of the men is very bad indeed and, as they possess no capital, any prospect of an expansion of their business or its improvement is most remote. In the interior the materials—hides and leather—used are of a large extent indigenous. In Calcutta, and other important towns, particularly those which are not very far from Calcutta, foreign leather is used on a very large scale. Even in the interior, wherever there are skilled shoemakers, foreign leather, procured from Calcutta or Cawnpur, is exclusively used for the preparation of articles required for the use of the higher classes. The uneducated classes in the villages, with the Muchis, regard imported leather as inferior to indigenous leather. Foreign leather, they say, is good to look at but not substantial and lasting. It is thus only the uneducated, living away from the influences of city-life, who still use native products. But civilization and education are rapidly undermining such ideas, and the industry is steadily declining. Imported leather is also used for the preparation of saddlery and harness, but these articles are produced on a limited scale.

The manufacturer of leather articles is his own tanner, and the tanning materials he uses are almost entirely indigenous. The implements for manufacturing leather articles are usually of foreign manufacture.

It has been found impossible to obtain reliable statistics showing the quantity of articles manufactured or their money value. In places like Calcutta, Dacca, the 24-Parganas, Patna, Cuttack, Hazaribagh, etc., the outturn is considerable, but in the interior the demand being little the outturn is small, and that again is steadily falling. The estimated value of manufactured articles varies considerably. It ranges between Rs. 1,000 per annum, in some districts, and Rs. 1,500,000 in others, but there are very few districts the leather industry of which can be estimated at so high a value. These figures
include manufactures from indigenous as well as foreign materials, but it is not possible to ascertain what the proportion of articles made from indigenous materials is to those made from foreign materials. Declining with the demand for them, local manufactures are just sufficient for local consumption. It is rarely, therefore, that the products have to be exported because they exceed the country's need.

CHAPTER III.

EFFECT OF FOREIGN COMPETITION.

With the advance of civilization, the improvement of communications, and the growing severity of the struggle for existence, it is but natural that foreign manufactured articles should find their way into countries outside the homes of their production. The degree of the influx depends on the degree of the capability of the country to resist the influx, by putting in the market, side by side with the foreign manufactures, its own products. A successful resistance requires three conditions to be fulfilled, viz., that the quantity of indigenous products is sufficient for the demand, that their quality is not inferior to that of foreign articles, and that their market value is somewhat less than that of the foreign manufactures. Unfortunately, these conditions are not satisfied by the indigenous products, and the result is as might be expected. Foreign manufactured shoes and boots are now sold in all bazaars and temporary fairs. Fifty years back, they were to be found only in the largest towns, particularly in the seaports; but as the days have gone by, foreign manufactures have penetrated into the country, and now there is hardly an important village with a bazar which does not possess a fair supply of them. The native manufactured articles are being supplanted by the former, as a matter of course, and this process is steadily progressing. Nor is this to be wondered at. The articles locally manufactured do not stand equal in competition with the foreign manufactures. A pair of English patent-leather shoes can be had at Rs. 4 to Rs. 5 and the same article manufactured locally cannot be had at less than Rs. 3 to 4. Superiority of leather, shape and make, coupled with a very moderate price, must prevail; and so it is that foreign manufactures are gradually gaining ground. The process of supplanting has hitherto made little progress in the districts which have no means of facile locomotion, e.g., the Chota Nagpur Division, the Sonthal Parganas, etc., but education and civilization are advancing and opening the way to foreign manufactures, and the day is not far off when the latter will command the field in these backward tracts also.

In some branches of the industry, the indigenous manufactures are still holding their own, and it seems they are destined to survive, as foreign manufactures have not been able to supplant them. I refer to indigenous musical instruments, and articles of course make, meant for rough use—water-bags, buckets, oil or molasses jars, bellows, etc. The reason is not far to seek. India is a poor country and must needs prefer the cheapest products. The articles just mentioned cannot be surpassed in cheapness by similar articles of foreign manufacture.

The effect of foreign competition is not, however, limited to manufactured articles only. It is to be found in the case of raw materials as well. Raw skins and hides are collected and bought up by hide merchants, who have their agents in all districts, and are exported to Europe and America, whence they are returned to this country mostly as unwrought leather, and partly, as leather manufactures.

We thus see that the effect of foreign competition is double. It is drawing out of the country its stock of raw materials, hides and skins, causing the prices of what are left to rise very high. It is also supplying the markets with manufactured articles, at such a moderate cost, that the prices of the indigenous manufactures must be lowered, and their outturn reduced, if the industry has still to be carried on by the natives.

The subject of exports and imports has been dealt with in another chapter and statistics have been furnished in the appendices showing the external and the internal trade of the country. The figures, however, are not sufficient to enable us to make an accurate comparison between the quantity of leather and leather manufactures, foreign and those which are purely Indian.
Nor can any help be had from the local manufacturers who are very thinly scattered and are too ignorant to keep written accounts. The only test possible is an inspection of the two classes of articles as they are at present stocked in the shops. This, coupled with enquiries from reliable persons of the locality, as to the proportion of the articles in the past, say 40 or 50 years back, reveals that the production of indigenous articles has steadily declined. Ask any intelligent observer, and he will say that he sees the proportion changing in favour of the foreign manufactures almost from year to year. The following statistics, from the 24 Parganas, will give some idea as to how prices have been affected by foreign competition:

<table>
<thead>
<tr>
<th>Articles</th>
<th>Former cost price of raw materials</th>
<th>Former value of manufactured articles exported</th>
<th>Present cost price of raw materials</th>
<th>Present value of manufactured articles exported</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs. a.</td>
<td>Rs. a.</td>
<td>Rs. a.</td>
<td>Rs. a.</td>
</tr>
<tr>
<td>Cow-hide</td>
<td>3 0</td>
<td>7 0</td>
<td>5 0</td>
<td>6 0</td>
</tr>
<tr>
<td>Buffalo-hide</td>
<td>6 0</td>
<td>24 0</td>
<td>12 0</td>
<td>20 0</td>
</tr>
<tr>
<td>Calf-hide</td>
<td>8 0</td>
<td>2 8</td>
<td>1 4</td>
<td>2 0</td>
</tr>
<tr>
<td>Sheep skin</td>
<td>0 8</td>
<td>1 4</td>
<td>0 10</td>
<td>1 0</td>
</tr>
<tr>
<td>Goat skin</td>
<td>0 8</td>
<td>3 8</td>
<td>2 0</td>
<td>3 0</td>
</tr>
<tr>
<td>Myrabolam</td>
<td>1 8</td>
<td>3 0</td>
<td>3 0</td>
<td>3 0</td>
</tr>
</tbody>
</table>

These statistics may not be fully applicable to the whole of the Province, but they fairly indicate the effect of foreign competition, and, although it is not possible to make a correct estimate of the loss to the indigenous industry, it may be roughly estimated on the whole at 50 to 60 per cent.

CHAPTER IV.

PRINCIPAL CENTRES OF THE INDUSTRY, AND TANNERS.

The principal centres of the industry, the extent of which has already been pointed out are Calcutta and its suburbs, Patna, Dinapur, Darbhanga, Dacca, Cuttack, Monghyr and Hazaribagh. There are no tanneries in the districts. In Calcutta and its suburbs there are 17 tanneries, of which 7 are owned and managed by Europeans and the remaining 10 by natives. A list of them is given in Appendix I.

An illustration has been given of a tannery owned and managed wholly by Indians. It represents the Calcutta Tannery. As will appear from the illustration, the principal appurtenances of a tannery are the following:

1. Dusters and limepits, where the liming processes are carried out.
2. Tanners' beams, on which unhairing and fleshing are done.
3. Bark-water pits, where the tan liquors are prepared.
4. Tan baths, in which hides and skins are soaked.
5. Lapping pits, where the process is repeated.
6. Tan vats, in which hides and skins are handled or pressed.
7. Shaving pins, on which partially tanned leather is shaved on the inner side.
8. Press for smoothing leather.
9. Implements for sleeking and greasing.
10. " " graining.
11. " " varnishing.

The use of these will be understood from what is stated in Chapter VII, on the process of tanning.

The principal implements used in tanneries are as follows:

1. Knives for fleshing, shaving and cutting hides and skins.
2. Instrument for draining off the liquor from hides and skins and for smoothing them.
3. Implements for greasing and sleeking leather.
4. Tanners' beams and shaving pins.
5. Instruments on which leather is beaten to render it soft and supple.
6. Roller or Press for smoothing leather.
7. Graining implements.
8. Vessels for the preparation of the varnishing liquid and brushes to paint with.

A sheet illustrating these implements has been furnished in this volume.
IMPLEMENTS USED IN ORDINARY TANNERIES.

Flashing knife.

Shaving knife.

Knife for cutting edges of skins.

Instrument for draining off liquor from leather — steel blade.

Instrument for draining off liquor from leather — shear blade.

Graining hand instrument made of cork.

Brush for applying tallow.

Coconut brush.

Lummeri hands for boiling varnish.

Spiked board for beating tanned leather on to make it soft.
CHAPTER V.
HIDES AND SKINS.

In commerce a distinction is made between hides and skins. By hides are meant the pelllicles of cows, bullocks, buffaloes and their calves; and by skins, the pelllicles of sheep and goats. The word skin is also used for the pelllicles of pigs, tigers, deer, monkeys, &c.

Hides and skins can be had dry or raw. The raw articles are sold at the prices noted below, per piece.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Rs. A.</th>
<th>Rs. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows and bullocks</td>
<td>2.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Buffaloes</td>
<td>3.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Sheep</td>
<td>0.10</td>
<td>1.8</td>
</tr>
<tr>
<td>Goats</td>
<td>0.10</td>
<td>1.8</td>
</tr>
<tr>
<td>Cow calves</td>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Buffalo calves</td>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Pigs</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Tigers</td>
<td>0.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Deer</td>
<td>0.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Monkeys</td>
<td>0.8</td>
<td>1.0</td>
</tr>
</tbody>
</table>

The skins of the domestic animals in the above list are obtained from two sources, namely, from the butchers who sell the skins of the animals slaughtered by them, and from the villagers whose animals die a natural death, and who allow the Chamars to take the skins in return for shoes and articles required in connection with agricultural pursuits. Zemindars and other owners of landed property usually make arrangements of this kind. They grant permission to one or two Muchis or Chamars to take the skins of dead animals throughout their estates, and in return are supplied with shoes and other leather articles required by them, free of cost, all the year round. For the purpose of obtaining the skins of dead animals, the Chamars and Muchis often wander about the country, and sometimes they take leases of bheels and river banks, known as shashen mahals or shashen bhumi, where carcasses of dead animals are thrown.

The process of removing skins from the carcasses is as follows: The heads and the legs from the lower joints are separated. Then a long skin-deep cut is made from the neck to the tail and four shorter cuts along the four legs commencing from the long cut and reaching down to the joints. The skin is then separated. In the case of goats and sheep, the skin is removed by simply pulling it off the body which is suspended by the hind legs for the purpose. The skin comes off as the pillow-case comes off the pillow. The skins of the larger animals—bullocks, cows, and buffaloes—have to be separated from the flesh little by little, by means of the slaughter knife, and great care is needed in the process, as a slip of the hand will cause a puncture in the skin and reduce its value.

A distinction is made between the skins of castrated goats and of those which are not castrated. The former are somewhat thicker than, and have not the disagreeable odour of, the latter, and fetch higher prices than the latter. Skins are sold by their measurement in inches. The length is measured from the neck to the root of the tail and the breadth is the measurement round the belly. Skins exceeding 36 inches in length and 20 inches in breadth are called heavy and fetch the highest price. Those which are 32 to 35 inches by 18 inches are called naat; 30 to 31 inches by 18 inches, halka; 28 to 29 inches by 18 inches, athais; and 25 to 27 inches by 18 inches, sattaish. Skins of smaller dimensions are classed as kid skins and fetch low prices. The price of dry heavy skins is Re. 1.4 to Re. 1.8 per piece. Skins without hair are not sold. Falling off of the hair, marks of cut, bruise or sore, and holes, are regarded as defects. Even very slight defects in skins of the class heavy or athais will reduce them from the first to the second class. When the defects are numerous or serious the skins are called ferto, and when they are worse they are called double ferto. Raw skins are preferred to dry ones, as in the process of cleaning and salting the hair falls off and the value of the skins is consequently reduced. Skins and hides are sold in entire pieces. If they are cut in pieces or are mutilated, they
are not taken by the hide merchants, and are sold to the Muchis and Chamars at a nominal price.

Hides when thoroughly dry are sold by their weight in pounds. The price is As. 8 per pound for the best quality. They are divided into four classes, halali, mardari, dogi, and rawtul or farta; the first named being the best in quality. Hides of a very superior class are called Commisariat hides, but they cannot usually be had in the interior. The defects in hides are of the same nature as the defects in skins, but attention is not paid to a slight falling off of the hair in the case of buffalo hides. In the case of raw hides, taken by their weight, a deduction of 1/3 of the weight is made in order to bring it down approximately to the weight of dry hides. The allowance in the case of partially dry hides depends on the degree to which the hides have become dry.

The skins of wild animals are obtained from shikaries—professional hunters—and from tribes and races inhabiting hills and jungles, e.g., the Southals, Gonds, Kols, Hos, Mundas, Oramus, Paharias, &c. It is extremely rare that a wild animal is found dead from natural causes. The skins obtained are therefore invariably those of animals killed, and unless the animals are shot by guns their skins are damaged more or less. Animals are sometimes trapped and then battered to death. The skins of such animals are badly damaged and have no market value.

CHAPTER VI.

TANNING INGREDIENTS.

In this country, with its wealth of vegetable growth, ingredients for tanning are not wanting. They are to be had in the jungle produce as well as in the products of cultivation. Numerous trees and plants furnish the materials in their bark, roots and leaves, and the greater part, being waste products, are obtained without cost, or at a small cost. Unfortunately, however, they are not made the best use of through the ignorance of the people, and there are many ingredients the use of which is not known, or, if at all known, very imperfectly. The following materials have been found in use among the indigenous workers:

1. Lime.—It is obtained by burning ghating or kankur, which may be gathered in any quantity from the beds and banks of rivers and streams and from the fields. The quantity required is small; 5 seers are sufficient for tanning two buffalo skins, or four cow skins, or 12 goat skins. The price is 2 or 3 seers for a piece. Sometimes the Chamars pay a yearly rent in order to get the right of collecting the glating.

2. Shell lime or lime obtained by burning shells.—It is the same as that used for building purposes. Price, two seers per anna.

3. Astra, Astra, Ata or Amlaki (Phyllanthus Emblica).—The leaves contain some essential oil or fat and 18 per cent. of tannic acid. The bark contains about 13 per cent. of tannic acid. The dried pulp portion of the immature fruit contains about 35 per cent. of tannin, but in the ripe fruit only traces of the tannin are found. The leaves and bark are dried and powdered and used for making the tanning liquor. It produces white leather. Price, 4 annas to Re. 1 per maund.

4. Harra, Harra or Myrabolam (Terminalia Chebula).—The dried fruits are extremely rich in gallo-tannic acid. They contain 31 to 44 per cent. of tannin. The bark is also very rich in the same substance, but the men use the fruits and not the bark. Price of the fruit, 2 annas per seer.

5. Boona or Bahera (Terminalia Bellerica).—The fruit is used, but it is not very rich in tannin. Price, 2 annas per seer. It produces yellow or brown colour, but with harkash it gives a black colour.

6. Babul or Ejar (Acacia Arabica).—Fruits or leaves and bark are used for the production of buff coloured leather. The husk or covering of the seeds has been found to contain as much as 60 per cent. of tannin and the bark 19 per cent. of it, but the seeds contain practically nothing.

7. Dhan (Anogeissus Latifolia).—Leaf is used. It produces yellow leather.

8. Biser or Kus (Zizyphus Jujubus).—The root dried and powdered is used. It produces brown leather.
9. *Arjun* (Terminalia Arjuna).—Leaf and bark are used, but commonly the bark. Price, 1 piece per seer. The bark contains about 8 or 9 per cent. of tannin and is sometimes used as a substitute for, and sometimes in conjunction with, the *Asan* or *Garan* or *Babul*. Used by itself it gives a brown colour.

10. *Taur* or *Teri* (Cassipinca Digina).—The trees are thorny, and the fruits are hard chitinous brown pods resembling dhan fruits. The fruits are dried and powdered and are considered the best material of all for the production of white leather. Price, Rs. 4-8 per maund. It is superior to *Divi-Divi* not only on account of its greater richness in tannin, but also because its extract does not undergo fermentation which is deleterious to leather.

11. *Asan* (Terminalia Tomentosa).—Its bark dried and powdered is used for the final tanning of heavy skins. Price, 2 annas to 6 annas per maund. It contains from 57 to 13-6 per cent. of tannin and imparts a characteristic red colour to native leather and is commonly used.

12. *Bänba* or *Bandra* or *Ban* (Loranthus Longiflora).—It grows as a parasite on mango and mahua trees. The roots, twigs, and leaves, dried and powdered, are used.

13. *Sôl* or *Sakhu* (Shorea Robusta).—Its bark is used as a substitute for that of the *Asan*. It renders the leather brittle, and the latter consequently cracks and splits. Price, 2 annas to 6 annas per maund. Chemical analysis shows that it has tannin from 4 to 16 per cent. of the same kind as that contained in *Acacia Catechu*. The bark is often used in conjunction with the *Asan*, *Babul*, *Aora*, etc.

14. *Khari minak* or *black salt*.—Price, 1½ seers per anna.

15. *Kath* or *Khât* (*Acacia Catechu*).—Extracts prepared from the bark and the wood are used. Price, 10 annas per seer. It contains tannin to the extent of 7 or 8 per cent. and produces a dark colour.

16. *Mahua* (Bassia Latifolia).—The bark and leaves are used mostly in Bihar.

17. *Siria* (Albizza Lebbak).—The bark is used in some places. The price is 2 to 3 annas per seer.

18. *Piyal* (Buchanania Latifolia).—The bark is used.

19. *Divi-Divi* (Cassipinca Coriaria).—A very valuable tanning material introduced from South Africa about the year 1834. The pods have been found to contain 30 to 50 per cent. of tannin. The cultivation of the tree has not, however, been successful in Bengal, as the climate is unfavourable to its growth. Its merits are richness in tannin and excellent weight-giving property. Its defect is that its extract undergoes fermentation and causes red stains on the leather.

20. *Gôb* (Diospyros Embryopteris).—The fruits are used for colouring leather brown or black. To blacken a cowhide, two or three fruits are squashed in a seer of water to which are added 5 or 6 powdered Myrabolans, one chittak of green vitriol, one chittak of smashed-up onions, and a few pieces of old iron. The hide is then soaked in the mixture for a day and is then taken out and stretched and dried, and the operation is repeated two or three times. The price of the fruit is Rs. 1 to Rs. 2 per maund.

21. *Jiyal* (Odina Wodier).—The bark, which yields a brownish-red colour, is used.

22. *Robina* (Soymida Febrifugia).—The bark, which yields a dirty brown colour, is used for tanning. It is sometimes used in combination with other tanning materials, e.g., the *Nathan*.

23. *Kud* (Diospyros Melanoxylon).—The fruit is dried, powdered and soaked in order to obtain the tanning liquor.


25. *Asnâla* or *Bar* (Ficus Religiosa).—The bark is used. The price is Rs. 3 per maund. It produces a light brown colour. Mixed with other barks it produces a black colour.

26. *Sidha* (Lagerstroemia Parviflora).—The bark is used. With *Asan* it gives a black colour.

27. *Kanta* or *Abir* (Mallotus Philippinensis).—Leaves are used.

28. *Am* (Mangifera Indica).—The bark and leaves are used. With *Aola* it gives a black colour, and with lime, a kind of green colour.
29. Bakul (Meriago Elengi).—The bark is used and produces a light brown colour. It is sometimes used in combination with the Asan, and then it produces a reddish brown colour. Price, 3 annas per seer.
30. Dhatki (Woodfordia Floribunda).—Leaves and flowers are used. The blossoms and leaves are dried in the sun and then made into the tanning liquor. The leaves contain as much as 30 per cent. of the tannic acid and produce a dirty red colour.
31. Soanal or Sunari (Cassia Fistula).—The bark is used in Lower Bengal and Orissa, often in combination with the Asan or Teli, or both.
32. Sindari (Heritiera Fomes).—The bark is used. Price, Re. 1-4 per maund.
33. Jika.—The bark is used.
34. Lodha or Nodha (Symplocos Racemosa).—The bark and leaves are dried, powdered and made into an infusion. It gives by itself a yellow colour, but it is often used in conjunction with Harra.
35. Natkati (Bixa Orellana).—The fruit is powdered and used and gives a yellow colour.
36. Pounded rice or fermented rice.
37. Ghio. The fruit is used. The tree grows in the Orissa Garjats.
38. Karoi.—The bark is used. Price, 8 annas per maund.
39. Gatigara (probably a terminalia).—The bark is used. Price Rs. 2 per maund. It gives a red colour.
40. Giras or Goran (Ceriops Roxburghianus).—It can be had in abundance in the Sundarbans, whence it is imported into Lower Bengal for tanning purposes. The bark is used. Price varies from Re. 1 to Rs. 2. It makes the leather durable and impervious to water. The solution is sometimes prepared by boiling the bark with a quantity of til oil.
41. Dholo.—Leaves are used.
42. Dava or Dihut (Woodfordia Floribunda).—Leaves and the bark are powdered and used. The infusion gives a brown colour.
43. Saya (Achryranthes Lanata).—Leaves are used.
44. Kakana (Pentapeta Arjuna).—Leaves are used.
45. Guava (Psidium Pyniferum).—The bark is used.
46. Nonta.—The bark is used.
47. Kourail.—The bark is used.
48. Kanak (Ehretia Umbellulata).—The bark and leaves are used.
49. Tamarind (Tamarindus Indica).—The raw fruit is used.
50. Bhusi (Bran).—1 anna per seer.
51. Linseed oil.—Rs. 22 per maund.
52. Fish oil.—Rs. 8 per maund.
53. Bhuus kali (Lambplack).—Re. 1-4 per seer.
54. Tailor.—Rs. 1-5 per maund.
55. Indigo.—Rs. 2 per pound.
56. Khintharpat or Laha (extract from wax).—It gives a red colour.
57. Hiranaksh (Sulphate of iron or copper or green vitriol).—It gives a black colour. Price, Rs. 6 per maund. It is principally used in combination with Harra and Cudla.
58. Alta or liquid vermillion (extract of wax).
59. Sambal khar or Saktina (arsenic).
60. Philkiri (alum).—It gives a white colour. Price, 4 annas per seer.

I may add here the names of the principal tanning materials used in England. The results they will give in this country and their suitability to it may be tested. The bark of the Oak is considered one of the best materials. It contains 10 to 12 per cent. of tannin. Valonia, or the seom-cup of an evergreen oak growing in Greece and the Archipelago, is considered very good for sole leather. It contains 10 to 35 per cent. of tannin. The bark of the Mimosa from Australia contains 17 to 30 per cent. of tannin. The bark of the American Hemlock Pine, which contains 14 per cent. of tannin, and gives a red colour to leather, and the bark of the Spanish Chestnut, which contains 14 to 20 per cent. of tannin and gives a yellow colour, are used as colouring ingredients. Myrabolans, Cutch, and Divi-Divi, which were introduced within the last hundred years, are known in this country. Some of the other materials are...
the Algarbilla pods from South America, which contain 50 per cent. of tannin; the Smaohn leaves from South Europe and South America, which contain 16 to 27 per cent. of tannin; the Maca tree bark from Venezuela, which contains 24 to 30 per cent. of tannin; the rind of the Pomegranate fruit which contains 13 per cent. of tannin; the bark of the Peppermint which contains 20 per cent. of tannin; the bark of the Peresolyn from Chili, which contains 20 to 24 per cent. of tannin and is very suitable for heavy leathers.

CHAPTER VII.

THE PROCESS OF TANNING.

No use can be made of hides and skins without tanning them, as in their natural state they are liable to putrefy in no time. To save them from putrefaction, tanning is required; but merely to prevent putrefaction no elaborate and prolonged process is necessary. Hides and Skins are turned into various products to meet the requirements of man, but before anything can be turned out of them they have to be made firm, durable, impervious to moisture, soft and supple. Tanning imparts to hides and skins these properties, and, as will appear, they have to be subjected to a series of operations occupying a considerable period of time. In the course of the treatment, the tannins, the gelatins and albuminoids in the hides, a series of insoluble compounds which result in leather. Similar results may be obtained by other reagents in place of tannin, e.g., alum or some acids or chlorides.

The process of manufacturing leather is divisible into two main heads, of which tanning is one and currying the other. The operation begins with treating raw hides and skins with tannin solutions and ends with manipulating them with fatty matters. Currying further softens leather, renders it more water-proof and improves its appearance. Curry, however, is not practised by the village leather manufacturers and the treatment of leather with oil or fat referred to in section XI is not a part of the process of currying it. In this monograph only the process of tanning has been described.

The process of tanning is almost the same everywhere. The difference lies in the tanning materials used, and the care, attention and time bestowed on the work. The method of treating the skins of goats and sheep differs slightly from that of tanning the hides of bullocks and buffaloes. The skins of deer, tigers and monkeys are dealt with somewhat differently. The successive stages in tanning bullock and buffalo hides are as follows:

I. Cleaning and drying green hides.—The green pellicle laid from the carcass of a bullock, or a buffalo, is first of all washed well, to remove mud and blood stains, dung plasters and other kinds of dirt. Plain water is used for the purpose. After washing, it is placed on the level ground exposed to the sun, the ends being pinned to the ground by small pegs in order to prevent contraction. If the hide has a bad smell, a solution of khar salt is applied to remove the smell. Sometimes before placing it in the sun, the reverse of the hide is plastered over with earth and water. Earth is used in the dry season and khar salt in the wet season. Two or three days sunning is sufficient in the dry season, but in the wet season a longer period is required. In the rainy season the hide often begins to rot, and in such cases the rotten portions are clipped off to prevent the rest of the hide from being spoiled. The hides thus dried are fit for exportation and are exported in this state from the interior. Unless they are dried and salted they must be subjected to the processes of tanning at once or they will rot. Usually, however, some time elapses before they are taken up for tanning and as the climate of the country is against their preservation in their natural state, the usual practice is to dry and salt them.

II. Softening of dry and hard hides.—The foregoing process renders the hide hard and dry. To soften it, it is steeped in water. Another method is to apply earth and water, or water only, and to roll the hide up and keep it by for a few days.

III. Washing the hides.—The washing referred to above is a preliminary one and meant only to remove the loose dirt, i.e., dirt which has not gone deep into the hide. The second washing is a more thorough process. The hides are steeped in a ban or earthen cauldron, or wooden tub, for a day, and are then
rubbed with the hands or scraped with a blunt instrument, so as to thoroughly clean them of all dirt. Wet salted hides, dry salted hides, and sun-dried hides, obtained from merchants and dealers in hides, have to be similarly steeped in water, and washed, in order to free them from salt and to render them uniformly flaccid and soft. After washing they are stretched out on the ground to remove creases and marks of folds.

These are all only preliminary processes. The next operation is an important one.

IV. Liming the hides.—The flesh side of the hide is next smeared with a thick layer of lime. It is then rolled up, folded, and immersed in a strong solution of lime in a tub or pit, and weights are put over it to cause complete immersion. It is usually taken out and aired every day for an hour or so. Some, however, soak it for three or four days continuously; after which they unroll it, air it, fold it up again, and put it into the lime vat for another period. During the period of its immersion it is often stirred in the solution, to assist the work of the lime, and in order to obtain a uniform spreading over of the substance. But this process has a more important object, viz., prevention of heating and rotting of the hide. In the cold weather, cowhides are kept in lime water for 8 to 12 days and buffalo hides for 15 or 16 days; but in the hot weather, the usual periods are 5 or 6 days and 10 or 12 days. If the hide is kept in lime for a longer period than necessary, it will decompose. This process of liming is commonly known as “sweating.” For one buffalo, or two bullock or cow hides, or six goat or sheep skins, 3 seers of freshly burnt and clean lime are used, mixed with 7 seers of water. If the hide is dry, it is first soaked in water for about 12 hours and is then put into the lime-pit, and the period of liming it is longer by one to three days according to the season and the class to which the hide belongs.

The object of liming is the same for all classes of hides. It is to swell the hides, to make them more porous and therefore more permeable to the tanning solutions, to render them soft and flaccid, and to loosen the fur and the fleshy and fatty substances attached to them.

V. Unhairing and Fleasing the hides.—The hide is then taken out of the lime-pit or tub and the water wrung out of it by twisting it tightly. It is then put on a sloping block of wood called the tanner’s beam (kanta pin), or on a stone called sille, or on the floor, or on the smooth ground, as straight as possible, and the hair scraped off by means of a blunt knife called banki or khurchuni. The latter is a slightly curved instrument provided with one, but usually with two handles. It is held fast on the hide and dragged on its edge with a firm and steady hand. If the tanner is too poor to possess a knife he uses a bit of broken earthen-ware, or a brick, or a jhama for the purpose. The inner side of the hide is then scraped clean of its adherent flesh and fat with a sharper knife called bandar or raupa, convex and semi-circular in shape, and resembling somewhat the gardener’s weeding knife, but a little wider at the head. Sometimes only the khurpi—an ordinary iron scraper—is used. If scraping is not sufficient the fleshy and fatty substances are pared off with the knife.

The removal of the hair requires no labour at all. The liming purifies the roots of the hair and causes the latter to fall off easily. Sometimes it is sufficient only to rub the hairy side with the hands or with a piece of cloth.

The removal of the hair and the flesh is usually done one immediately after the other. But sometimes an interval is allowed between the two. After the hair has been removed, the hide is placed in a tub of water and washed three or four times. It is then soaked in water for about 12 hours, during which the water is changed twice, and after which it is spread on a smooth surface with the flesh side uppermost, and the flesh scraped off.

Ordinarily it takes a full day to unhair and flesh a big hide, but three goat skins can be done in one day.

If the hair is to be kept intact, the raw skin is spread out in the sun with the hairy side down and the flesh side up, and the edges are fixed to the ground by means of pegs to keep it straight. The flesh side is then rubbed hard with khari or rock salt to remove the flesh and fat.

VI. Washing away the lime.—This is the last process preceding tanning proper. The hide has now to be thoroughly cleaned of lime, and for this purpose it is put into a tub of clean water and rubbed with the hands. But
the use of running water is preferable, as the hide can then be cleaned better. To thoroughly clean it, the hide is rubbed with soap in a tub of bran and water, in the proportion of 2 pounds of bran to a gallon of water. Instead of soap, some people rub it with alum and then wash it. Others again steep it for a period of 10 to 15 days in a diluted solution of gruel or water of boiled rice. In order to remove the smell of lime and gruel they sprinkle salt water over the hide, and after this they twist the hide like cloth to take out the water. In some places the hide is dipped in a solution of the juice of mahua leaves for a double purpose, viz., to clean off the lime and to distend the pores for the process of tanning proper.

VII. Tanning Proper.—The technical expression in the vernacular for tanning is making the leather wucha. The tannic mixture is called kush jal. In the preceding chapter, the names of the various tanning ingredients in use have been given, and in some cases their tannic property has also been stated. The fruits, leaves and bark of various trees and plants furnish the materials. The tannic mixture is produced in several ways. The materials are gathered green and are dried, broken up and simply mixed with cold water or boiled in water and used at once. Sometimes the raw material is boiled. Sometimes the dry material is soaked in cold water long enough to yield the decoction required. Sometimes the tanning materials and the hides are soaked together in a vessel of water. Whatever the process of preparation, there can be little doubt that it is very perfidious and crude. A succession of tanning liquors is used sometimes with a single material and sometimes with a combination of materials. The general idea seems to be that the stronger the infusion, the more satisfactory the results to be expected and the shorter the duration of the process necessary. But it does not appear that the men have any clear ideas as regards the potency of the infusions they use.

The tanning is carried out in two ways, viz., by steeping the hide in a solution of tannic material and by infiltration of the decoction through the hide. The steeping process is as follows:—The hide is put in a vat containing the infusion and is trodden with the feet or rubbed with the hands. Some people thrust the hide in a manner similar to that adopted by washermen in washing dirty linen. The object of doing all this is to force the tannic juice into the pores of the hide and thus to impregnate it with tannin. The treading is employed for two or three hours a day; or, if it is rubbing, four or five times a day. The treading or rubbing is gradually diminished and is eventually stopped if the steeping is continued for a long period. Generally after two to four days the hide is taken out and the superfluous moisture squeezed out. Sometimes instead of twisting the hide, it is pressed on the "draining table"—a block of wood or stone or the cemented floor—in order to take off the moisture. The old solution is now thrown away, and the hide is soaked in a new and stronger solution of some other tanning ingredient. After two or three days the hide is removed and the water is squeezed out of it, and it is then put into another mixture, and this process is continued as many times and with as many tanning mixtures as the tanner wishes. Five or six steepings are considered essential for cow hides, and eight to ten for buffalo hides. In order to obtain very substantial leather, sometimes as many as fourteen solutions are used one after another. But the ordinary Muchu or Chamar does not take so much trouble, and he does not give more than two or three soakings to his hides.

Some Muchis do not at all use the process of steeping, and instead rub the hide on both sides with a paste made of the powder of a tanning ingredient and water. They then dry the hide in the sun for a period of four to eight days.

Others again do not use the second process of tanning proper, viz., infiltration, but content themselves only with steeping. They are, however, careful that the latter is really a thorough process, and for this purpose they place the hides in lapping pits after they have undergone sufficient steeping in the bark solution pits. The lapping pits are pits in which the hides are laid in strata with usually raw babul bark between each hide and the whole sunk in a solution of the same ingredient. The process of the lapping pits is repeated four or five times in the case of cow and buffalo hides and lasts from eight to ten months; it is repeated two or three times in the case of goat and sheep skins and lasts from four to six months.
Yet another process remains to be mentioned. In some places after the first course of steeping the hide is removed from the bath and is placed on a wooden plank and scraped by means of a wooden instrument like the hairing knife called \textit{beonga}. After the second course of steeping it is again scraped and brushed until it regains the original colour.

We now come to the next process, \textit{viz}, that of infiltration, a process generally followed by Muchis and which comes after that of steeping in tankers. For this purpose the hide is sewn up on three sides and made into a bag resembling the bhishi's \textit{masak} (leather water-bag). A tanning infusion is then poured into the bag until the latter is quite full. The open side is then sewn up and the bag suspended from a tripod made of three bamboos or poles. Underneath the bag is placed a vat which catches the infusion, as it percolates through the hide and falls out drop by drop. Instead of the infusion prepared beforehand many tanners put inside the bag the tanning materials and then pour water into the bag. The infusion is thus made inside the bag. Some say that the object of this process is to clean the hide and to expel all fatty matter from it. But this cannot be, as in the first stages of the tanning the hide has already been cleaned as thoroughly as possible. The real object is to complete the impregnation of the hide with the tannin. The infiltration is repeated as often as the tanner desires. When the inside has been well done, the bag is turned inside out and in the reversed bag the tanning liquid is poured, and the process is continued until the tanning is satisfactorily done. A test as to whether the infiltration is complete or not is to beat on the hide to find out the sound it gives. If the sound is hard, and not soft, the tanning is considered done. If after three or four days the sound is soft, the hide is taken down and put back into the tanning pit for a few days. Soft sound on striking the hide, together with the appearance of granular excrecences on the latter, are signs indicating that the process has been unsuccessful.

Of the tanning ingredients mentioned before, the following are mostly used. They are shown in the order of the extent of their use:

\begin{enumerate}
  \item[(a)] Harra or Harijaki (\textit{Merybolam}).—It is used almost everywhere.
  \item[(b)] Babul (\textit{Acacia Arabica}).—Used almost as much as the preceding.
  \item[(c)] Amla, Aora, Amlaki (\textit{Phyllanthus Emblica}).—It is very extensively used.
  \item[(d)] Asan (\textit{Terminalia Tometosa}), Am bark (\textit{Mangifera Indica}), Garan bark (\textit{Ceriops Rothschildiana}), Sal or Sakhna (\textit{Shorea Robusta}) come next. Of these Asan and Garan are more in use. The latter is used only in Lower Bengal.
  \item[(e)] Teri or Taur (\textit{Casualia Digina}), Mahua (\textit{Bassia Latifolia}), Arjun (\textit{Terminalia Arjuna}), Bahera (\textit{Terminalia Bellerica}), Dhawa or Dalna (\textit{Woodfordia Floribunda}) come next. These have been placed in the order of the extent of their use.
\end{enumerate}

Where two or more ingredients are used mixed, it has been found that generally the following combinations are made:

\begin{enumerate}
  \item[(1)] Harra and Nathan.
  \item[(2)] Do. and Girau or Garan.
  \item[(3)] Do. and Babera.
  \item[(4)] Amla and Gilo
  \item[(5)] Do. and Dhola.
  \item[(6)] Babul and Bahera.
  \item[(7)] Do. and Harra.
  \item[(8)] Do. and Garan.
  \item[(9)] Do. and Am.
  \item[(10)] Babera and Dalna or Dhawa.
  \item[(11)] Asan, Sakhna or Sal and Babul.
  \item[(12)] Harra, Garan and Teri.
  \item[(13)] Babul, Garan and Harra.
\end{enumerate}

In the process of steeping, the materials commonly used are—Harra, Garan, Teri, Babul, Am, Amla, Mahua and Bahera.

In the process of infiltration the materials commonly used are—Asan, Dhawa, Sal or Sakhna, Babul, Banha, Dhan and Arjun; but most of all, and in preference to all, the Asan.
VIII. Making the leather compact, soft and supple.—After infiltration has been completed, the bag is opened up, and the leather stretched out on a flat board, and the tanning ingredients are dusted off or washed away. The leather is then allowed to dry partially. Next comes the process to make it compact, soft and supple. It begins with an application of khari salt, fried and powdered, mixed with flour or pounded rice, or without it, on the inner side of the leather. The salt is rubbed till it permeates the leather, and a little water is sprinkled over the latter, if it is tough. It is then rolled up and trampled under foot for an hour or so. After that, it is unrolled and placed over the mouth of a hollow block of wood called ootkli and hammered by the end of a heavy pole called shanmat. In order to have the whole surface beaten on, the leather is moved about over the ootkli. The hammering process lasts for a couple of hours or so, and its object is said to be to give compactness to the leather. In tanneries the process consists of striking the leather with force—like the washerman striking his linen on the washing board—on a spiked surface, i.e., a block of wood covered thickly over with blunt wooden spikes. The inner surface of the leather is, thereby, broken up and the leather made supple.

IX. Shaving.—Next, creases and marks of folds, etc., are removed, and for this the outer side of the leather is scraped, rubbed and scoured with a knife of khair wood (if the tanner possesses it) or with merely a piece of split bamboo, somewhat like a paper-cutter, called the pelangi. After this, the leather is finally dried in the sun before it is subjected to the process of shaving. The leather is now spread over the shaving pin—a sloping board—with the inner side upwards, and the surface is carefully worked upon with a sharp two-handled convex knife. The rough parts are pared off and the leather is made uniformly even. The parts which are thicker are also sliced away, in order to make the leather uniformly thick.

X. Smoothening.—In the villages all that is done in this process is to spread out the leather on an even surface and to place over it weights. In tanneries the leather is spread over a smooth surface and rolled over with a heavy roller. One man catches the leather spread out and two men work the roller up and down over the leather till perfect smoothness is obtained. Or instead of using the roller, the leather is placed on a smooth surface under a press and is allowed to remain there till it is perfectly smooth.

XI. Polishing and graining.—The leather is now dressed with fish oil and tallow or pig's lard, and when the application has well soaked in, it is rubbed, by those who possess it, with a three-sided steel instrument called a "sleek," to remove any crease and unevenness still left. The ordinary village Muchi polishes his leather by drawing over it a flat smooth piece of iron. Graining is a process known only to regular tanners and is followed in regular tanneries. To produce grained leather it is worked on the greased outer side with an implement with a cork surface, an illustration of which is given.

XII. Colouring and Varnishing.—Varnishing is not known to the village Muchis. Varnished leather is only produced in regular tanneries, i.e., in Calcutta and its suburbs. The village Muchi usually colours his leather. He produces leather of different shades of red, black, yellow and white, the quality of which depends on his knowledge of the colouring ingredients and the method of using them. His knowledge of the materials is very limited indeed, and his method of colouring very primitive. To obtain black leather he simply rubs black ink composed of myrobolan and ferrisulph. He colours leather red by applying laha or khunkharap (extract from wax). White leather is manufactured by the use of botha or nodha; brown, by the use of the dahua or dhawa decoction; orange, by the application of colour extracted from the kum flower. There is no gloss or glaze in the leather, and the colouring is so imperfect that it can only pass muster before rural folk, unacquainted with foreign manufactured leathers.

Tanning goat and sheep skins.—The process of unhairing and fleshing these is much the same as in the case of the hides already mentioned. The principal difference being that the period of the limeing of these skins is usually two or three days only. After this the skins are soaked in amani (water in which rice has been boiled) for three or four days. They are then spread out on the ground...
and sprinkled over with salt. After a few hours the moisture is rung out, and the skins are again spread out and from time to time twisted and pressed with the hands to make them soft. Some tanners soak the skins in a solution of alum, instead of in amani, for two or three days, in order to make them smooth and soft. Next comes the process of colouring, which consists in soaking the skins for three days in a solution of sunari or sonali bark in order to obtain a brown colour; or in alta (extract of wax) for a red colour; or in alum for a white colour; or in ferrisulph for a black colour. If a repetition of the soaking is necessary a new bath is prepared and given, as the same bath can be used only once.

Sometimes the skins are not at all tanned; but are merely tawed by the application of khari.

Method of treating tiger, deer and monkey skins.—The skins of tigers and deer are also tanned by the village Muchis, where these animals can be had, viz., Orissa, Chota Nagpur, the Darjeeling Terai, the Sunderbans, &c. Monkey skins are merely tawed by the use of khari, but as this animal (the langur, which is to be found almost everywhere) is held sacred and is not killed, the work in this line is nominal.

Tiger skins are dealt with in the following manner. They are rubbed with khari and phiktiri (alum) and then dried in the sun. Next they are made tough by the use of Sanka (arsenic). They are then rubbed with dahi (curd) mixed with chalk. For deer skins the hair of which has to be retained, the process is similar, but where the hair is not required, the following process is followed. The skin is soaked in water and the hair scraped by a knife. It is then well cleaned in water and soaked in harra solution. A second steeping in harra is next given, and the solution is rubbed into the skin. Then follows a steeping in bakul solution, and it lasts three days, and the solution is well rubbed into the skin. The latter is then sewn into a bag, and an infusion of bahera is poured into it. When infiltration is completed the skin is dried and dahi is rubbed on it. This completes the process.

These skins are treated in such a defective manner that they never last long. The hair falls off and the skin is attacked and damaged by insects. Tiger skins, bear skins, deer skins, and the skins of other wild animals are, therefore, usually sent to Calcutta to be treated by taxidermists. Their processes are not indigenous and need not be described in this monograph.

CHAPTER VIII.

THE DEFECTS OF INDIGENOUS TANNING.

Leather, like other commodities of a marketable nature, is judged by certain general standards, such as colour and texture. The lighter the shade and the closer the texture, the superior is the quality of the leather.

The native manufactured leather has no claim whatever to superiority of quality as it has many defects as pointed out below. But before entering into the defects of indigenous leather and indigenous tanning, let us see what the hides are. As a rule, hides of a superior quality are not available. The cattle are weak, thin and poor in growth. The hides are consequently wanting in strength, compactness and thickness. Moreover, they are often spoiled by sores and skin diseases. The practice of branding the diseased part of an animal's body, on the supposition that the disease will be cured thereby, really deteriorates the skin. Then the Muchis are careless in taking off the skins from dead bodies, and this results in punctures and cuts in the skins. Thus the material to work with is very inferior if not defective.

The native manufactured leather is neither soft nor durable nor impervious to water. Often it is raw and ill-smelling. It cracks and splits or rots easily. All this indicates serious defects in tanning. The indigenous process is as tedious as it is crude, and time and labour could be saved and better results obtained by the introduction of modern methods. To begin with, dry hides could be better softened by the use of sulphide of sodium. Putrefaction in the process of liming could undoubtedly be prevented by using solutions of borax or carbolic acid. To remove lime and to distend the pores more effectually before commencing actual tanning the leather should be treated with dilute acids.
The tanning extracts are generally of a very inferior kind, as they are prepared carelessly. The green materials are obtained often in a most careless way. The bark, for instance, is removed by beating it with mallets or sticks, and the result is that much of the tannin juice is lost. It ought to be removed by means of some peeling instrument. At present no distinction is made between full grown trees and mere saplings. The bark of full grown trees of course yields the largest quantity of tannin, and care should be taken to use bark from full grown trees only. Then, again, the bark is stripped from the trees at all seasons of the year, whereas it should be taken when it is most juicy, and for this purpose it should be removed only in the season when the sap is upon the trees. The stronger and more quick-acting tanning ingredients which can be had in abundance in this country, should be chosen and foreign materials of known efficacy should be tried. At present no precaution is taken to prevent the formation of gallic acid in the infusions used, and hard water is used in the preparation of the latter. The fullest effect is never obtained from them. By the use of disintegrators better tannin liquors can be produced. The strength of the infusions should be tested before using them. Then, again, sufficient time is not allowed for the tannin to act on the hide thoroughly. Lastly, for the production of very soft and flexible leather the process of baking, i.e., treating with pigeon or hen dung, may be adopted.

CHAPTER IX.

MANUFACTURE OF LEATHER ARTICLES.

We have now tanned leather. The cost of tanning leather in the indigenous fashion is roughly estimated at As. 8 to Rs. 3-8 per piece. The price of tanned leather varies according to its quality and the demand for leather-made articles. The better the quality, the greater must have been the labour involved and larger the number of tanning materials used. Then, again, if there is a great demand for leather articles, the price of leather must be high. One thing is beyond question, viz., that within the last 30 or 40 years there has been a great rise in the price of raw hides and skins, owing to their exportation to foreign countries, and this has produced its natural effect on the price of tanned leather.

The price of leather at present is as follows:—

- Cowhides, brown leather, Rs. 4 to Rs. 9 per piece.
- Ditto, black leather, Rs. 4 to Rs. 8.
- Buffalos, brown leather, per piece Rs. 12 to 15; per pound As. 12.
- Sheep and goat skin, brown or white, Re. 1 to Rs. 2.

The articles manufactured by the village Muchis consist of shoes, slippers, native pump shoes or chamarkhani or nagra shoes, embroidered slippers of kinds for the use of Muhammadan women who get this article as part of their marriage dowry; various sorts of drums, leather straps or strings for tying carts and ploughs, whip-lashes, money-bags and pouches, water-carriers' bags, leather sheets for covering things, bellows, &c. In many places, carriage cushions, scabbards for swords, baskets and boxes, machine belts, jars for keeping oil, ghee or molasses, coverings for boxes, coverings for bullock ropes and vessels for drawing water are made. Saddles and bridles are made only in the larger towns, e.g., Calcutta, Patna, Dacca, Monghyr, Dinapur, &c. In most towns decent boots and shoes are made, as the workmen are more clever than their brethren in the villages, and as they use foreign leather. Country harness (for buckney carriages, ekkas, &c.) is made in all the important towns.

The following list shows the prices of the various articles manufactured:—

- Country or nagra or chamarkhani shoes, As. 8 to Re. 1 per pair.
- Munda shoes, Re. 1-3.
- Shoes for the upper classes, Re. 1 to Rs. 3.
- Boots, Rs. 3 to Rs. 5.
- Slippers, As. 6 to Rs. 1-4.
- Do., ornamented, As. 12 to Rs. 2.
- Motes (bags for drawing water), Rs. 3 to Rs. 5 each.
- Leather straps for fastening oxen to the ploughs, As. 2 per piece.
Musical instruments—

Dugi, As. 12 each.
Tabla, As. 12
dDholak, Re. 1 to Rs. 3 each.
Khole, Re. 1 to Rs. 10
dKhanyani, As. 4 to As. 8
dMirdang, Rs. 4 to Rs. 6
Dhak, Re. 1-8 to Rs. 10
dMandar, Re. 1 to Rs. 2

Native Saddles, Rs. 8 to Rs. 10 each.
Asan (seats) made of deer skins or tiger skins, Re. 2 to Re. 5 each.
Whip lashes, As. 1 to As. 4 per piece.
Money-bags and pouches, As. 1 to Re. 1 each.
Bridles, Rs. 2 to Rs. 4 each.
Molumes, As. 8 to Rs. 1-8
Hide ropes, Rs. 10 to Rs. 12 per piece.
Skin-paras, As. 8 to Rs. 2 each.
Skin boxes and baskets, Re. 1 to Rs. 3 each.
Water-bags, Rs. 3 to Rs. 5 each.
Jhulla, (coverings for bullocks) Re. 1 to Rs. 3 each.

Goat and sheep skins and calf leather are mostly used in the villages for making strips for sewing and for shoe-edging (muggi). Cow leather is mostly used in making the top parts, and buffalo leather, the soles and heels of shoes and boots. Goat and sheep skins are generally used for the inner lining of boots and shoes. Goatskin is mostly used for musical instruments, the principal centres of the manufacture of which are Calcutta, Murshidabad, Dacca and Vizianagaram (now Bankura).

Tiger and deer skins are mostly made into asans (carpets to sit on) and foot rugs.

In a separate list (see Appendix II) the various articles manufactured by native workers employed at Messrs. John Tell & Co.'s Tannery at Kidderpur, the oldest tannery in this country, have been mentioned. Being properly trained by their employers their products are much more varied and better finished than those of their brethren in the villages.

The commonest of all articles manufactured is of course the shoe, and it may be worth while briefly to describe the indigenous process of manufacturing it.

The stages of the preparation are as follows:

1. Cutting pattern on paper.
2. Planing leather and cutting it according to pattern.
3. Preparation of the upper part of the shoe.
4. Ditto of the sole.
5. Heel-making.
6. Joining all together.
7. Cleaning.

The first thing is always to cut a pattern on paper. The next process is to plane the leather. The upper part of the shoe, called the kumbas or ashab, is then cut out. A piece of leather of about the right size is taken and from the middle of it a piece is cut out to make the opening for the insertion of the foot. A second piece of leather is then taken and a similar opening of exactly the same size is made in it. The two pieces of leather are then stitched together round the inside of the opening and are turned inside out to get the sewing inside. The edges are then trimmed and stitched together. Often, however, the outer leather is cut in two pieces, but the lining is kept a whole piece as it gives a better shape. When the pieces of the outer leather have been joined together they are mounted on a wooden mould and stitched up with the lining. The upper part is now done. Then the tala—sole—is made by taking three or four pieces of leather and cutting them into the right shape, pasting them together and then stitching them by a narrow strip of leather—sali—down the centre and then by a leather string round the edges. Then the leather for the heel is cut and joined together by paste and stitched on to the sole, but as the stitching cannot reach the end of the heel on account of its thickness, nails are used to attach it firmly to the sole. Finally, the upper part and the sole are joined together, the edges of the upper part being stitched to the edges of the sole. The shoe is then cleaned by a piece of glass and rubbed over with wax or lard.
Skins of different animals tanned at the Calcutta Tannery.

Various articles manufactured by native workers at Messrs. John Teil & Co.'s Tannery at Kidderpur.
The implements used are—

1. A wooden board (pīrchi) on which the leather is planed.
2. Dec. stick (kēpa) to smooth the leather.
3. A chisel (kharpa) for cutting leather.
4. A chisel (khurpa) for graining the edges of the sole.
5. A pounder (lohin).
7. Sewing pin (kharatni) to pull the thread through when stitching.
8. Boring pin (suitni).
9. Horn (singia) to keep lard or wax in. The lard or wax is used to make the thread come through easily.
11. The last (ghorna).
12. Wedges of wood or leather fastened to the last to make it fit (paratka).

CHAPTER X.

THE TANNERS AND LEATHER WORKERS.

The leather industry in this country is, as is well known, in the hands of men who hold one of the lowest places in the social and religious scale of the Hindus, i.e., the Chamars and the Muchis. Their position is so low that the ordinary barbers and watermen will not shave them or wash their clothes, nor would Brahmins officiate as their priests at their festivals or religious ceremonies. They are held as unclean, and their touch is pollution, and to avoid them their quarters are assigned invariably away on the outskirts of towns and villages. So great is the depth of the degradation of these classes in the eyes of the higher castes, that the term Chamar has passed into one of obloquy. To call a person a Chamar, is to call him the meanest of men.

It is very likely that Chamars and Muchis were originally mere subdivisions of one main caste, whose occupation was preparing leather and working in it. They have, however, been two distinct castes since a long time, and if a distinction were to be made as to which of the two was the higher caste, it would be the Muchi. The Chamar handles dead bodies in pursuing his vocation, and in the eyes of a Hindu it is the most unclean of all things to touch dead bodies. The Muchi is only a manufacturer of leather articles, and has got nothing to do with dead bodies; consequently he is less unclean than his brother the Chamar, and holds a higher position than the latter. The mythology, about the origin of the Chamar is that his first parents were a Mullah (boat-man) and a Chandal woman. One story goes that he was originally a Brahmin and he turned into a Chamar in this way. Once upon a time four brothers, Brahmins by caste, were crossing a river. Having seen a cow struggling in the water and about to be drowned, the youngest of them went to its rescue, but before he could reach the animal it was dead and, consequently, he could only bring away the carcass. As he now became unclean the other three brothers at once disowned him, and as to touch him, or to live with him, would be pollution, they sent him away, saying that he was no longer a Brahmin but a Chamar. The Chamar himself claims to be descended from one Luidhar or Ravi Das or Ravi Das—a man reputed to be an ascetic and a devotee, and to whom, it is held, the deity revealed the mysteries of the art of leather making. Some legends about the origin of the art have been given in the first chapter.

The Chamars have many sub-castes, and the names of at least 15 of them have been found, namely, Dhusia, Goreya, Dohar, Dhureya, Jeswaria, Kanouja, Jainpuria, Jaunpuri, Kurila, Kori, Magabia, Mahara, Ranguja, Jatua, and Lantua.

The Chamar is polygamous, but as he is extremely poor, he cannot afford to have more than one wife usually. One curious custom is that two sisters are not to be married to the same husband at the same time. As Brahmins will not act as their priests, an elder of their community, a guru, performs their rites and ceremonies. The marriage of widows is customary. The bodies of their dead are buried by them and not burned.

The Chamar is a Hindu; but his religious festivals are few; the principal one being that in connection with the worship of Bishakarma (the god of artisans). The festival is celebrated by some in the month of Bhadra, and by
others in the month of Aswin. On the nabomi, or the ninth day of the new moon, often on the Bijoya-dashami day, in Aswin, the god of artisans is worshipped. A clean place outside the house is selected and plastered over with cow-dung and mud and a small stool is placed there to serve as the seat of the deity, and flowers are spread over it. The tools and implements are then cleaned and placed beside the stool, and are dedicated to the deity, with a view to secure efficiency to the instruments and consequent prosperity to their owners. Offerings are then made of flowers, sweetmeats, vermillion, rice, fruits, wood-apple leaves, fried rice, curd, jaggery, etc. These are sprinkled over with liquor. Goats are also sacrificed by those who can afford it. The ceremonies are accompanied the whole time by music of a religious character. Often Laidhan or Rai Das is also worshipped at the same time. Some people, instead of the stool, worship a waterpot on which are placed mango leaves and a coconut. The ceremonies are usually performed at night, and are wound up by the distribution of the offerings among the people assembled. The last thing is a feast according to the means of the worshipper, and the meat of goats sacrificed forms the chief dish in it, and liquor is indulged in without restraint. Till the puja is over no food is taken.

These people are very superstitious. They believe in mischievous hobgoblins and other evil spirits, and in order to pacify them, and to ward off evil, they offer pujas now and then with eggs, pigs and liquor.

The Chamars and Muchis are regarded, and often justly, as great cattle lifters and poisoners of cattle, and one of their pujas is characteristic of them. It is the worship of Kali performed in the month of Kartick, when they all assemble in a field and exhort the goddess to increase mortality among cattle for their benefit.

The chief occupation of the Chamars is the leather industry. He has usually a small piece of land which he cultivates himself. In rural areas many of them depend entirely on cultivation for their living; some of them earn a living as agricultural labourers, some as musicians and some as grooms.

The Muchi, also called Rishi, has also a mythological account of his origin. The story goes that a lower deity used to make offerings of cow's meat to the higher deities, and that, after the worship, he would restore the cow to life and send it away. One day he failed to revive the cow, and found that this was due to his having eaten a portion of the sacrificial meat. On this he cursed his wife and sent her away. She was expecting a child at the time, and shortly afterwards gave birth to one who became the first Muchi. There is another story, namely, that the progenitor of the Muchis was one Muchi Ram, who came into existence out of the sweat of Brahma, and so held a very high place in the scale of castes. Muchi Ram somehow happened to offend a Rishi (sage), and the latter, in revenge, accused him of being the father of twin children born of some Brahmin widow. On this Muchi Ram, though innocent, was expelled from his high position, and the twin children became, one, the founder of the Bara Bhagiya, and the other the founder of the Chhota Bhagiya section among the Muchis. These are the two main subdivisions in the Muchi caste. Some recognise three, namely, Guru, Darsana and Rari, of which the Guru is the highest. The Guru does not eat the flesh of dead animals, like the Darsana and the Rari. These are all Hindus by religion. There are also Muhammadan Muchis but their number is very small.

Their marriage and religious customs and ceremonies are the same as those of the Chamars, excepting that the Muhammadan Muchis, perform Muhammadan religious rites and ceremonies. Muchis, unlike the Chamars, however, burn their dead. Besides working in leather, they make baskets, brushes and mats, and follow agricultural pursuits. Some of them earn their living as sweepers and musicians. The female Chamar is usually a midwife, but the female Muchi never follows this vocation.

The material condition of the Muchis and Chamars is very poor indeed. They live a hand to mouth life. Many of them cannot get two full meals a day, and those who do get two full meals for themselves and their families consider themselves lucky. They live in dirty, low-built thatched huts. Half a dozen people huddle themselves together in a hut already half-filled with household articles and hides and implements. The value of such a hut is not more than Rs. 5. Those that are better off, have two or three huts and the
value of these is within Rs. 15. They have no furniture worth the name; but the comparatively well-to-do among them have one or two 'khatis' (bedsteads), bamboo baskets and boxes, and some brass utensils for cooking and eating their food. The majority have one or two pieces of gunny-bags and one or two mats to sit and lie on, and the utensils and crockery they possess consist of some earthen pots and pans. Their food consists of 'muh' (fried rice), 'bhat' (boiled rice), pulses, sometimes vegetables, fish on rare occasions, and the flesh of dead animals. Two to four 'duoties' and the same number of 'sarees', two or three 'ganeshes' (towels), and a couple of shirts; some 'ruzaas' made of rags obtained from dead bodies, or presented by the relatives of the dead, are all the clothing they possess. The income of a family of 6 members is, roughly estimated, at Rs. 12 to Rs. 25 per mensan, and the details are as follows:

(1) Tanning skins and hides and sale of leather ... Rs. 5 to Rs. 10
(2) Making shoes ... ... ... ... ... ... ... ... ... ... ... ... ... Rs. 2 to Rs. 4
(3) Manufacturing other leather articles ... ... ... ... ... ... ... ... ... ... ... ... ... Re. 1 to Rs. 2
(4) Mending shoes and leather articles ... ... ... ... ... ... ... ... ... ... ... ... ... Ans. 8 to Re. 1
(5) Value of crops on his lands ... ... ... ... ... ... ... ... ... ... ... ... ... Rs. 8 to Rs. 2
(6) Acting as musicians ... ... ... ... ... ... ... ... ... ... ... ... ... Ans. 8 to Re. 1
(7) Working as agricultural labourers and as menial servants of the higher castes ... ... ... ... ... ... ... ... ... ... ... ... Rs. 2 to Rs. 4
(8) Midwifery ... ... ... ... ... ... ... ... ... ... ... ... ... Ans. 8 to Re. 1

Total ... Rs. 12 to Rs. 25

Their expenditure, per mensan, is roughly estimated as follows:

Food ... ... ... ... ... ... ... ... ... ... ... ... ... Rs. 8 to Rs. 10
Liquor ... ... ... ... ... ... ... ... ... ... ... ... ... Rs. 2 to Rs. 4
Clothing ... ... ... ... ... ... ... ... ... ... ... ... ... Re. 1 to Rs. 2
Cost of tanning materials and allowance for wear and tear of implements ... ... ... ... ... ... ... ... ... ... ... ... Ans. 8 to Rs. 2
Cost for permission to take skins of dead animals ... ... ... ... ... ... Nil. to Ans. 8
Social functions and festivals ... ... ... ... ... ... ... ... ... ... ... ... Ans. 8 to Re. 1-8

Total ... Rs. 12 to Rs. 25

Although occupying the lowest place in society in this country, and living on the brink of starvation, the statistics of the past census operations show that they are not behind any other caste in multiplying themselves. Had the contrary been the case, there could have been some chance of a change for the better in their material condition.

The census statistics are as follows:

<table>
<thead>
<tr>
<th></th>
<th>1881</th>
<th></th>
<th>1891</th>
<th></th>
<th>1901</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamars</td>
<td>1,088,842</td>
<td></td>
<td>1,079,644</td>
<td></td>
<td>1,172,869</td>
<td></td>
</tr>
<tr>
<td>Muchis</td>
<td>292,811</td>
<td></td>
<td>494,914</td>
<td></td>
<td>496,996</td>
<td></td>
</tr>
</tbody>
</table>

Taking the two together, the increase, in 1891 as compared to 1881, was over 6 per cent, and the increase, in 1901 as compared to 1891, was 8 per cent. The Patna Division has the largest number of Chamars and, after it, the Bhagalpur Division. The largest number of Muchis, however, are to be found in the Presidency Division, and next to it in the Bardwan Division. Among the Muchis the males exceed the females, whereas among the Chamars the females exceed the males. The last census shows the majority of these men as engaged in agricultural pursuits and in the leather industry. The other occupations recorded of them are, "provision and care for animals, menial service, dealing in food and drink, weaving, working in metals, wood, glass, stone, canes, bamboos, leaves," etc. Education at last seems to have found an entrance into their ranks, and we find that, among the Chamars, there are 5,521 literate people, including 198 females, and that among the Muchis there are 2,064 literate persons of whom 232 are females. The Muchis include 131 Muhammadan Muchis, and curiously enough all of them are literate. Some further advance is noticeable. In the ranks of the Chamars, we now find 7 clerks, 166
men holding the position of rent-receivers, and 12 medical practitioners. The Muchis show 147 men enjoying the status of rent-receivers and 15 of medical practitioners.

The following statistics show the number of persons at present engaged in the various branches of the leather industry:

<table>
<thead>
<tr>
<th>Branch</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leather dyers</td>
<td>141</td>
</tr>
<tr>
<td>Shoe, boot and sandal makers</td>
<td>158,432</td>
</tr>
<tr>
<td>Tanners and curriers</td>
<td>22,323</td>
</tr>
<tr>
<td>Water-bag, well-bag, bucket and ghee-pot makers</td>
<td>667</td>
</tr>
<tr>
<td>Harness makers</td>
<td>10</td>
</tr>
</tbody>
</table>

Figures under similar heads are unfortunately not available in respect of the previous censuses. Had they been available, they would have helped us to form a clear and definite idea of the rate of decline of the native leather industry.

CHAPTER XI

TRADE STATISTICS.

In the annexed statements, III to VI, figures have been furnished showing the trade, external and internal, in dyes and tans, hides and skins, and leather and leather manufactures. The trade in tanning barks sprang up within the last few years, as, although they have been in use from time immemorial, no commercial value was attached to them until quite recently. Fifty years before there was no trade in hides and skins worth the name, the whole quantity of these articles being locally used up, as they were available. Within the last half a century, a class of men, chiefly Muhammadans, have taken to collecting them in the villages and sending them to Calcutta. Thence the articles are exported to foreign countries, and as the business is a very lucrative one, it is continually increasing, but, as has been pointed out, its effect on the indigenous leather industry has been extremely injurious. Raw hides and skins were, a quarter of a century back, exported in small quantities to other Provinces. But this has now practically ceased, and Bengal exports these products to Calcutta only. The figures of sea-borne trade show the magnitude of the exports of the raw materials to foreign countries, and of the imports of foreign leather and of leather manufactures. The exportation of raw materials, and the importation of foreign leather and leather articles, have hand in hand steadily increased, and are an evidence of the steady decline of the native industry and of the supplanting of native manufactures by foreign products.

Dyes and tans.—The figures showing the internal trade, from 1889-90 to 1899-1900, include only cutch and myrabolams, as these are the only tanning materials specifically mentioned in the reports. The figures for the last two years include, besides myrabolams and cutch, tanning barks. The imports into Bengal are chiefly from the port of Calcutta, and next to it from the United Provinces; and the imports into Calcutta are mostly from Bengal. Consequently the exports from Bengal are mostly to Calcutta and from the latter mostly to the former.

The figures showing the external trade include Indian as well as foreign articles, and separate figures have been furnished for each class. The import trade comprises "cutch, gambier, myrabolams, turmeric and other sorts," but of these cutch and myrabolams are the only articles which are used as tanning ingredients by indigenous tanners. The figures for cutch, however, cannot be had separately from gambier, and so the statistics furnished include gambier. These are mostly imported from the ports of Madras and Bombay and in insignificant quantities from foreign countries. Bengal has a large export trade in these articles and nearly the whole of the exports is to foreign countries. Cutch appears to be exported in the largest quantity to France. Among other countries to which it is exported are South and East Africa, Ceylon, the Fiji Islands, and Great Britain. By far the largest export trade is in myrabolams and Germany
heads the list of the countries to which it is exported. Great Britain, Austria, Australia, Belgium, China, Japan, the Fiji islands and South America, are among the countries to which it is exported.

Raw hides and skins.—In the internal trade, the imports to Bengal come from the United Provinces, Assam, Central Provinces, the Punjab, the Native States and the ports of Bombay and Madras; but by far the largest quantities come from the United Provinces, and the Punjab. The exports are mostly to the United Provinces. The statistics of seaborne trade show that the interior of Bengal gets the largest quantity from Calcutta and small quantities from the ports of Bombay, Madras and Burma. But Bengal returns the supplies to these exporting ports, and her imports and exports seem to be fairly counterbalanced. She also imports foreign hides and skins. The trade report for 1901-1902, shows that the articles were imported from the following countries, which are stated in the order of the quantity of hides and skins supplied by them:—Great Britain, France, Ceylon, Germany, Italy and Persia. Hides and skins are exported to foreign countries and the exportation of both is of so great a magnitude as to bear no proportion to the importation of these articles. The countries to which they are exported are—Germany, Egypt, China, Austria, France, New Zealand, Great Britain, Australia, Holland, Belgium, Greece, Italy, Russia, Spain, Turkey, the United States, Japan and Canada. Of these the largest quantities are taken by Italy, the United States, Spain, Austria, France, Great Britain and Germany.

Dressed and tanned leather.—There is a large interchange in this article between the interior of Bengal and Calcutta. Formerly, fairly large quantities used to be imported also from Bombay, Rajputana, Berar, the Central Provinces, and Central India. At present, however, beyond a small quantity obtained from the United Provinces, the internal trade is practically a mutual interchange of the article between the interior of Bengal and Calcutta.

The external trade in Indian leather is with Madras, Bombay and Burma. During the last decade, the imports from these ports have considerably decreased, but the exports to them have slightly increased. The foreign trade consists of very large imports from Great Britain, Austria, France, Germany, Persia, Belgium and Ceylon, and of exports on a limited scale to Great Britain, Egypt, Africa, the Straits Settlements, Turkey, the United States, China and Australia. The exports are nominal as compared to the imports. The imports have steadily increased, whilst the exports, though still fluctuating, have a decided tendency to fall.

Leather manufactures.—Native leather articles are obtained mainly from the United Provinces and the Punjab, and in small quantities from the Central Provinces and Assam, and quantities are exported to these Provinces in return. But the total exports is very small compared to the total imports. Moreover, the imports have steadily increased during the past years, whilst the exports have materially decreased. In 1889-90, the exports to the United Provinces and the Punjab were half and one-third, respectively, of the imports from those Provinces. In 1893-94, the imports from the United Provinces increased 25 per cent., and from the Punjab, nearly 175 per cent. whilst the exports showed a heavy fall. In 1900-1901, a further increase in the imports and a further fall in the exports is noticeable. In 1901-1902, there was a still further increase in the imports, but the total export was practically the same as in the preceding year. Bengal now sends by far the greater part of her leather manufactures to Assam, and if tanneries be opened in this Province, she will have an increasing export trade with Assam and a large field in Burma.

Indian manufactures were formerly imported also from Bombay, Karachi, Madras and Burma, but the importation gradually decreased, and it now seems to have died out. Foreign articles are, however, imported on a very large scale; their importation has steadily increased, and their quantity is so large as to bear no proportion to the Indian manufactures imported. Nearly the whole of the foreign manufactures comes from Great Britain. The exportation of Indian manufactures, mostly saddlery and harness, to Indian ports has on the whole slightly increased. Bombay, Madras and Burma are among the countries to which they are exported, but by far the largest quantity is exported to Burma. The exportation of Indian manufactures to foreign countries is usually very limited in scale. On account, however, of the Boer and China wars,
there was a sudden and great rise in the export trade in 1900-1901 and 1901-1902, but now that the wars are over, the exports will revert to their normal state. Among the foreign countries to which Indian manufactures find their way, are Africa, the Straits Settlements, Siam, Ceylon, the Philippine Islands and Australia. The Indian manufactures referred to in this paragraph are, however, not indigenous manufactures, but the products of European firms in Calcutta. The suggestions in the next chapter are offered with the view that the indigenous industry may make its way up in the future and eventually attain a place in the commercial world in no way inferior to that held by the leather industries of foreign countries.

CHAPTER XII.

THE PAST AND THE FUTURE OF THE INDUSTRY.

Writing of the people of the period, in his translation of the Rig Veda, Mr. Wilson, the Sanscrit scholar, says:—""They were a manufacturing people; for the art of weaving, the labours of the carpenter, and the fabrication of golden and iron mail are alluded to, and what is more remarkable they were a maritime and mercantile people." Of leather, Royle in his "Arts and Manufactures of India" says:—"It is another chemical art with which the Hindus have long been acquainted, though it is doubtful whether they ever made leather of very superior quality; but the art is practised in native states where it is not likely to have been introduced by European influence, e.g., Cashmere, Cutch, whence we have had skins dyed of different colours." "Leather work is a very ancient art in India," says Sir George Birdwood. Further quotations are perhaps not necessary, as the general consensus of opinions is, that the art of leather making has been known in this country from very olden times. Some writers, however, have attempted to show that the arts of India were borrowed from the Greeks; but the latter came to India in the 4th Century B.C., whereas the industry is mentioned in various Sanscrit writings, some of them as old as 3000 B.C.

One of the oldest books is the Rig Veda, written about 3000 B.C. It indicates a civilization in India at least as advanced as the best of ancient civilizations left on record. If therefore any art or industry is mentioned in it, that art or industry must have existed, and must have been practised, from a long time before; and although it is not possible to fix dates, it may be safely assumed that, if the industry did not exist in the country before, it came in with the race which produced the Rig Veda. It is, therefore, claimed that the leather industry in India dates back to the entry of the Aryans in India. Now the Aryans invaded India between 3500 and 4000 B.C., and this is the probable date of the origin of the leather industry in this land.

Dr. Rajendra Lala Mitra in his "Indo-Aryans" says:—

"In the time of the Rig Veda, leather mashals for water were well-known, and Indra is praised as piercing the rain-confining skins or mashals of the clouds. Bottles of the same material also were evidently in common use. For Agastya (2000 B.C.) in his poison-neutralizing mantra says, 'I deposit the poison in the solar orb, like a leather bottle in the house of a vendor of spirits.' In the Laws of Manu (800 B.C.) mashals for water are allowed to under the name of driti, and its peculiar form with the four feet left intact is pointed out. Directions are also given for the purification of leather articles. Other Smritis ordain that oleraceous articles preserved in leather bottles do not become impure by the contact of the impure cowhide; and in the present day jars of that material are in extensive use, in Bengal and the United Provinces, for the storage of oil and ghee. In the latter place, leather bags are universally used for raising water from wells, and according to the law books of Sanakha and Likhita (2000 B.C.), that water is declared pure which is kept in old leather bottles. Atri (2900 B.C.) is likewise of the same opinion, and adds that flowing water, and that which is raised by machinery, are not defiled. The use of such words, as charmanda, charnepath, varatra, chandana, &c., in old Sanskrit works, indicates that straps, bands and strings of leather were in common use, and shafts were also made of leather or hide."

Shoes and sandals, shields and coats of armour (norma), quivers and gauntlets, saddles and bridles, whips and harness, etc., were among the other,
manufactures from leather. The shoe incident in the Ramayana is well known, and may once more be quoted. Bharata says to Rama:

"Put noble brother I entreat,
These sandals on thy blessed feet,
These, lord of men, with gold bedecked,
The realm and people will protect."

Again

"Through fourteen seasons will I wear
The hermit's dress and matted hair;
With fruit and root my life sustain,
And still beyond the realm remain,
Longing for thee to come again.
The rule and all affairs of state
I, to these shoes will delegate."

Bharata places Rama's slippers on the throne of Ayodhya to represent Rama, and carries on the government, in his name till the latter returns to his kingdom.

In the Ramayana (1300 B.C.) we further find the leather industry as among the many other thriving industries of the day. The Ayodhya-kanda tells us that the inhabitants went out with Bharata seeking after Rama in the following order:

1. Jewellers
2. Potters
3. Ivory workers
4. Perfumers
5. Goldsmiths
6. Weavers
7. Carpenters
8. Braziers
9. Painters
10. Musical instrument makers
11. Armourers
12. Carriers
13. Glass makers
14. Inlayers, etc.

There are other books mentioned by Dr. Mitra. He says:

In Manu and the Mahabharata (1500 B.C.) the slippers are also mentioned, and the time and mode of putting them on pointed out; and medival Sanskrit authors allude to them pretty frequently. The Vishnu Purana enjoins all who wish to protect their person, never to be without leather shoes. Manu, in one place, expresses great repugnance to stepping into another's shoes, and expressly forbids it, and the Puranas (500 A.D.) recommend the use of shoes when walking outside the house and particularly in thorny places and on hot sand. Arrian (about 200 B.C.) says: "They, the Indians, wear shoes made of white leather, and these are elaborately trimmed, while the soles are variegated, and made of great thickness to make the wearer seem so much taller."

In the 'Toy Cart' of Sudraka which dates from the 1st century B.C., the mother of a rich courtezan is described as arrayed in flowered muslin with her feet thrust into a pair of slippers, showing that in ancient times, as in the present day, women of the town were in the habit of wearing shoes.

Panini, the grammarian (350 B.C.), speaks of the Anupadina—a variety of boots, and Amara Singh refers to it. Paramananda (57 B.C.) also mentions it in his Amarkoshamala. The use of hogs' skin for the preparation of shoes has also been found mentioned in the Vedas.

Of musical instruments (drums), Dr. Mitra says:

"Of percussion instruments the dholaka, played either on one or both sides, is the most prevalent to be met with everywhere, and was made of various shapes; some were of large size with small ends and broad centres, like the mridanga of our day; others less protracted in the middle, but with broad ends, like the pakhwa; others, again, of a small size. Of the large military drum played with a stick, there are the rama dholu and the jaya dholu with which the heroes of the Ramayana, and the Mahabharata, are said to have inspired their legions with military ardour on the battle-fields."

The mridanga is commonly believed to have been invented by Brahma. This indicates a belief in its origin to be so ancient as to be lost in obscurity. Of another instrument, the native bagpipe, Dr. Bidie says:

"Instruments of the nature of a bagpipe are of very ancient date and very widely diffused, having been used by the Hebrews, Greeks, Romans, Arabs, Persians and Hindus, and by most Celtic and Slavonic races."

The Rig Veda often refers to the quiver and the gauntlet. Of the use of the bridle, Megasthenes (300 B.C.) says:

"When it is said that an Indian by springing forward in front of a horse can check his speed and hold him back, this is not true of all Indians, but only of such as have been trained from boyhood to manage horses; for it is a practice with them to control their horses with bit and bridle, and to make them move at a measured pace and in a straight course."

Harness, and chariots in which leather was used are also mentioned in the Rig Veda. Here are some verses—

"The Pajras, the kinsmen of Kaka's irat, rub down the high-spirited steeds, decorated with golden trappings."

"Harness with traces to thy car thy long maned ruddy steeds to the sacrifice."

"Ascend Aswins your sky-touching chariot with golden seat and golden reins. Golden is its supporting shaft, golden the axle, both golden the wheels."

In the 17th century A.D., we find a traveller recording his opinion about the industrial skill of the Indians, and of their skill in imitating foreign manufactures, which include boots and shoes. He says:

"The natives show very much ingenuity in their curious manufactures, as in the silk stuffs. They make likewise excellent carpets. Their skill is likewise exquisite in the making of cabinets, boxes, trunks, standishes curiously wrought within and without. They paint staves, bedsteads, chests or boxes, fruit dishes, large chargers. They are also excellent at limning and will copy out any picture they see to the life. The truth is that the natives are so full of ingenuity that they will make any new thing by pattern, how hardsoever it seems to be done; and therefore it is no marvel if the natives there make shoes, boots, clothes, linen, bands and cuffs of their English fashion, which are also of them very much different from their fashions and habits, and yet make them all exceedingly neat." (Terry's Voyage in the East Indies, 1650).

It is thus clear that the art and industry were well known in India in ancient times; that although no information is available from which we can fix the date of their beginning in this country, it may be safely assumed that they came in with the Aryans; that consequently they are more ancient than the Greek art of leather making; and that as late as the middle of the 17th century the art was well known and practised with admirable skill.

Reference has already been made to the present state of the industry—how and to what extent it has suffered in consequence of the exportation of raw materials and the importation of foreign manufactures.

We may now look forward and consider what the future of the industry will be and what can be done in its interests.

The last 50 years has been a record of the continuous decline of the industry. Considering the rate at which it has run its downward course, we can well conceive that it will not be long before the manufacture of boots and shoes from native made leather will cease. The same may be expected in regard to the manufacture of boxes, baskets, pouches and bags, country harness, native saddlery, water-carriers' bags, vessels for the storage of ghee, molasses, oil, &c. What will be left will be the native musical instruments and the articles required in connection with agriculture—traces, ropes, whip-thongs, water-buckets, &c.

The revival of the industry, and its attaining to a footing equal to what it has in Europe or America, depend on a number of circumstances of which the following appear to be the principal:

2. Discouraging the exportation of the raw materials from the land.
3. The production of leather which will compare well with European or American leather.
4. Cheapsening the cost of tanning leather and economising the time now spent on it.
5. Manufacturing leather articles which will compare favourably, in respect of quality and workmanship, with European and American products.
6. Reducing the cost of manufacturing articles and the time now spent on them.

Better raw materials mean better breeds of cattle. Cattle-breeding has not yet engaged the attention of the people of this country, and the only cattle-breeding farm, we at present have, is that in the Hathwa Raj, under the immediate superintendence of Mr. N. N. Banerji who received his training in agriculture in England. Another farm of this kind may be expected in the near future. It is in the contemplation of Government to include cattle-breeding in the operations to be carried out at the farm to be shortly established at Pusa,
in Darbhanga. The Civil Veterinary Department of Government has cattle-breeding as one of the branches of its work and it forms part of the curriculum of studies at the Bengal Veterinary College. But no practical advance can be expected, unless the people themselves take an interest in the matter and come forward to participate in the improvement of the country's breeds of cattle. More work in this direction is expected from the District Boards as they hold the best position for doing practical work.

The direct, but not an artificial means, of discouraging the exportation of raw hides and skins would be to impose on the export trade a tax. But free trade is a principle characteristic of the British Government, and free trade alone will prevail in the long run in the struggle for existence. State interference in the way of taxation of exportation cannot therefore be suggested. The natural means of stopping exportation would be the revival of the indigenous industry, including the establishment of tanneries, and to this we must look as the real remedy.

A good deal can be done for the revival of the native industry. A good deal has to be done to obtain superior native leather and superior native products. Superior leather means superior processes of tanning, and superior products require an improvement in the knowledge of the leather workers. The latter are not wanting in natural skill and industry, but better and more economical processes should be taught them. A regular scientific education is not necessary. A practical training in the modern methods of leather tanning and manufacturing leather articles is what is required. There are already a few industrial institutions in the country, and arrangements can be made without difficulty for giving such a training in them. The number of such institutions, however, is small at present, and unless the number is greatly increased—at least so long as regular tanneries are not established in the country—very little fruit can be expected. The raising up of a considerable number of men acquainted with up-to-date methods of leather manufacture, will prepare the way to the establishment of regular tanneries. The Muchis and Chamaris are, however, very poor people, and at first some inducement will be necessary to call them away from their homes and hereditary associations to new places and associations requiring a more costly mode of life. The inducement may take the shape of money grants or subsistence allowances. District Boards should be able to supply the funds which may be supplemented by the subscriptions and donations of noblemen and well-wishers of the country. Taking for granted that all this is realised, it is clear that after all training at technical and industrial institutions will not be so practical and thorough as in a regular tannery. My next suggestion, therefore, is that these men should be sent for a course of training to a regular tannery, say the Government Tannery at Cawnpur. The expenses should be supplied by the District Boards. When the course is completed, in order to enable the men to make a start in business, presents or rewards in the shape of tools and implements, tanning ingredients, samples of leather tanned under different processes, and the like, may be given.

But a supply of skilled workers only will not suffice. Tanneries are required where leather on the modern principles, and leather articles which can compete with foreign manufactures, will be produced. For the supervision and management of such tanneries experts are required. We have at present no such Indian experts. A staff of such men, therefore, has to be raised up, and the only way of doing this is to send periodically to Europe, America, or Japan, two or three young men selected by turns from Bengal and the other Provinces of the Indian Empire. Young graduates in the Science course, selected and recommended by the Universities, would seem to be the most suitable. They may be sent at Government expense at first. Students are at present sent with State scholarships to complete their education in the English Universities, and until private enterprise supplies the want, Government help is the only means of providing the country with qualified men. I am, however, happy to be able to say that one Indian nobleman has already taken the initiative in this line. I refer to the enlightened and

* Since writing this I have seen the scheme just sanctioned by Government for the improvement of technical and industrial education in this country. Ten annual scholarships have now been founded for training Indian youths in technical and industrial arts in Europe and America.
munificent Chief of Mourbhanj, in Orissa. This nobleman has offered three scholarships, tenable in Japan, or America, for the training of Indian youths in the useful arts, and one of these scholarships is for learning the art of leather-making. Those of our noblemen who desire to be real benefactors of their country, may well follow the example of the Chief of Mourbhanj, and with their help we might have in a short time a number of experts capable of taking up the supervision and management of tanneries. The establishment of tanneries will then naturally follow. The exportation of raw hides and skins will in course of time die a natural death, as the establishment of tanneries will create a great demand for raw materials. But the future of the leather industry is not confined to the production of leather and leather articles capable of successfully competing with foreign articles. The industry is susceptible of expansion by the inclusion of raw materials, of which no use is made at present. Little use is made at present of pigskins and the skins of the guana. No use is made of the hides of horses and asses. The use of the hides of crocodiles and alligators and of the furs of wild animals is unknown. Some use can no doubt be made of dog skins of certain kinds. Faney articles may be prepared from the skins of snakes and frogs of certain kinds. Thus materials are available of which no use is made at present, but which can be turned into marketable products.

From the fact that there are already good tanneries in Calcutta, Cawnpur, and Agra, it does not follow that, if tanneries could yield a good profit in Bengal, they would have been opened by this time. The question is not one of profit at all, but of knowledge in up-to-date methods of tanning and working in leather, and of capital—two factors essential to the establishment of tanneries. Capital, it is understood, will not be wanting when expert knowledge is available. The circumstances which regulate profits are apparently in favour of, and not against, the establishment of tanneries in the interior of Bengal, and may be summed up as follows:

1. Small supervisinal cost;
2. Cheap cost of labour;
3. Cheap cost of materials;
4. Cheap ground rent of factory.

This monograph will be incomplete without a reference to the latest process of manufacturing leather, viz., the chrome process. The characteristics of the chrome leather are thus described by Mr. C. T. Davis, in his "Manufacture of Leather." "Chrome leather has special and peculiar qualities which distinguish it from all other kinds of leather, and these special features cause it to be a superior fabric for all the purposes for which leather is used. It has often been stated that chrome leather is waterproof, but this is not a proper term to use in connection with it; it should more properly be called non-absorbent. All kinds of leather produced with tannin absorb water readily, like a sponge, while chrome leather does not absorb water, but resists it, or sheds it, like the feathers of a duck. In fact, it is a difficult matter to thoroughly wet chrome leather when it is once dry. Again, water and air are the agencies in nature which promote decomposition and decay; and as tannin and hide substance are both organic materials, and when combined, as is the case in bark tanned leather, and subjected to the process of wetting and drying, such leather will eventually but surely deteriorate and become rotten. Chrome leather, on the other hand, being a combination of an inorganic material with the hide substance and subjected to the same process of wetting and drying shews no effect whatever. In fact, the softer chrome leather is wet and dried the softer and more flexible it becomes. Even subjecting it to boiling water apparently has no effect upon it, whilst any sort of leather produced with tannin and placed in boiling water is utterly destroyed. Moreover, chrome leather is of much lighter weight than bark leather, and this is a decided advantage for almost all purposes for which leather is used."

Mr. Talati, a Parsee gentleman, proprietor of the Miscocher Leather Works in Bombay, learnt the process in America some years ago, and, on his return to India, made experiments in it in his factory and found it suitable to this country. The old process of bark tanning takes a month at least to tan a goat skin, whereas the chrome process requires only a day. Cowhide
calf skins, and sheep skins can all be chromed like goat skins. The process has also been introduced into the Madras tanneries, and a great future is expected of it. Professor Chatterton, of the Madras Government School of Art, considers chrome leather as the most suitable for water-buckets and water bags.

As to profit, Mr. Talati is of opinion that it will be mainly regulated by the following circumstances:—(1) price of raw materials; (2) rent of factory; (3) wages of workmen; (4) supervision of the proprietor; (5) nearness of port; and (6) honesty of the workmen. The process in his opinion may be learnt in two to six months according to the intelligence and application of the learner. It is clear this process has a great future in this country, and the sooner it is introduced the better. The establishment of good tanneries will take time, but in the meanwhile the existing native tanneries in the suburbs of Calcutta may well start the work of manufacturing chrome leather. Time is valuable and competition is keen in every business, and unless prompt action is taken very little fruit can be expected. I trust the native factories, realising the importance of the process and the necessity of prompt action, will lose no more time in adopting the process.
APPENDIX I

Tanneries in Calcutta and its Suburbs.

1. Monteith & Co. (Tannery at Ballygunge).
2. Cuthbertson and Harper.
4. C. Galstaun and Son.
5. Watts & Co.
6. G. Wence & Co. (Bentinck Street).
7. Chowson Chizaman's Tannery in Entally.
8. The Calcutta Tannery in Beniapukur.
9. The Bengal Tannery in Beniapukur.
10. Satoor Sircar's Tannery in Beniapukur.
15. John Tul & Co.'s Tannery in Watugunge, established in 1796. The oldest tannery in Bengal, if not in India.

APPENDIX II

Showing leather and leather articles manufactured by native workers at Messrs. John Tul & Co.'s Tannery.

<table>
<thead>
<tr>
<th>Name</th>
<th>Price</th>
<th>Remarks</th>
<th>Name</th>
<th>Price</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-grained enamelled top hide</td>
<td>Rs. a</td>
<td>each.</td>
<td>Waist belt</td>
<td>Rs. a</td>
<td>each.</td>
</tr>
<tr>
<td>Black hood hide</td>
<td></td>
<td></td>
<td>Bayonet scabbard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td></td>
<td></td>
<td>Sword frog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sheep-kin</td>
<td></td>
<td></td>
<td>scabbard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow harness leather</td>
<td></td>
<td></td>
<td>Bendalier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td></td>
<td></td>
<td>Kukri frog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sole leather</td>
<td></td>
<td></td>
<td>Leather belting (single)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japanned hide (both sides)</td>
<td></td>
<td></td>
<td>(double)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dash leather</td>
<td></td>
<td></td>
<td>Leather laces</td>
<td></td>
<td></td>
</tr>
</tbody>
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Rs. a. 0.12 each.
## APPENDIX

### Showing Imports by

<table>
<thead>
<tr>
<th>Years</th>
<th>Dyers and Tann.</th>
<th>Hides (Dressed)</th>
<th>Hides (Raw)</th>
<th>Skins</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value in rupees</td>
<td>Quantity in mounds</td>
<td>Value in rupees</td>
<td>Quantity in mounds</td>
</tr>
<tr>
<td>1895-96</td>
<td>{ Bengal Calcutta }</td>
<td>1,51,305</td>
<td>7,351</td>
<td>2,51,817</td>
</tr>
<tr>
<td>1900-01</td>
<td>{ Bengal Calcutta }</td>
<td>1,48,765</td>
<td>3,47,657</td>
<td>3,53,013</td>
</tr>
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## APPENDIX

### Showing Exports

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### Dix Iv.

by Rail and River

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## APPENDIX V

### Showing Imports by Sea.

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<th>SKINS, DESERED.</th>
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<th>MANUFACTURES.</th>
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## APPENDIX VI

### Showing Exports by Sea.

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<th>DYEING AND TANNING MATERIALS</th>
<th>HIDES, RAW.</th>
<th>SKINS, RAW.</th>
<th>HIDES, DESERED.</th>
<th>SKINS, DESERED.</th>
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<th>MANUFACTURES.</th>
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<td>Value in Rs.</td>
<td>Weight in mams.</td>
<td>Value in Rs.</td>
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