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DACCA MUSLINS.

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DACCA MUSLINS.

As under this head we shall have occasion to notice the famed and still valued productions of the Dacca loom, we shall here take the opportunity of making some general remarks regarding their *fineness*.

It has long been a subject of interest and doubt whether the finest Dacca muslins have ever been equalled or surpassed by the machine-made muslins of Europe.

An answer has been given to the question by the British manufacturer, who alleges that the hand-spinner of Dacca has produced nothing so fine as some of the examples produced by his machinery. It was asserted, and it has been generally accepted as true, that in the Exhibitions of 1851 and 1862 there were muslins of European make which were finer than anything shown there from India.

Whatever be the state of the case, however, as regards the contest between Dacca and European muslins, *quoad actual fineness*, this at least seems clear—and it is admitted, we believe, by all—that as regards *apparent fineness* India bears the palm. It is said that this is explained by a greater compression of the thread, depending on the peculiar mode of spinning, and by a consequent lessening of its diameter.

We do not think that this fact should be lost sight of. *Apparent fineness*, of course, is not *actual fineness*; but *actual fineness* loses much of its value by seeming coarse. Whether the muslins which disputed with Dacca for the prize were or were not really the finer, it was admitted by our best judges in such matters that they *seemed* not to be so.

In dealing with a vexed question of this kind the first thing to be done is to examine the way in which the relative fineness of the different muslins is practically determined and stated. We cannot show this better than by quoting from a letter which we received from Mr. H. Houldsworth, in February 1864:—

"It may be useful to repeat here the formula for ascertaining the fineness of yarn when woven. In England it is designated *by the number of hanks in one pound weight of 7,000 grs.* A hank is 840 yards, or 30,240 inches. The first step is to count the number of threads of warp and weft in one square inch. This is usually done by the weaver's magnifying glass, which, through an opening of  $\frac{1}{2}$  inch, brings the threads in that space distinctly into view. Thus the specimen A B (muslin from Arnee, Madras) counts 40 threads each way in  $\frac{1}{2}$  inch, or 80 threads in 1 inch of warp, and 80 of weft, showing that each square inch contains 160 inches of yarn.

Thus the sq. ins. in the piece  $\times 160$   
 $\frac{30,240}{30,240}$  = the hanks in the piece;

and, as the wt. of the piece in grains : the hanks :: 7,000 : No. of the yrn.  
Then for A B (the length of which is 15 yds. 18 inches, the width 1 yd. 16 inches,  
Sq. ins. piece. Thds. p. inch. inch.  
and the weight 6891 grs.),  $\frac{29016 \times 160 \times 7000}{30240 \times 6891 \text{ grs.}} = \text{No. 156.}^*$

Nothing can be more clear or simple than the process here described, but it is, at the same time, very evidently one into which error may easily creep. For instance, if we take two specimens of the same muslin—halving a piece, for example—and if we starch and dress the one half, and leave the other unstarched, by following the manufacturer's method of determining fineness, we shall arrive at the startling conclusion that it is two things at  
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once—that the yarn of which it is *all* made is of *two* distinct qualities. It will be seen that the whole process depends on the determination of the length of yarn in a given weight of cloth; but it is clear that this length will be the same before starching as after, while the weight, on the other hand, will be very different; and this will, of course, affect the estimate of the fineness, and it may do so to a very serious extent.

In the case of the Arnee muslin, which formed the subject of the above calculation, we found the loss in weight, after careful washing, to be 23 per cent., and it would in consequence have the *No.* of its yarn raised from 156 before washing to 203 after washing.

In ascertaining the comparative fineness, therefore, of different woven yarns, this process cannot be safely employed, unless the sizing or starching has been carefully removed from all the specimens examined and compared.

So also it will almost certainly lead to erroneous conclusions if in one muslin the fineness is estimated before, and in another after the yarn is woven. In the first case we find how many hanks or lengths of 840 yards there are in 7,000 grains of yarn, and in the other how many like lengths there are in 7,000 grains of the fabric. But this last will not, or may not, represent 7,000 grains of yarn, but *that weight of a mixture of yarn and size*.

Now it so happens that in assigning those numbers to European muslins which represent their fineness, they have been computed from the yarns before weaving, but the numbers for the Dacca muslins, on the other hand, have always been computed from the fabrics. These last are not nearly so heavily starched as fine European muslins generally are, but still a certain proportion of their weight does consist of size. And this fact has only to be stated to show that the two sets of estimates, when used for purposes of comparison, cannot tell the truth of the matter. If the numbers assigned to Dacca muslins be computed from the examination of the finished fabric, so ought also those for the European—and even then we must take the further and absolutely necessary precaution of having both sets of specimens carefully washed.

Feeling that this dispute as to superiority was really an unsettled thing, we resolved to try to throw some light on it by another mode of inquiry. It was thought this might be done *by a series of determinations of the diameter of the thread, the number of filaments in it, and the diameter of the filaments themselves*. Such measurements could only be ascertained by the aid of the microscope in the hands of persons accustomed to its use, and such assistance was accordingly sought.

Four muslins were selected—two of European and two of Dacca make. Of the European, one was the best exhibited in 1851,\* and the other the best exhibited in 1862.† Of those from Dacca, one was the best exhibited in 1862, and the other a still finer one from the India Museum.‡

Each specimen was divided into several portions—and these were given to two skilled observers, who were not told that among the samples sent for examination there were any duplicates. This course was adopted in order to have a thorough test of accuracy in a large comparison of results. Ten sets of measurements for each portion of each specimen were made. In only one case was the discrepancy such as to lead us to conclude that the

\* Numbered in the Catalogue of the Exhibition as 540\*. Of the accuracy of this No., however, there is good reason for doubt.

† Numbered in Catalogue of the Exhibition, 440\*. Muslin, manufactured by M. Thivel Michon, of Tavare, from yarn made by H. Houldsworth and Co., of Manchester.

‡ As calculated from the piece these gave 380 and 406 as the Nos. of their yarn.

observer had made a mistake, probably by an accidental change of sample at one stage of the measurements. The general results bear intrinsic evidence of substantial accuracy—a conclusion which we think a careful examination of the following table will bear out:—

Description, &c.	Diameter of Threads. (Parts of an inch.)			Number of Filaments in Thread.			Diameter of Filaments in Thread in parts of an inch. <sup>†</sup>		
	Minimum.	Maximum.	Mean.	Minimum.	Maximum.	Mean.	Minimum.	Maximum.	Mean.
French muslin, manufactured by M. Thibet Michon, of Lavare, from thread of 440's, spun by Thomas Houldsworth & Co. Shown at the International Exhibition of 1862.	·0020	·0040	·003000*	5	12	8·5*	·00036	·00100	·00068*
2nd ditto	·0015	·003	·002200	8	21	12·7	·00050	·00075	·000618
3rd ditto	·00125	·003	·002025	7	18	11·7	·00050	·00087	·000637
4th ditto	·0015	·003	·002350	10	20	15·5	·00037	·00087	·000625
5th ditto	·0015	·003	·002225	9	26	15·8	·00050	·00087	·000687
<b>Mean</b>	—	—	<b>·002220</b>	—	—	<b>13·8</b>	—	—	<b>·0006427</b>
English Muslin, stated to be of 540's yarn. Exhibited in International Exhibition of 1851.	·0018	·0032	·0025*	7	14	10·5*	·00030	·00084	·00057*
2nd ditto	·00175	·003	·00215	9	23	16·7	·00050	·00075	·000575
3rd ditto	·00125	·00325	·00215	7	22	13·6	·00037	·00075	·000500
<b>Mean</b>	—	—	<b>·002167</b>	—	—	<b>14·9</b>	—	—	<b>·000539</b>
Dacca muslin, <i>Mulmul Khas</i> from India Museum. Length, 4 yards. <sup>‡</sup> Width, 1 yard. Warp threads per square inch, 100. Weft threads in square inch, 92. Weight of piece, 566·8 grs. Computed No. of yarn in piece, 406·5.	·0014	·0032	·0023*	5	12	8·5*	·00030	·00102	·00066*
2nd ditto	·001	·0025	·001625	5	14	9·2	·00062	·00125	·00080
3rd ditto	·00075	·002	·00135	4	18	8·9	·00062	·00112	·00082
<b>Mean</b>	—	—	<b>·001526</b>	—	—	<b>9·0</b>	—	—	<b>·000803</b>
Dacca muslin, <i>Mulmul Khas</i> . Exhibited in Indian section of the International Exhibition of 1862. Length, 10 yds. 12 ins. Width, 1 yard. Warp threads in square inch, 104. Weft threads in square inch, 100. Weight of piece, 1565 grains. Computed No. of yarn in piece, 380·5.	·0015	·0035	·0025*	4	10	7*	·00038	·00098	·00068*
2nd ditto	·00125	·00375	·002175	5	15	9	·00050	·00075	·000681
3rd ditto	·00125	·00225	·001825	4	12	8·1	·00062	·00087	·00095
4th ditto	·001	·0025	·0017	5	16	8·9	·00062	·00100	·000725
5th ditto	·001	·0025	·001825	4	17	8·8	·000375	·00100	·000725
<b>Mean</b>	—	—	<b>·001896</b>	—	—	<b>8·6</b>	—	—	<b>·000719</b>

\* Those marked thus are the means of the highest and lowest of all the measurements made. The means without the asterisk are calculated from the sum of ten separate measurements. The general means are calculated by using the means marked by the asterisks as one observation, the others being multiplied by ten, and so giving the sum of all the observations from which they are drawn.

† To ascertain this, the size was in each case removed before the separation into filaments was attempted.

‡ This applies to the portion used for experiment; the original length of the piece was 10 yards.

These measurements, so far as they go, lead to the following conclusions:—

1. That the diameter of the Dacca yarn is less than that of the finest European. The two finest specimens of the last ever known to have been exhibited, gave ·00222 and ·002167 of an inch, while the two specimens from India gave ·001526 and ·001896 respectively. At first sight this does not appear a great difference, but it is in reality a very appreciable one, and so far as it goes it is distinctly in favour of the Indian fabrics.
2. That the number of filaments in each thread is considerably smaller in the Dacca than in the European yarns. The two latter gave 13·8 and 14·9, and the two former 9·0 and 8·6. We were scarcely prepared to find this point of difference so decidedly marked, but no result of the investigation may be more safely accepted as correct.
3. That the diameter of the ultimate filaments or fibres, of which the cotton of the Dacca yarn consists, is larger than that of the European. The two last gave ·0006427 inch and ·000539 inch; and the two former ·000803 inch and ·000719 inch. Here again the difference is quite decided, and is only in accordance with the results of other investigations into the comparative size of the filaments of Indian and American cotton.

4. That it appears from the investigation that the superior fineness of Dacca yarn depends chiefly on the fact that it contains a smaller number of filaments. The mode of spinning—as we shall afterwards find—makes it more compressed, but it is not probable that this greatly affects the result. Even after taking into account the greater thickness of the filaments of the cotton used in Dacca, it is clear, however, that their number, which is so much smaller, must give a finer thread. In other words the eight to nine (8·9 & 9·0) filaments of a diameter of ·000803 and ·000719 as in the best of the two Dacca muslins, must give a thread smaller in size or finer, than the 14 or 15 (13·8 and 14·9) filaments of a diameter of ·0006427 and ·000539 as in the best of the two muslins from Europe.

The measurements of the diameter of the thread were taken from specimens of muslin which were sized, that is in the condition in which they are offered for sale as finished goods. But as it was possible that the sizing might influence these, it was carefully removed from all of them and the measurements repeated.

The results of this part of the investigation are given in the following table:—

Description.	Diameter of threads. (Parts of an inch.)		
	Minimum.	Maximum.	Mean.*
French muslin (International Exhibition of 1862). -	1st sample	·001	·00325
	2nd ditto	·00125	·00325
	Mean	—	·0019
English muslin (International Exhibition of 1851). -	1st sample	·001	·00275
	2nd ditto	·00125	·0025
	Mean	—	·0018
Dacca muslin (India Museum). -	1st sample	·00075	·002
	2nd ditto	·001	·0025
	Mean	—	·001375
Dacca muslin (International Exhibition of 1862). -	1st sample	·001	·00225
	2nd ditto	·001	·00225
	Mean	—	·0015625

\* Calculated from ten separate measurements.

This table shows that it was proper to extend and complete the investigation, and that sizing does really affect the diameter of the thread; but it also shows that the Indian maker is still able to claim the palm—*his yarn being finer than anything yet known to have been produced in Europe.*\*

\* In the International Exhibition of 1862, a few yards of muslin, stated to be of No. 700<sup>th</sup> yarn, spun by Thomas Houldsworth & Co., of Manchester, were shown. Regarding this specimen, Mr. Houldsworth himself remarked that it was too imperfect for any purpose, except to fix the limits of fineness at which cotton yarn can be woven at all. Regarding the specimens of muslin of 440<sup>th</sup> yarn, exhibited on the same occasion, and a portion from which formed one of the subjects of the investigation here detailed, Mr. Houldsworth states that he considers these a great advance on any muslin exhibited in 1851, chiefly, he adds, "Owing to the introduction "since then of Neilman's combing machine for cotton, by which the quality of fine yarn has been vastly improved, "and made nearly as perfect as the fibre will admit." (Catalogue of the Indian Department of the International Exhibition of 1862, p. 206.) Mr. Houldsworth's further remarks, on this subject, have such an immediate bearing on what has preceded, that we repeat them here. Referring to the muslin (440<sup>th</sup>) before named, he continues, "A comparison, however, of this muslin with the Dacca piece, as tested by the eye and feel, would lead "to the opinion that the Indian piece was the finer. This arises from the difference in the finishing or getting

The condition of the fibre with reference to the amount of twisting which it receives in the process of spinning, constitutes another element of advantage in favour of the Dacca muslins. The subjoined Table<sup>a</sup> shows the difference between the two in this respect:—

Description.		Number of twists in thread per inch.		
		Minimum.	Maximum.	Mean. <sup>b</sup>
French muslin (International Exhibition, 1862).	1st sample	32	172	73·2
	2nd ditto	46	166	64·4
	Mean	—	—	68·8
English muslin (International Exhibition, 1851).	1st sample	26	114	55·6
	2nd ditto	28	146	57·6
	Mean	—	—	56·6
Dacca muslin (India Museum).	1st sample	64	260	121·8
	2nd ditto	46	190	98·4
	Mean	—	—	110·1
Dacca muslin (International Exhibition, 1862).	1st sample	48	196	82·8
	2nd ditto	38	144	78·6
	Mean	—	—	80·7

\* Calculated from the sum of ten separate determinations.

In the case of the two first—the European—we find that the number of twists or turns which each inch of the yarn has received in the process of spinning amounts on the average to only 68·8 and 56·6 as compared with 110·1 and 80·7 in the Indian. This is a most important difference, and one which in all probability affords the key to the very superior durability of the *hand-made* over the *machine-made* fabric—it being well known that for *wear* these very fine machine-made muslins of Europe are practically useless, whereas the very finest of the hand-made ones from India are proverbially lasting, and bear frequent washing, which the finest English or European muslins do not.<sup>†</sup>

" up of the two muslins—the French pieces being got up hard and wiry by means of starch, which coats the threads  
 " and makes them appear coarser than they are ; while the Dacca muslin is soft, and appears perfectly free from all  
 " starch or other dressing. It may also be that the India threads, spun by hand, are more condensed in their  
 " substance by the compression of the fingers in the act of spinning than the machine-spun 440<sup>c</sup> of the Manchester  
 " yarn."

<sup>a</sup> These calculations were made by Mr. W. T. Suffolk, to whose care and skill I am indebted for the results in the last Table, as well as for the majority of those in the one preceding it. The determination of the number of twists per inch was effected without taking the fabric to pieces, in order to avoid the chance of untwisting. The muslin was placed in a compressorium, gently drawn straight, and then fixed. The twists were counted in a length of half-an-inch, determined by means of a carefully cut aperture, the figures being, of course, doubled to give the twists per inch. Power used a  $\frac{5}{8}$ -yds. binocular =  $\times 60$  diameters.

<sup>†</sup> It might be thought that the greater length of the fibre of the Sea-island cotton, of which these European muslins are made, would neutralize the advantage arising from the superior twisting of the shorter Indian staple ; the difference in favour of the Indian *spinning* is, however, too great for this to hold good. The shorter staple of the Indian cotton may, however, to some extent, account for *machine-made* fabrics of it being less durable than those composed of the longer staple cottons,—although the difference in the length between India cotton and that of the "Middling Orleans," which before the American civil war constituted the bulk of the cotton used in this country, only amounts on the average to  $\frac{1}{6}$ th of an inch. Another fact must be kept in mind—the filaments of the Indian cotton being thicker than that of the American (Sea Island) are perhaps *individually* stronger ; and, therefore, although called upon to attribute the greater durability of the Dacca muslins to their better spinning, it is possible that the thickness of the ultimate fibre may have something to do with the matter.

*However viewed, therefore, our manufacturers have something still to do. With all our machinery and wondrous appliances, we have hitherto been unable to produce a fabric which for fineness or utility can equal the "woven air" of Dacca—the product of arrangements which appear rude and primitive, but which in reality are admirably adapted for their purpose.*

These arrangements appear to us of such interest that we shall introduce here a short account of the processes of the Dacca manufactures, and for this purpose shall fully avail ourselves of the information contained in an admirable work on the Cotton Manufactures of Dacca,\* which we are able to say was written by James Taylor, Esq. This gentleman sent to the Exhibition of 1851 a series of specimens of the Dacca fabrics, with valuable drawings, and other objects, illustrative of the process of manufacture. Soon after the Exhibition, Mr. Taylor wrote the book referred to as the one from which the following extracts are taken. Those who desire a knowledge of the subject more full and minute than the quotations afford, should consult the work itself. In order to make the description as clear as possible, we have had prepared from the drawings in the India Museum, a lithographic representation—opposite—of the chief processes on a larger scale than those which Mr. Taylor used in illustration of his excellent work.

The passages which we have selected and which we here reproduce, are those which describe the processes of *spinning, weaving, bleaching, and dressing.*

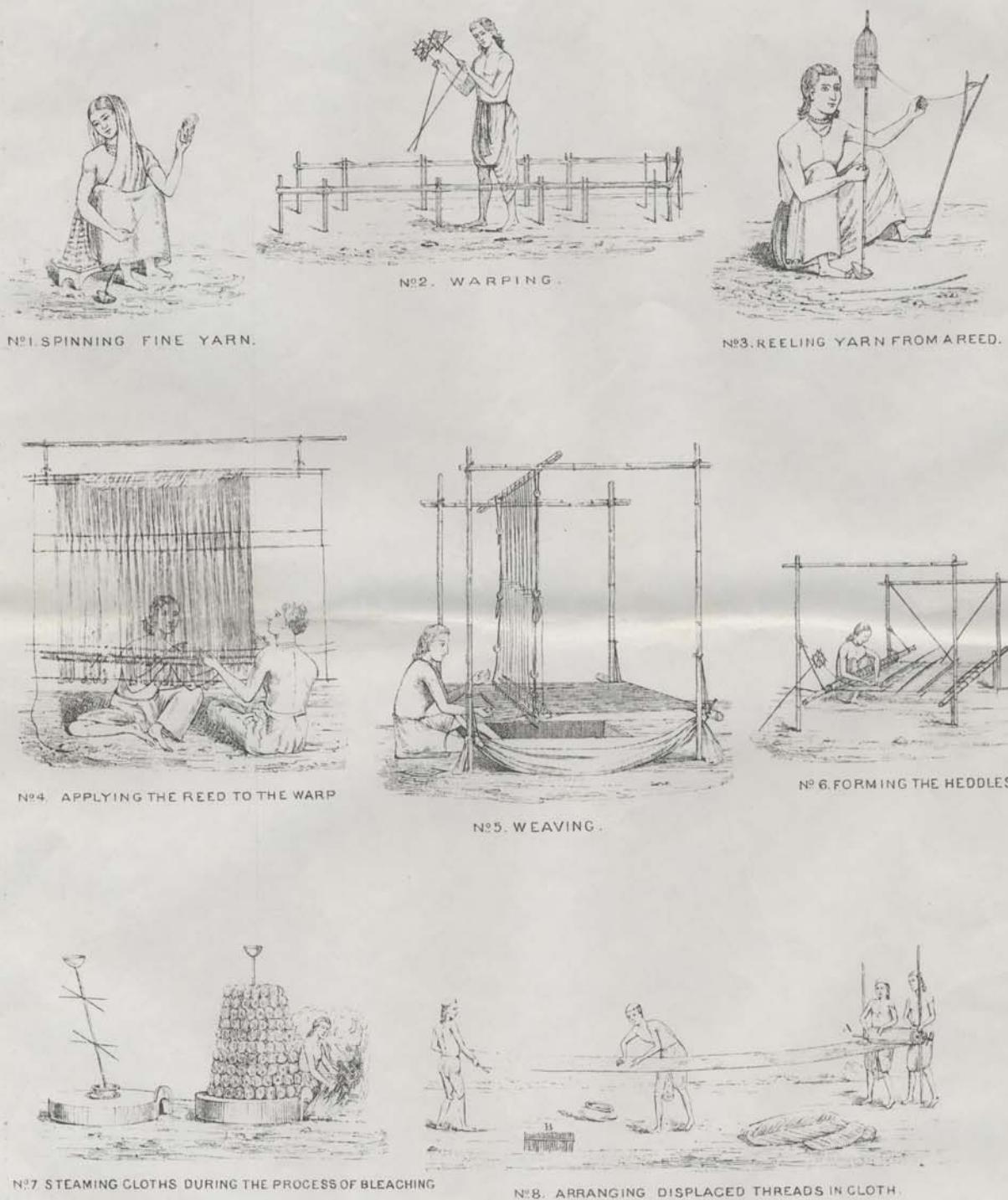
#### SPINNING.

"The cotton in the state of *kāpās* (*i. e.* seeds and wool unseparated) is cleaned and prepared by the women who spin the yarn. Fragments of the leaves, stalks, and capsules of the plant are carefully picked out with the fingers, and the wool adhering to the seeds is then carded with the jaw-bone of the *boalee* fish (*Siluris boalis*), the teeth of which, being small, recurved, and closely set, act as a fine comb in removing the loose and coarser fibres of the cotton, and all extraneous matter, such as minute particles of earthy and vegetable matter, from it. The Hindoo spinner, with that unwearied patience that characterizes her race, sits down to the laborious task of cleaning with this instrument each separate seed of cotton. Having accomplished this, she proceeds to detach the fibres from the seeds. This is done by placing a small quantity of the combed cotton upon a smooth flat board, made of the wood of the Chalta tree (*Dillenia speciosa*), and then rolling an iron pin backwards and forwards upon it with the hands, in such a manner as to separate the fibres without crushing the seeds. The cotton is next teased with a small hand-bow, formed of a piece of bamboo with two elastic slips of the same material inserted into it, and strung with a cord made of catgut, muga silk, or of plantain or rattan fibres, twisted together. The bamboo slips are moveable within the centre piece, and in proportion to the extent they are drawn out, or pushed back, the tension of the cord is increased or diminished. The cotton having been reduced by the operation of bowing to a state of light downy fleece, is spread out and lapped round a thick wooden roller; and, on the removal of the latter instrument, it is pressed between two flat boards. It is next rolled round a piece of lacquered reed of the size of a quill; and, lastly, is enveloped in the smooth and soft skin of the *cuchia* fish, which serves as a cover to preserve it from dust and from being soiled, whilst it is held in the hand, during the process of spinning."

"The finest thread is spun by women generally under thirty years of age. The spinning apparatus, which is usually contained in a small flat work-basket, not unlike the *calathus* of the

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\* A Descriptive and Historical Account of the Cotton Manufactures of Dacca in Bengal, by a former Resident of Dacca. Publisher, John Mortimer, 1851.



ancients, comprises the cylindrical roll of cotton (*pāni*), a delicate iron spindle,\* a piece of shell embedded in clay, and a little hollow stone containing chalk-powder, to which the spinner occasionally applies her fingers. The spindle (*tukū'ā*) is not much thicker than a stout needle. It is from ten to fourteen inches in length; and attached to it, near its lower point, is a small ball of unbaked clay, to give it sufficient weight in turning. The spinner (fig. 1, pl. A.) holds it in an inclined position, with its point resting in the hollow of the piece of shell, and turns it between the thumb and forefinger of one hand, while she, at the same time, draws out the single filaments from the roll of cotton held in the other hand, and twists them into yarn upon the spindle. When a certain quantity of the yarn has been spun and collected on this instrument it is wound from it upon a reed. Dryness of the air prevents the filaments of cotton from being sufficiently attenuated or elongated, and is, therefore, unfavourable to the spinning of fine yarn. A certain degree of moisture, combined with a temperature of about 82 degrees, is the condition of the atmosphere best suited to the carrying on of this operation. The Dacca spinners generally work from soon after early dawn to nine or 10 o'clock, A.M., and from three or four in the afternoon till half an hour before sunset. The finest yarn is spun early in the morning before the rising sun dissipates the dew on the grass; or, when this is wanting and the air is unusually dry, it is not unfrequently made over a shallow vessel of water, the evaporation from which imparts the necessary degree of moisture to the filaments of cotton, and enables the spinner to form them into thread.

"The native weavers commonly judge of the fineness of yarn by sight alone. They have no rule or standard for the length of the reels, or instrument by which they can form an estimate of any given weight of thread. The only mode, therefore, of ascertaining the quality of the fine yarn is to weigh the skeins and then measure them on sticks placed in the ground, as in warping—an operation which requires delicate manipulation, and which few except the spinners or weavers themselves can do. Yarn is measured by the *hāth* (cubit), the length of which is stated by the Commercial Resident to be 19 $\frac{1}{2}$  inches; and is weighed by the *ruttee*, which is equal to about two grains troy. The standard quality of the yarn used in the manufacture of the muslins formerly sent to the Court of Delhi is said to have been 150 *hāths* in length to one *ruttee* in weight; but was commonly used varied from 140 to 160 *hāths* in length to the above weight—the yarn of 140 *hāths* being employed for the warp, and that of 160 for the weft, of these fabrics. The finest yarn used in the Dacca looms, in the year 1800, did not exceed 140 cubits in length to one *ruttee* in weight. Some, however, is mentioned as having been spun at Sunargong at this time, of the quality of 175 cubits to one *ruttee*. Yarn much finer than this is made at Dacca in the present day. A skein, which a native weaver measured in my presence in 1846, and which was afterwards carefully weighed, proved to be in the proportion of upwards of 250 miles to the pound of cotton. The short fibres of the Dacca cotton, of which the fine thread is made, are not well adapted to spinning by machinery; while, on the other hand, the long, cylindrico-spiral, and more elastic fibres of the American cotton which are best suited to this process, cannot be made into fine yarn with the primitive spindle of the Hindoo. In 1811, a quantity of Sea Island cotton was sent by the Commercial Resident to the different manufacturing stations connected with the Dacca factory for trial, but the spinners were unable to work it into thread, and it was pronounced to be an article unfit for the manufactures of the native looms. The Dacca yarn is said to be softer than mule twist; and I believe it is generally admitted that the fabrics made of it are more durable than muslins manufactured by machinery. The tendency of the fibres to expand from moisture is the criterion by which the native weavers judge of the quality of cotton; and it is mentioned by Mr. Bebb, the Commercial Resident in 1789, as the test which then determined the value of this article as raised in different parts of the district. The cotton which swells the least on bleaching is considered by the weavers as the best, or at least, as the material best suited to the manufacture of fine thread. A common remark among them is, that English yarn swells on bleaching, while Dacca spun thread shrinks and becomes stronger the more frequently it is subjected to that process."

\* In some of the eastern districts of Bengal, and in Assam, the spindle is frequently made of a slender piece of bamboo instead of iron.

"A spinner devoting the whole morning to the spindle can make about a half-sicca or tola weight (ninety grains troy) of fine thread in a month. This is considered the maximum quantity. But as spinning is now more a leisure occupation than a professed trade, it is calculated that the average quantity produced in that time, by each of the persons employed in the business, does not much exceed 45 grains weight. Fine thread is weighed either by a small rude balance (*tula*), on the principle of the Roman steel-yard, or in jewellers' scales—the substances used as weights in the latter case being four barleycorns, or a seed of the *Abrus precatorius* (*lal kunch*), either of which constitutes a *ruttee*. The price of the finest yarn used in the Dacca looms is eight rupees (16s.) per tola weight (180 grains). This is at the rate of about 3*l.* 2*s.* per pound (7,000 grains) avoirdupois."

The steps in the process of weaving "may be described according to the order in which they occur, under the following heads, viz.:—winding and preparing the yarn; warping; applying the reed to the warp; beaming, or applying the warp to the end roll of the loom; preparing the heddles; and lastly, weaving."

#### WINDING AND PREPARING THE YARN.

"The yarn when delivered to the weaver is wound on small pieces of reed, or made up in the form of small skeins. The first thing that is done is to steep it in this state in water. It is then reeled in the manner shown in figure 3, Pl. A. A piece of stick is passed through the hollow reed and fixed in the cleft end of a piece of bamboo. The weaver, holding the latter between his toes, draws off the yarn from the reed, which revolves upon the stick through it, and winds it upon the reel, which he holds in the other hand, and whirls round in a small cup of smooth cocoa-nut shell. When the yarn is in the form of a skein, it is put upon a small wheel made of fine splints of bamboo and thread. This is mounted on the end of a stick upon which it is made to revolve, and as the yarn is thus drawn off, it is wound upon the reel."

"The yarn is divided into two portions—viz., a sufficient quantity of the finest of it for the woof (*burna*), and the rest for the warp (*tānā*)."

"The warp thread is steeped for three days in water, which is twice changed daily. On the fourth day it is, after being rinsed, put upon a small wheel, made of splints of reed and thread, and is then reeled—the stick upon which the wheel is mounted being held between the toes, and the reel turned in the manner represented. Skeins of a convenient size having been wound off, are steeped in water, and tightly twisted between two sticks; they are then left upon the sticks and exposed to the sun to dry. They are next untwisted and put into water mixed with fine charcoal-powder, lampblack, or soot scraped from the surface of an earthen cooking vessel. They are kept in this mixture for two days, then rinsed in clear water, wrung out, and hung upon pieces of stick placed in the shade to dry. Each skein having been again reeled, is steeped in water for one night, and is next day opened up and spread over a flat board, upon which it is smoothed with the hand, and rubbed over with a paste or size made of *koic* (paddy or rice, from which the husk has been removed by heated sand), and a small quantity of fine lime mixed with water. Rice, it may be remarked, has formed the basis of the starched used in weaving in India, from remote antiquity. 'Let a weaver,' says Menu, 'who has received ten palas of cotton thread, give them back increased to eleven by the *rice water*, and the like used in weaving, &c., (Menu's 'Institutes,' No. 397.)'

"The skeins after being sized are wound upon large reels, and exposed to the sun—the turns of the thread being widely spread over the surface of the reels in order that they may dry quickly. All the thread is again reeled and sorted preparatory to warping. It is generally divided into three shades of quality—viz., the finest for the right-hand side, the next finest for the left-hand side, and the coarsest for the centre, of the warp. Such is the mode of preparing the yarn for the warp of plain muslins. The yarn for the warp of striped or chequered fabrics, is prepared by twisting a certain number of threads together, namely, two for each stripe of the *dooreea*,

and four for that of the *charkanu* muslin, and then sizing and reeling it in the manner above mentioned."

"The yarn for the woof is not prepared till two days previous to the commencement of weaving. A quantity sufficient for one day's work is steeped in water for twenty-four hours. Next day it is rinsed and wound on large reels, and then lightly sized with paste of the same kind as that applied to the warp. From small reels it is wound upon larger ones, and left upon these to dry in the shade. This process of preparing the yarn for the woof is continued daily until the cloth is finished."

## WARPING.

"This operation is usually performed in a field or any open spot convenient for the work near the weaver's house. For this purpose, four short bamboo posts are fixed in the ground, at measured distances (varying according to the intended length of the cloth), and several pairs of rods placed between them, the whole forming two parallel rows of rods about four feet apart. The weaver holding a small wheel of warp-yarn in each hand (Fig. 2, pl. A.), passes the latter over one of the posts and then walks along the rows, laying down two threads, and crossing them (by crossing his hands between each pair of rods) until he arrives at the post at the opposite extremity. He retraces his steps from this point, and thus continues to traverse backwards and forwards as many times as there are threads of the warp to be laid down. The small wheels or bobbins on which the warp yarn is wound are made of fine splits of bamboo and thread, and are each attached at a right angle to a short handle, at the end of which there is a *kangch*\* and ring, through which the yarn runs. Two pairs of hand-wheels, one with single, and another with twisted yarn, are used alternately for the warps of striped and chequered muslins."

## APPLYING THE REED TO THE WARP.

"The reed is generally applied to the warp after the preceding operation; but sometimes it is not attached until the warp has been fastened to the end roll of the loom. It is made of fine splits of bamboo firmly fixed between ribs of split cane. The finest reed used in the Dacca looms contains only 2,800 dents in a space of 40 inches in length. In order to apply it to the warp, the latter is folded up in the form of a roll or bundle, and suspended from the roof of the weaver's hut, with one end of it unfolded, spread out, and hanging down to within a foot or two from the ground. The reed is then fastened with two slight cords to the bundle and lease rods, and hangs in front of the unfolded portion of the warp. Two workmen seat themselves (Fig. 4, Pl. A), one on each side of the warp. Having cut with a knife a portion of its end loops, the man in front passes an iron wire or sley hook through the first division of the reed to the other workman; and the ends of the two outermost threads being twisted upon it by him, it is drawn back, and the thread thus brought through. In this manner the wire is introduced through all the divisions of the reed in succession, and two threads are drawn through each of them at a time. The ends of the threads are gathered in bunches of five or six, and knotted; and through the loops formed by these knots a small bamboo rod is passed."

\* A kind of coarse glass.

(b) WATSON, J.F. IBM 1803.C.33 (Regarding 18 vols of 700 textile samples; 20 sets)

18. In conclusion, I have now to suggest that the authorities in the selected districts should, previously to the actual presentation of the work, undertake as follows :—

- 1st. To provide for the permanent protection of the work by placing it in the charge of a proper and responsible person, or persons, in a suitable building.
- 2nd. To afford the requisite facilities for consulting the work ; subject, however, to the condition that under no circumstances shall any of the volumes be removed for purposes of exhibition or reference.
- 3rd. That access to the work be given to any person bearing an order to that effect signed by the President, Vice-President, or Secretary of the Society of Arts; the Presidents, Vice-Presidents, or Secretaries of the Chambers of Commerce; the Chairman or Secretary of the Association of Chambers of Commerce; the President, Vice-President, or Secretary of the Cotton Supply Association; the Chairman, Vice-Chairman, or Secretary of the Cotton Brokers Association; the Chairman, Vice-Chairman, or Secretary of the Liverpool East India and China Association; by the Presidents, Vice-Presidents, Chairmen, Vice-Chairmen, or Secretaries of such other Associations for the promotion of Commerce as now exist, or may hereafter be formed; and by the Reporter on the Products of India.

(Signed)

J. FORBES WATSON,  
Reporter on the Products of India to the  
Secretary of State for India in Council.

INDIA MUSEUM, July 1866.

NOTE.—The foregoing conditions having been agreed to by the Chambers of Commerce of Belfast, Bradford, Glasgow, Halifax, Liverpool, and Manchester; by the Industrial Museum of Scotland in Edinburgh; by the Industrial Museum of Ireland in Dublin; by the Huddersfield Mechanics' Institution; by the Towns of Macclesfield and Preston; and by the Borough of Salford for the Royal Peel Park Museum,—a Set of the Volumes in question has been presented to each of these places, making, in addition to the India Museum, attached to the Department of the Reporter on the Products of India, thirteen places in this country where the Work can be consulted by persons practically interested in the matter. With respect to the seven Sets for India: These, under the instructions of the Secretary of State for India in Council, have been forwarded for deposition in Calcutta, Madras, Bombay, and Kurrachee, and in such places in the North-Western Provinces, in the Punjab, and in Berar, as the respective Governments of the Divisions in question may decide upon. As soon as the exact localities have been determined by the authorities in India, intimation thereof will be made both in this country and in India.

## MUSLINS, PLAIN AND EMBROIDERED.

No.	DESCRIPTION.			Length. yds. ins.	Width. yds. ins.	Weight. Ibs. ozs.	Price. £ s. d.	Whence procured, Place of Manufacture, &c.
	Name and Use.	Material.	Quality, &c.					
241	"Abrawan" or "Running Water," for dresses.	Muslin	Plain	20 0	1 0	0 7 <i>1</i>	6 4 0	Dacca, Bengal.
242	"Circular Ali," for dresses, &c.	Ditto	Ditto. Fine quality	20 0	1 0	0 6 <i>1</i>	- - -	Ditto.
243	"Shubnam" or "Evening Dew," for dresses.	Ditto	Ditto. Fine material	19 1 <i>4</i>	0 3 <i>4</i>	0 6 <i>1</i>	3 4 0	Ditto.
244	"Tunzeb," for dresses	Ditto	Ditto. Fine quality	21 5	1 0	0 12 <i>1</i>	5 0 0	Ditto.
245	"Nyansook," for neckerchiefs, &c.	Ditto	Ditto. Good quality	19 1 <i>8</i>	1 7	1 2 <i>1</i>	4 0 0	Ditto.
246	"Jungle Khass," for dresses, &c.	Ditto	Ditto. Ditto	21 6	1 5	1 9 <i>1</i>	5 2 0	Ditto.
247	"Doorees," for children's dresses, &c.	Ditto	Striped	13 1 <i>4</i>	0 28	0 10 <i>1</i>	- - -	Gwalior.
248	"Dooreen," chiefly for children's dresses.	Ditto	Ditto	10 0	1 0	0 12 <i>1</i>	- - -	Radnagore.
249	"Dooreah," chiefly for children's dresses.	Ditto	Ditto. Fine	10 0	1 0	0 13 <i>1</i>	1 4 0	Dacca, Bengal.
250	"Charkanu," for dresses, &c.	Ditto	Cheek. Good quality	9 2 <i>6</i>	0 35 <i>1</i>	0 15	1 0 0	Ditto.
251	Ditto	Ditto	Ditto	9 2 <i>9</i>	1 0	0 10 <i>1</i>	1 0 0	Ditto.
252	"Phookary," for dresses, &c.	Ditto	Stripes and Flowers	13 1 <i>3</i>	0 28	0 14 <i>1</i>	- - -	Gwalior.
253	"Jamdance," for dresses, &c.	Ditto	Figured in the loom. Very fine quality	11 2 <i>0</i>	1 0	0 13 <i>1</i>	3 18 0	Dacca, Bengal.
254	"Jamdance," for dresses, &c.	Ditto	Ditto	10 0	0 31	0 11	3 18 0	Ditto.
255	"Chikan work," for dresses	Ditto	Embroidered in diagonal stripes of flowers.	10 0	0 34	1 0 <i>1</i>	4 0 0	Ditto.
256	Ditto	Ditto	Embroidered flower pattern. Good quality.	10 0	0 35	0 13 <i>1</i>	3 18 0	Ditto.
257	Ditto	Ditto	Embroidered. Diagonal stripes and flowers. A fine example.	10 0	1 0	1 5	4 0 0	Ditto.
258	Ditto	Ditto	Embroidered. Of fine quality	10 0	1 0	0 13 <i>1</i>	3 18 0	Ditto.
259	Ditto	Ditto	Ditto. ditto	9 1 <i>4</i>	0 33	0 11 <i>1</i>	3 18 0	Ditto.
260	"Bootee," for dresses	Ditto	Ditto, with crimson spots	10 0	1 0	0 13 <i>1</i>	1 10 0	Hyderabad, Deccan.
261	- - -	Gold cloth	Plain	2 31	0 24	0 5	1 16 0	Hyderabad, Deccan.
262	- - -	Silver cloth	Ditto	2 32	0 23 <i>1</i>	0 5 <i>1</i>	- - -	Ditto.
263	- - -	Gold cloth	With red silk stripes	2 33	0 26 <i>1</i>	0 5 <i>1</i>	- - -	Ditto.
264	- - -	Silver cloth	Plain	1 0	0 22 <i>1</i>	0 1 <i>1</i>	- - -	Ditto.
265	- - -	Gold cloth	With green silk stripes	2 0	0 25	0 4	About 1 16 0	Ditto.
266	- - -	Silver cloth	With crimson silk stripes	2 35	0 24	0 5 <i>1</i>	- - -	Ditto.
267	- - -	Ditto	Plain	1 4	0 33 <i>1</i>	0 4 <i>1</i>	- - -	Moorshedabad, Bengal.
268	- - -	Gold cloth	Figured	1 9	0 28	0 5 <i>1</i>	- - -	Ditto.
269	- - -	Silver cloth	Ditto	1 8	0 31	0 5 <i>1</i>	- - -	Ditto.
270	- - -	Gold cloth	With gold and beetle wing embroidery	2 22	0 20	0 6 <i>1</i>	- - -	Madras.
271	- - -	Muslin	Printed with gold flowers	9 27	1 25	1 0	- - -	Jeypore, Rajpootana states.
272	For small scarfs	Ditto	Printed with silver. Piece incomplete	9 33	1 5	0 3	0 4 6	Hyderabad, Deccan.
273	- - -	Ditto	Ditto	9 33	1 7	0 3	0 4 6	Ditto.
274	For making women's bodices	Ditto	Worked in gold figures	1 4	1 0	0 3	- - -	Madras.
275	"Kincoob"	Silk gauze and gold	Diagonal stripes and flowers of gold on a mauve ground.	4 20	0 34	2 4 <i>1</i>	- - -	Benares.
276	To make up into scarfs	Muslin	Embroidered. Diagonal stripes and flowers in gold and beetle wing.	9 22	1 3	1 11 <i>1</i>	- - -	Madras.
277	- - -	Ditto	Embroidered in gold, &c.	1 20	1 15	0 12	- - -	Ditto.
278	For scarfs and head coverings.	Ditto	Embroidered in gold stars and flowers	2 2	1 8	0 6 <i>1</i>	5 0 0	Ditto.
279	- - -	Ditto	Embroidered in gold, &c. Pine pattern. Very rich.	3 7	1 12	0 8 <i>1</i>	7 10 0	Ditto.
280	- - -	Ditto	Leaf pattern, embroidered in gold	3 3	1 8	0 9 <i>1</i>	- - -	Ditto.

## MUSLINS, CALICOES, AND OTHER PIECE GOODS.

No.	DESCRIPTION.			Length. yds. ins.	Width. yds. ins.	Weight. lbs. ozs.	Price. £ s. d.	Whence procured, Place of Manufacture, &c.
	Name and Use.	Material.	Quality, &c.					
281	"Dooreen"	Striped muslin	Unbleached. Coarse. Four pieces (3 yards 22 inches each) woven in one length and connected by a fag. Plain ends.	14 18	0 30 $\frac{1}{2}$	2 2	0 3 6	Nagpore, Berar.
282	"Charkana"	Muslin	Check pattern. Unbleached. Coarse. Four pieces of 3 yards 22 inches each; woven in one length and connected by a fag. Plain ends.	14 18	0 24 $\frac{1}{2}$	2 0 $\frac{1}{2}$	0 3 6	Ditto.
283	"Dooreen"	Ditto	Striped. Narrow gold stripe in end.	14 0	0 30 $\frac{1}{2}$	0 10 $\frac{1}{2}$	1 13 0	Chundarce.
284	"Chudder, a covering for the body."	Ditto	Plain. Fine quality. Narrow gold stripe in end.	14 0	0 30 $\frac{1}{2}$	0 10 $\frac{1}{2}$	1 13 0	Ditto.
285	"Charkana"	Ditto	Check pattern. Superior quality. Gold stripe in end.	14 1	0 31 $\frac{1}{2}$	0 10 $\frac{1}{2}$	1 13 0	Ditto.
286	-	Ditto	Plain	15 39	1 2	1 24	0 4 3	Shahabad, Palna.
287	"Chunderkora"	Ditto	Bordered. Coarse	4 18	1 4 $\frac{1}{2}$	0 6	0 2 7 $\frac{1}{2}$	Calcutta.
288	For covering the head and neck.	Ditto	Bordered	2 33	1 10	0 3 $\frac{1}{2}$	0 2 0	Ditto.
289	"Santipore dhootee"	Ditto	Very light. Coloured figured borders with tussah silk worked therein.	5 32	1 9	0 5 $\frac{1}{2}$	0 5 6	Santipore, Bengal.
290	Ditto	Ditto	Very light. Coloured borders and ends.	4 18	0 32	0 5 $\frac{1}{2}$	0 5 6	Ditto.
291	Ditto	Ditto	Very light. Uncommon pattern. One border orange and blue, the opposite border crimson and blue.	5 20	1 10	0 6 $\frac{1}{2}$	0 5 6	Ditto.
292	When ends and borders are added, used for shawls and scarfs.	Cotton and silk	Embroiled with silk flowers	4 9	0 33 $\frac{1}{2}$	0 10 $\frac{1}{2}$	- - -	Dacca, Bengal.
293	For scarfs and dress	Ditto	"Moonga" silk. Embroidered	4 24	1 11	0 12 $\frac{1}{2}$	- - -	Ditto.
294	Ditto	Ditto	Ditto and cotton. Striped pattern.	4 16	1 0	0 8	- - -	Ditto.
295	Ditto	Ditto	Ditto and cotton, with pattern embroidered in Moonga silk.	4 17	0 33	0 13 $\frac{1}{2}$	- - -	Ditto.
296	-	Ditto	"Moonga" silk. Embroidered in coloured cotton.	4 12 $\frac{1}{2}$	0 33 $\frac{1}{2}$	0 11 $\frac{1}{2}$	- - -	Ditto.
297	"Gurrah" cloth	Cotton	Calico. 1st quality	12 18	0 28	2 12	0 4 0	Agra, N. W. Provinces.
298	"Guzzi" cloth	Ditto	Ditto. 2d "	17 18	0 18	1 13	0 2 0	Ditto.
299	"Gurrah" cloth	Ditto	Ditto. 1st	16 18	0 31	3 12	0 3 0	Palna, Bengal.
300	Ditto	Ditto	Ditto	12 0	0 34	3 0	0 4 0	Agra, N. W. Provinces.
301	"Dhoojee" cloth	Ditto	Coarse calico	4 12	1 0	1 4	- - -	Bhurtpore, Rajpootana States.
302	-	Ditto	Coarse brown calico. Piece incomplete.	2 11 $\frac{1}{2}$	0 28	0 8 $\frac{1}{2}$	- - -	Benares.
303	"Gurrah" cloth	Ditto	Calico. Unbleached. Cut sample only.	9 19	0 21	1 5 $\frac{1}{2}$	- - -	Ditto.
304	-	Ditto	Calico. Coarse. A sample only	2 14	1 0	0 12	- - -	Ditto.
305	For "sarees" (women's garments).	Ditto	Coarse gauze, light fabric. A sample only.	2 12	1 1	0 6 $\frac{1}{2}$	- - -	Ditto.
306	"Gurrah" cloth	Ditto	Coarse. A sample only	2 12	0 27	0 3 $\frac{1}{2}$	- - -	Ditto.
307	Sailcloth	Ditto	Coloured stripes of orange, green, and red, about one yard from principal end. Sample only.	5 0	0 22 $\frac{1}{2}$	4 12 $\frac{1}{2}$	0 2 6	Cutch, Bombay.
308	-	Cotton piece goods	Check, woven in colours. Sample only.	7 25	0 29	1 0 $\frac{1}{2}$	- - -	Benares.
309	-	Ditto	Design, ditto, ditto	8 0	1 1	1 10 $\frac{1}{2}$	- - -	Ditto.
310	-	Ditto	Print	5 28 $\frac{1}{2}$	1 1	1 4 $\frac{1}{2}$	- - -	Puttigurh, N. W. Provinces.
311	-	Ditto	Ditto	5 30 $\frac{1}{2}$	1 11	1 4 $\frac{1}{2}$	- - -	Ditto.
312	-	Ditto	Ditto	5 31 $\frac{1}{2}$	1 11 $\frac{1}{2}$	1 5 $\frac{1}{2}$	- - -	Ditto.
313	-	Ditto	Woven in colours. Imitation of English	6 18	0 23	1 5 $\frac{1}{2}$	0 3 0	Broach, Bombay.
314	-	Ditto	Ditto (plaid). Ditto	12 0	0 22 $\frac{1}{2}$	2 11 $\frac{1}{2}$	0 6 0	Ditto.
315	"Peshghee" for petticoats of poorer classes.	Ditto	Print. Fabric of English thread	5 0	0 32	1 24	0 4 0	Shikarpore, Sind.
316	-	Ditto	Plaid, woven in colours. Twilled cotton	8 15	0 25	1 12	0 6 0	Loodiana, Punjab.
317	-	Ditto	Check. Red on yellow ground	5 26	0 25	0 12 $\frac{1}{2}$	0 3 0	Ditto.
318	-	Ditto	Check or Plaid	8 23	0 26	1 1	0 3 0	Ditto.
319	-	Ditto	Print	8 26	1 11	1 5 $\frac{1}{2}$	- - -	Puttigurh, N. W. Provinces.
320	-	Ditto	Plain cloth dyed with indigo	8 6	0 34	3 3 $\frac{1}{2}$	0 3 6	Beejapoore, Deccan.

## MUSLIN, SILK, AND OTHER PIECE GOODS.

No.	DESCRIPTION.				Length,	Width,	Weight,	Price,	Whence procured, Place of Manufacture, &c.
	Name and Use,	Material,	Quality, &c.						
321	"Sullah"	Muslin	Plain.	Fine quality	13 0	1 0	0 9	4 4 0	Cuddapah, Madras.
322	Ditto	Ditto	Ditto.	Superfine quality	15 18	1 13	0 13	12 5 0	Arnee, Madras.
323	"Dooreen Sullah"	Ditto	Striped	-	10 18	0 27	0 15	0 6 0	Hyderabad, Deccar. Bought in Madras.
324	-	Ditto	Ditto.	Good quality	14 0	1 4	1 4	0 15 0	Arnee, Madras.
325	"Charkhana Sullah" for children's dresses.	Ditto	Check	-	7 0	0 33	1 4	0 5 10	Ditto.
326	Ditto	Ditto	Ditto	-	7 0	0 34	1 1	0 5 10	Ditto.
327	Ditto	Ditto	Ditto.	Fine quality	16 0	1 4	0 9	1 4 6	Ditto.
328	Ditto	Ditto	Ditto	-	13 0	1 2	1 14	0 8 0	Nellore, Madras.
329	Ditto	Ditto	Ditto.	Finest quality	15 18	1 4	1 2	4 11 0	Arnee, Madras.
330	-	Ditto	Ditto	Fine quality. Pattern worked in loom	15 0	0 32	1 0	1 8 0	Chinacole, Madras.
331	-	Ditto	Ditto	Good quality. Flower pattern loom wrought.	16 0	0 31	1 3	0 14 0	Ditto.
332	-	Ditto	Ditto	Coloured check	15 0	0 39	1 61	0 6 1½	Arnee, Madras.
333	-	Ditto	Ditto	Ditto	10 0	0 32	0 121	0 10 0	Ditto.
334	-	Ditto	Ditto	Ditto	15 0	1 2	1 34	0 15 0	Ditto.
335	-	Ditto	Ditto	Ditto	7 0	0 30	1 0	0 4 0	Chinacole, Madras.
336	-	Ditto	Ditto	Ditto	7 0	0 32	1 0	0 4 0	Ditto.
337	-	Ditto	Ditto	Ditto	7 0	0 32	0 9	0 3 0	Arnee, Madras.
338	-	Ditto	Ditto	Ditto	7 18	0 37	0 10	0 3 0	Ditto.
339	-	Ditto	Ditto	Ditto	7 0	0 32	0 15	0 4 0	Chinacole, Madras.
340	-	Ditto	Ditto	Ditto	7 0	0 32	0 15½	0 4 0	Ditto.
341	-	Ditto	Ditto	Fine quality	15 0	1 2	1 5	0 15 0	Arnee, Madras.
342	-	Ditto	Ditto	Ditto	15 0	0 39	1 3	0 6 0	Chinacole, Madras.
343	-	Ditto	Ditto	Coloured stripes. Very light texture	13 0	1 2	1 41	0 11 0	Nellore, Madras.
344	Scarf, worn by Hindoo women.	Ditto	Printed	-	4 9	1 0	0 7	0 4 0	Trichinopoly, Madras.
345	Ditto	Ditto	Ditto	-	4 18	1 0	0 7	0 4 0	Ditto.
346	Ditto	Ditto	Ditto	-	4 18	1 0	0 7½	0 4 0	Ditto.
347	Ditto	Ditto	Ditto	-	4 18	1 0	0 6½	0 4 0	Madras.
348	Ditto	Ditto	Ditto	-	4 18	1 0	0 7½	0 5 0	Ditto.
349	Ditto	Ditto	Ditto	-	4 27	0 38	0 6	0 4 0	Ditto.
350	Ditto	Ditto	Ditto	-	4 18	1 2	0 6½	0 4 0	Cuddapah, Madras.
351	-	Silk	Tartan	-	9 0	0 22	0 15	1 2 0	Tanjore, Madras.
352	-	Silk and cotton	Check	-	11 27	0 22	1 0	0 7 0	Ditto.
353	Worn by women and children.	Ditto	Ditto	-	11 27	0 22	1 0	0 7 0	Ditto.
354	-	Silk	Fine cross stripes	-	9 0	0 30	0 10	0 18 0	Ditto.
355	-	Silk and cotton	Striped	-	11 27	0 22	1 10	0 8 6	Ditto.
356	-	Ditto	Check	-	12 0	0 22	1 0	0 9 6	Ditto.
357	-	Cotton	Dyed. Plain	-	6 9	0 25	0 10½	0 3 0	Coonoor, Madras.
358	-	Silk and cotton	Check	-	11 27	0 22	1 0	0 9 0	Tanjore, Madras.
359	-	Cotton	Plaid. Imitation of English pattern	-	6 0	21	0 14	0 4 0	Pulleet, Madras.
360	-	Ditto	Ditto	-	6 0	0 22	0 14	0 4 0	Mylapore, Madras.

THE BRITISH IMPACT ON THE INDIAN COTTON TEXTILE INDUSTRY 1757-1865  
by Jitendra Gopal Borpujari: Combridge Ph.D.thesis 1773(1969-70)

(Extract from concluding part)

It is the ~~Cardinal~~ conclusion of this dissertation on the question of the British impact on the ICTI (Indian Cotton Textile Industry): 1757-1865 that purely political means were adopted by the British to reduce the profitability of the 'old' methods relative to the profitability of the 'new' methods and that the actual nature of this impact changed with changes in the nature of these political means. While limitations of data do not permit the derivation of any strong form of this impact, the following pattern has the support of the sources consulted.

From circa 1757 to Circa 1813, the basic principles of British policy in India was to acquire a cut in the net output of the ICTI without participating directly in the production processes. The manifestation of this policy, in the experience of the ICTI, was the emergence of two markets for the same product in India. In one market the raw cotton-growers had to sell their raw cotton and the weavers had to sell their cloth at prices and in quantities determined arbitrarily by the British while, in the other market, the cotton-growers and the weavers sold the remaining portions of their outputs at free market prices. Such a simultaneous existence of two prices for the same product at a given place was made possible by the exercise of the coercive authority of the British Government of India in favour of retaining such a system of economy. As the period 1757-1813 progressed, the share of the free market in the total marketted output of the ICTI declined and by the end of the period the British were virtually the sole (p.208) purchasers of the ICTI output. The cotton-growers' absence of incentives and shortage of investible savings, the peculiarities of the British demand for Indian raw cotton and the failure of the British merchants to invest in the expansion of Indian raw cotton output contributed to a stagnation of that output. The secular increase in the British demand for Indian raw cotton, in the face of a general stagnation of the supply, resulted in a shortage and increase in the price of the raw cotton residual output available for the ICTI spinners. The ICTI spinners, who were mostly women of all castes adopting spinning as a subsidiary source of income, never came under the control of the British in the sense in which the ICTI weavers did. The spinners raised their offer price of yarn at a given fineness and often gave up spinning if the demand for their yarn was not effective at that price. By contrast, the weavers employed by the British had become, in effect, the chattels personel of their employers compelled physically to produce cloths at prices and in 'qualities' and quantities determined arbitrarily by the employers. In response, the weavers resorted to the clandestins sale of cloths legally belonging to the British and to attempts at reducing the quality of the ICTI cloth in terms of the raw cotton content per given area of cloth. This state of affairs continued until after the great reductions in the costs of spinning and weaving cotton in Britain which made a great part of the ICTI yarn and cloth output unprofitable relative to the BCTI (British Cotton Textile Industry) yarn and cloth output at the given wage-rates. Unable to reduce any further the labour cost of the ICTI output and largely unconcerned with the idea of introducing the new methods into the ICTI, the British merchants began to relinquish their trade in ICTI cloth in the 19th century.

The basic principle of British policy in India after 1813 was to find a market in India for products manufactured in Britain. The manifestation (p.209) of this policy, in the experience of the ICTI, was, on the one hand, the rapid cessation

/ weavers from  
their chattel  
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of the British trade in ICTI output, and the continuation, on the other hand, of many of the political means by which the British had reduced the profitability of the trade and manufactures conducted by Indians prior to 1813. The cessation of the British trade in ICTI output freed the ICTI no political coercion upon them to remain as weavers, they generally gained the option of continuing as weavers only if they found weaving profitable relative to the alternative price of their labour. The rapid expansion of the impact of BCTI cloth into India immediately after 1813, when the ICTI producers were still handicapped by such political devices as 'the British India transit duty system' led to a rapid decline of the ICTI in terms of output and employment during the twenty odd years following 1813. With political means decreasing the profitability of old method yarn and cloth, new method yarn and cloth sold cheaper than their old method competitors to a greater extent than they would have on purely economic grounds and, accordingly, the decline in the number of spinners and weavers and the quantity of their output was greater than what it would have been on purely economic grounds.

From circa 1830 onwards, new method yarn began to be imported into India regularly on a considerable scale. The weavers found the new yarn unambiguously and very considerably more profitable than the old yarn for all counts of yarn except for the very finest, namely, about 250s or above, and the coarsest, namely, about 20s or less. Besides, from 1836 onwards, there was a reduction in the political means such as the British India transit duty system which had earlier reduced the profitability of the ICTI. By circa 1848, India became a market in which the new and the old methods could compete without any large-scale intervention by (p.210) the British Government of India in favour of either side. Under these changed political circumstances, the rapid decline of the ICTI, which had occurred in the twenty odd years following circa 1813, came to a halt. The weavers of cloths using yarn of lower fineness continued with either new yarn or old yarn or a mixture of new and old yarn. The old yarn continued to be spun in the very coarse range of fineness for special purposes as well as for weaving. While there was certainly a great decline in ICTI spinning ICTI weaving seems to have increased generally during the 25 odd years following the 1830s. Some of the characteristics of the British impact on the ICTI: 1757-1865 were brought into clear and exaggerated relief by the impact of the 'Cotton Famine' 1860-65' which occurred initially in Britain as a result of the American Civil War.

Throughout the three broad phases of 'stagnation' 'rapid decline' and 'revival' outlined above, the history of the ICTI revealed certain characteristics of the Indian economy. Throughout the history reviewed, the ICTI cotton-growers, spinners and weavers had their activities constrained by the shortage of investible savings and the fact that a certain proportion of the market for their products revealed a preference for exotic varieties of raw cotton compared to Indian Varieties of raw cotton and for new method yarn and cloth compared to old method yarn and cloth. The main advantage of the old ICTI over the new BCTI consisted of the existence in India of 'zero wage cost family labour' and a generally low level of labourcost per unit of output relative to the corresponding wage cost of the BCTI. Given such 'stylised parts', one can argue that a programme exists for a policy of simultaneous investment in new and old methods with the ~~minimum~~

objective of maximising (p.211) the rate of growth of investible savings from a given initial stock of investible savings.

(extract from numbered conclusions)  
(p.213)

8th, given some of the characteristic features of the Indian economy revealed by this historical analysis, the old ICTI has an arguable claim to be a solvent to the vexed problems of 'disguised' and 'seasonal' unemployment in India in the context of a planned development of Indian economy.

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AII 3

A N

## S I M P O R T A N T Q U E S T I O N,

S H O R T L Y S T A T E D :

R E L A T I V E T O T H E P R E S E N T C O M P E T I T I O N

B E T W E E N T H E

C A L L I C O A N D M U S L I N M A N U F A C T U R E S

O F G R E A T B R I T A I N ;

A n d t h e s a m e S p e c i e s o f G o o d s I m p o r t e d f r o m t h e

E . A . S . T . I N D I E S .

T H E Question now to be discussed, is perhaps the most interesting, both as a matter of Commercial Regulation, and State Policy, which has for some time engaged the attention of Government.

The facilities which the Manufacturers of Great Britain have suddenly acquired, and the immense capitals which they have as suddenly laid out in expensive machinery, \* and great and heavy establishments for carrying on the Cotton Trade, are unparalleled in the annals of the world.

Above one † million of money is at this moment sunk in mills, hand-engines, and other machines, including the grounds, and necessary buildings. A power is created capable of working nearly two million of spindles; ‡ and men, women and children are trained and training to this business, capable of carrying the Cotton Manufacture almost to any extent.

In the branches applicable to *Muslin and Calico* alone, it is supposed that employment has been given to one hundred thousand Men and Women, and at least sixty thousand Children, many of the latter taken from the different Parishes and Hospitals in Great Britain.

One hundred and forty-three Cotton Mills are now built and in progress in Great Britain, of which nearly two thirds have been erected within these five years.

Besides these, there are above twenty thousand five hundred Hand Mills, or Jennies, for spinning the Shute for the Twisted Yarn, spun by the WaterMills.

† Expence of Water Mills,	—	—	—	—	—	—	L.	s. d.
• Expence of Hand Jennies, Houses, Buildings, and auxiliary Machinery; supposed at least	—	—	—	—	—	—	715,000	6 0
	—	—	—	—	—	—	285,000	6 0
	—	—	—	—	—	—	1000,000	10 10

‡ The power of Spindles now capable of being worked is estimated thus:

In the Water Mills	—	—	—	—	—	—	186,000	
In the Hand Jennies	—	—	—	—	—	—	1,665,100	
	—	—	—	—	—	—	1,941,100	Spindles.

The quantity of the raw material of Cotton Wool consumed in this Manufacture, which did not reach six millions of pounds in the year 1781, and was only about eleven millions, four years ago, now extends to the enormous height of *twenty-two millions and upwards.*

The astonishing rapidity of this increase is in some measure to be attributed to the extension of these branches similar to the Goods of India, particularly the Callicoes and Muslins.

British Callicoes were first made in Lancashire about the year 1772, but the progress was slow till within the last ten years, the quantity manufactured has since extended from about fifty thousand to one million of Pieces now made in the course of a single year.\*

British Muslins were not successfully introduced until the year 1781, and were carried to no great extent, until 1785, since which period the progress has been rapid beyond all example. The acquisition of Cotton Wool of a superior quality, from Demerary and the Brazils, and the improvements made in Spinning fine yarns upon the Mule Jennies, have given a spring to this branch of the Cotton Manufactory, which has extended it beyond what it was possible to conceive. Above half a million Pieces † of Muslins of different kinds, including Shawls and Handkerchiefs, are now supposed to be made in Great Britain, and the quantity not only increases daily with the new accession of powers that are bursting forth upon the country, but the quality is exceedingly improved; and since about 300 Bales of fine East-India Cotton have lately been obtained by the way of Ostend, Yarns have been spun, and Muslins have been wove, equal to any from India; and nothing but a fine raw material is wanted to enable the British Manufacturer to carry this branch to the greatest extent: and of all others, it is that species of Cotton Goods which deserves most to be encouraged, because of the immense return it makes for labour more than any other branch of the Cotton Manufactory. East-India Cotton Wool has been spun into one pound ‡ of yarn, worth five guineas, and when wove into Muslin, and afterwards ornamented by Children in the Tambour, has extended to the enormous value of fifteen pounds, yielding a return of five thousand nine hundred per cent. on the raw material.

Such is the state of the British Cotton Manufacture at present:—With establishments and mechanical powers capable of bringing forward immense quantities of goods into the consumption, this Manufacture is checked as it were in a moment; by a great and sudden reduction of the prices of East India goods, of the same species which have been recently sold above 20 per cent. on an average, under the lowest prices at which the British Manufacturer can afford to sell without loss.—The consequence of which has been, that an universal stagnation has taken place; the stocks on hand daily accumulate;—the poor Spinners who work upon the hand-mills are in the greatest distress; § and a great and valuable system is in danger of being broke down in a moment, if some remedy cannot be applied; for unless the British Market can be opened for the home Manufacturer, it is impossible

\* The value of Callicoes are supposed to be nearly one million and a half Sterling.

† The Muslins will now extend to above one million of money in value.

‡ In order to assist the mind in forming a conception of the fineness of this yarn, it may not be improper to state that a single pound of it, if stretched out, would extend to the enormous length of about 100 miles.

§ Many of the poor Spinners at Stockport, are at present quite idle. It is the same case with those in the towns and villages in Lancashire.

¶ An eminent Manufacturer of Muslins in England, who gave employment to 700 weavers in this branch, has not now 300 employed. The reduction is general all over the Country.

## [ 3 ]

impossible to go on :—Men and women trained to the business, at a great expence, will be set a drift, and the numerous children sent back to the hospitals and parishes from whence they came.

There is at present an interesting crisis in this business which *deserves well to be considered* :—The British Manufacturers have large stocks of goods on hand, made for the home market. The East-India Company have at the same time imported very large quantities; and to add to the distress, at the very moment when the British Manufactures of Callicoes and Muslins had accumulated beyond any former period, a great increase of East India Goods of the same fabrics are pressed upon the Market.\*

The quantity sold at the India-House in 1787, exceeds the average of the preceding seven years, no less than 324,852 pieces: and a general opinion prevails, that large quantities will be brought forward at each succeeding Sale, and that prices will still be reduced much lower. In this situation, the impression with regard to the reduced value of Muslins and Callicoes, operates against the British Manufactures, and occasions a distress as severe and alarming as what arises from the goods actually sold.—And this must unquestionably be the case, so long as it shall continue to be the plan of the Company, to press their Goods upon the market, at prices which have no relation to the original cost, and under circumstances where the just laws of competition cannot operate—and where every idea of protecting duties is annihilated, in the effect of the general system.

Such is the crisis of the British Calico and Muslin Trade; and such is the state of that of India.—The question, therefore, is—What ought to be the policy of the British Government in such an emergency?—

Unless some relief is given, perhaps little short of one half of the present mechanical powers, now in action, must cease working. †—The revenue arising from the operation of so great a system, must cease also to be productive.—A valuable branch of trade, acquired at so much expense and industry, must be lost to the country.—The consumption of the raw material must rapidly diminish, ‡ to the great injury of the West India Islands; and the returns from the labour of the people, to an immense extent, (both in possession and prospect) in the very productive article of Muslins, must be annihilated.

The present moment is critical.—It presses exceedingly for a remedy.—If applied soon, it may prevent a very general calamity, which, from the causes already stated, seems to be ready to burst upon the country.

\* The total quantity sold in 1787, by the East-India Company, extended to 791,646 Pieces of Callicoes, Muslins, and Nankeens.

† About 70 Water Mills, worth at least,	—	350,000.
10,000 Jennies, worth	—	70,000.
Buildings, &c.	—	180,000.

At least, ————— 500,000. would be lost and become rubbish.

‡ The state of the Raw Materials, and the progressive and astonishing increase of this Manufacture, will be best explained by what follows:

In 1781 the Cotton Wool applied to the Manufacture, was 5,101,996.	{ When Manufactured, supposed to be worth }	2,000,000.
— 1782 —	Item	11,406,816.
— 1783 —	Item	9,546,179.
— 1784 —	Item	11,280,238.
— 1785 —	Item	17,992,888.
— 1786 —	Item	19,151,867.
— 1787 —	Item	21,095,000.

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AT A GENERAL MEETING of the COTTON-SPINNERS, and MANUFACTURERS of WHITE COTTONS and MUSLINS, and others interested in the success and extension of the Cotton-Manufactory in Great Britain, residing in Glasgow, Paisley, and the neighbourhood, held in the Tontine-Tavern in the City of Glasgow, on Wednesday the 13th of February, 1788,

PATRICK COLQUHOUN, Esq; in the Chair.

THE Chairman submitted to the consideration of the Meeting various letters which he had received from the principal Cotton-Manufacturers in England, all tending, in the strongest manner, to corroborate the general opinion, founded on information formerly communicated. Namely,

" That the present depressed state of the White Cotton and Muslin Manufactures is chiefly occasioned by the interference of a foreign article, of the same fabric and quality, introduced by the East India Company into the British market, under circumstances where the just laws of competition cannot operate; and where the progressive reduction, from year to year, of the prices of the low qualities of East India cotton goods, greatly under what was ever known in former times, and the recent advance on the price of the finer articles, which are not yet opposed by the British manufactures,—indicate a system, the tendency of which seems to be, to crush and ruin the cotton-trade of Great Britain, in those particular articles which stand at present in competition with the same species of goods imported from India."

Resolved unanimously,

1. That it appears to this meeting, from the records of Parliament, that it has ever been the wisdom of the British Legislature to protect and nourish every home manufacture progressively, as it advanced to maturity—And that the cotton-trade, in particular, has already, on several occasions, experienced the fostering hand of the British Government.

Resolved unanimously,

2. That this meeting will, on no occasion, consider itself as authorised to make any public appearance whatsoever, or to prefer any petition or application to Parliament, but upon grounds of real distress, and where the justice of the cause, and the protection of a valuable branch of inland trade, immediately connected with the interest and prosperity of the country, shall sanction such application.

Resolved unanimously,

3. That it appears to this meeting, that the manufacture of British muslins, which had, of late years, made a most rapid progress, and promised to become a most valuable branch of trade, is, at present, in the greatest danger of being lost to the country, in consequence of the interference of a similar article sold by the East India Company, under a system where the natural powers of competition do not operate; but, on the contrary, where a tendency is manifested to counteract and render abortive every aid from ingenious machinery, and every exertion of genius, industry, and capital, which the British artist can oppose.

Resolved unanimously,

4. That it appears to this meeting, that, before the late unexampled reduction of prices at the East India sales, the British muslins and calicoes occupied a considerable part of the inland as well as the foreign consumption, principally occasioned by the reduction of the prices to the consumers considerably below the average of the former sales of the East India Company, when no competition existed.

Resolved unanimously,

5. That this meeting do conceive, that the British nation has derived great and manifest advantages from the increase and extension of the cotton-manufactory, not only in bringing into the consumption various articles of cotton-goods at a lower price than was formerly paid to the East India Company, but by the employment, given in many branches of useful and productive labour, to a great body of the people, of both sexes, and of all ages.

Resolved unanimously,

6. That it is the opinion of this Meeting, that the cotton-manufacture in Great Britain, from the application of ingenious machinery, and from the skill and industry of the British artists, promises to become a source of great national wealth—and, in this view, every measure that has a tendency to obstruct its progress is hostile to the true interests of the country, and repugnant to every principle of protection heretofore established in favour of domestic manufactures.

Resolved unanimously,

7. That, in so far as it shall be made appear, that the consumption of Great Britain has been supplied, of late, with white cottons and muslins of equal quality, *and at a lower price*, than the average of the East India sales for some years previous to the year 1784; in so far such manufactures are justly entitled to the protection of the Legislature, in opposition to the same species and quality of goods imported from India, upon every principle connected with substantial justice, sound policy, and national prosperity.

Resolved unanimously,

8. That it appears to this meeting, that the East India Company, from the measures which seem to have been adopted, in progressively lowering those goods which stand directly in competition with the cotton-fabrics lately introduced into Great Britain, had it immediately in view to depress and ruin the British manufacture; for, without such an object, it is impossible to reconcile the great and sudden reduction which has taken place upon any principle connected with these maxims and feelings, which regulate mens minds in disposing of their property in trade.

Resolved unanimously,

9. That the operation of such a system, in the hands of such powerful rivals as the East India Company, *acting under impulses in the sale of their goods, which have no reference to the original cost, is dangerous in the extreme, and alarming in the highest degree to the muslin and calico manufactures in Great Britain.*

Resolved unanimously,

10. That, under such circumstances, heightened by the declining state of the trade, the Cotton-Spinners and Manufacturers in Great Britain are called upon by every duty which they owe to themselves as individuals, and to the public as good members of the state, *to solicit, on this interesting occasion, the interference and protection of the British Legislature*, in averting those dangers and distresses, which have already been felt, and which threaten the annihilation of the muslin and other branches of the cotton-manufacture in Great Britain.

Resolved unanimously,

11. That, for this interesting purpose, the meeting now convened will cordially join with the Cotton-Spinners and Manufacturers in England in such an application to his Majesty's Ministers, or to Parliament, as shall be thought expedient, for procuring redress: and that they will act, if possible, as a joint body, having *the same interest, and the same laudable object in view.*

Resolved unanimously,

12. That the Standing Committee, appointed by the former General Meeting held in this place on the 25th of January last, shall be empowered to correspond with all public bodies, as well as individuals, both in England and Scotland, on this interesting subject; and, in general, to take such steps for carrying into complete execution the measures necessary for redress, as shall, from time to time, appear most expedient.

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Resolved unanimously,

13. That the grateful thanks of this meeting be presented to the Chairman, PATRICK, COLQUHOUN, Esq; for that disinterested assiduity, and distinguished ability, which he has displayed, upon this and many other occasions, in favour of the manufactures of his country.

Resolved unanimously,

14. That these Resolutions be printed.

*Extracted from the records of the General Meeting by John Dunlop, secretary.*

*John Dunlop, secretary.*

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REPORT

ON

INDIAN FIBRES AND FIBROUS  
SUBSTANCES

EXHIBITED AT THE

Colonial and Indian Exhibition, 1886,

BY C. F. CROSS, E. J. BEVAN, AND C. M. KING,

*TK*  
IN ASSOCIATION WITH

E. JOYNSON, ESQ.

WITH

NOTES OF METHODS OF TREATMENT AND USES  
PREVALENT IN INDIA,

BY DR. GEORGE WATT, C.I.E., M.B., C.M.,

*Published by Authority of the Secretary of State for India.*



E. & F. N. SPON, 125, STRAND, LONDON.  
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1887.

## PART III.

## COTTON.

COTTON is the most important of all fibres, and is extensively cultivated in India. There are three well-known species, and the cultivated forms are varieties or hybrids of these. In the present state of our knowledge of the cottons of India, it is impossible to say how much of each species and its forms are actually cultivated, but it may be stated that the better cottons of the western side of India are chiefly forms of the American (*Gossypium barbadense*) plant, while that from the eastern side of India is mainly the Asiatic species (*Gossypium herbaceum*). The following extract from the 'Official Catalogue of the Colonial and Indian Exhibition' gives an abstract of all that is known regarding Indian cotton and the Indian trade in this most important fibre:—

Cotton is the most valuable article of Indian export trade. In India there are 14,000,000 acres annually under cotton, not including Bengal and Assam; of these provinces the cotton returns are not published. The following are the quantities and values of the cotton exports for the past five years:—

	Cwt.	Rupees.
1880-81 . . . . .	4,541,539	13,24,17,341
1881-82 . . . . .	5,627,453	14,93,59,595
1882-83 . . . . .	6,168,278	16,04,90,174
1883-84 . . . . .	5,979,494	14,38,37,278
1884-85 . . . . .	5,066,057	13,28,63,673

The exports for 1884-85 were about 15 per cent. smaller in quantity and 7½ per cent. less in value than those for 1883-84. This depression, Mr. O'Conor explains, was due to a short and inferior crop of Bombay cottons.

It is remarkable how unimportant India is as a supply of cotton for the English market. Out of the whole exports for

1884-85, the Continent imported direct 2,513,807 cwt., and England 2,134,762, but nearly half the amount consigned to England was re-exported again to the Continent of Europe. To the English manufacturer, therefore, Indian cotton is, comparatively speaking, of secondary importance; Italy offers the largest market.

The following analysis of the exports for the year 1884-85 shows the chief markets to which Indian cottons are consigned:—

Presidency from which Exported.	Weight in Cwt.	Value in Rupees.	Country to which Exported.	Weight in Cwt.	Value in Rupees.
Bengal .	288,976	68,82,064	United Kingdom.	2,134,762	5,58,86,298
Bombay .	4,064,609	10,88,52,143	Italy .	740,647	1,90,78,004
Sindh .	71,660	17,45,986	France .	577,169	1,52,80,431
Madras .	557,877	1,34,72,806	Austria .	575,645	1,55,54,204
British Burma .	82,935	19,10,674	Belgium .	533,993	1,41,88,184
			China .	236,600	58,51,838
			Germany .	85,353	23,19,504
			Other Countries.	181,888	47,05,210
TOTAL .	5,066,057	13,28,63,673	TOTAL .	5,066,057	13,28,63,673

Much confusion still exists with regard to the forms of cotton met with in cultivation in India, and it may therefore be of service to repeat here the characters of the leading species. There are in India three species of *Gossypium* which yield cotton, but of these there are many varieties and hybrids, giving origin to the numerous forms known to the cultivator and manufacturer by local and technical names. The three species may be briefly defined:—

\**GOSSEPIUM ARBOREUM*, Linn.; *MALVACEAE*.

This is known as *narma*, *manua*, or *radya* cotton in India generally, and in Mysore as *deo kapás*. It does not appear to be cultivated to a great extent. It sometimes attains the height of a small tree; more frequently it is a densely branched bush, with purple flowers, often with a yellow centre. The leaves are thicker and more glossy than those of the next species; they are three-fourths segmented, or even cut to the base, into five to seven lobes (mostly five, never three); the segments are contracted below, narrow ovate, linear, acuminate or ovate lanceolate, not one-fourth as broad as long;

the central lobe often has, on either side, a small supplementary segment or tooth in the deep rounded lateral sinus. *Bracteoles* of the flowers ovate, cordate acute, toothed or entire. *Seeds* free from each other, covered with a white cotton overlying a dense green down; *cotton* not readily separable from the seed.

This is now viewed as a native of tropical Africa.

\**G. barbadense*, Linn.

There are many very distinct cultivated forms referred to this species. Whether the accepted type is the original condition of the plant, however, or is itself only one of the numerous cultivated forms, can only be determined when the whole subject of the wild cottons of America (the wild cottons which exist as such at the present day) has been carefully worked out. At the time of the discovery of America the forms of cotton now referred to this species were being cultivated from the West Indies to Peru, and from Mexico to Brazil. Accepting this as evidence that they were the cultivated forms of an indigenous species, the more so since, as far as can be learned, they were not known to the Old World before the discovery of America—we may adopt the general view and regard them collectively as “the American cottons.” According to some botanists these are referred to a number of distinct species, or by others are reduced to varieties under a somewhat hypothetical species. Parlatore relegated the numerous conditions to three species, which answer to *Gossypium hirsutum*, *G. barbadense*, and *G. religiosum*, Linn. The authors of the ‘Flora of British India’ group a number of forms, including the above, into one species, namely, *G. barbadense*.

*G. barbadense* may be distinguished from the other species as follows:—*Leaves* sub-glabrous, broader and more cordate than those of the preceding species, having rounded ears at the base: blade about half cut into three to five lobes, each broad ovate, acuminate, more than half as broad as long (often very acuminate and then almost sub-lanceolate). *Floral bracteoles*, larger and broader than in the preceding species, obtuse, deeply laciniate. *Flowers* yellow with a crimson spot. *Seeds* black and naked, i.e. destitute of adnate pubescence (except var. *religiosum*), free from each other or cohering in a kidney-shaped mass. *Cotton* readily separable from the seeds, white, tawny, or almost brown.

This may be reduced to three varieties:—

Var. 1st.—**BARBADENSE** proper.

The Bourbon cottons and the Barbadoes, New Orleans, Sea Island, Uplands, Egyptian, Georgian, Florida, and Alabama cottons. The much-prized cotton cultivated in Western India, and known as Dharwar, appears to be a form of New Orleans.

Var. 2nd.—**RELIGIOSUM**, Roxb.—Nankeen cotton.

The distinguishing feature of this cotton seems to be that the seeds are clothed with tawny pubescence and inclosed in cotton of the same colour. Apparently this was introduced into India at a much earlier date than the forms referred to the first variety, and as it exists at the present day it might be more correctly viewed as a hybrid, hence the fact of the seeds being pubescent.

Var. 3rd.—**ACUMINATUM**, Roxb.—Peruvian or kidney cotton.

The cottons which fall into this variety are distinguished chiefly by the peculiarity of the black naked seeds cohering together in a kidney-shaped mass. It is probable that these are even still earlier introductions than the forms of *religiosum*, and Roxburgh seemed to incline to the opinion that they were indigenous. They are sometimes spoken of under the name of *Gossypium peruvianum*. The following are the principal commercial forms:—Brazilian, Pernambuco, Maranham, and Peruvian and the *Ukan paruthi* and *Jadi paruthi* of Madras, and the long kidney cottons of the Gáro and Khásia hills.

It seems probable that instead of *Gossypium hirsutum*, Willd., being constituted into a fourth variety, it should be viewed as a distinct hybrid between *G. herbaceum* and *G. barbadense*. It is chiefly characterised by having greenish tomentose seeds surrounded by a fine long silky cotton, and by having purple flowers with the leaves of the American forms. A good deal of the Berar and Surat cottons, and also the *nudum yerra prathi*, and *semparuthi* of South India are of this nature.

**GOSSYPIUM HERBACEUM**, Linn.

There seems no doubt about this species having been originally a native of Asia, and of India in particular. A wild species, closely allied, is said to occur in Sind at the present day, which may prove the parent of the cultivated forms. Its cultivation has, however, spread all over the world—it is common in Europe, Asia, and the United States. To admit of comparison

with the species described above, the diagnostic characters of this species may be here given:—*Leaves* very hairy; often quite hirsute; about half cut into three to five lobes, mostly three; lobes ovate, oblong, acute, or acuminate; about half as broad as long. *Floral bracteoles* ovate, cordate, acute, toothed or entire. *Flowers* yellow with a purple centre, or rarely wholly yellow or white or purple. *Seeds* ovoid, free from each other, covered with greyish or greenish down, cotton white or yellow. The most characteristic features of this plant are its very hairy leaves, half segmented, the majority having only three lobes or five, very rarely seven. The bracteoles are those of *Gossypium arboreum*, and are quite unlike the laciniate bracteoles of *G. barbadense*. The purple flowers and green tomentum of some of the forms has most probably been derived by hybridism with *G. arboreum*; some such hybrid being again crossed with *G. barbadense* to produce a few of the cultivated forms, such as *G. hirsutum*, which possesses the characters of all three species.

There seems to be little doubt that *G. herbaceum* has been hybridised freely with both of the preceding species, and that many of the cultivated forms of cotton met with in India are of this nature. Efforts appear to have been made to improve the indigenous plant by crossing it with the superior though less hardy and introduced species. The hybrids and cultivated forms of this species may conveniently be referred to two sections:—

#### Var. 1st.—HERBACEUM proper.

This includes the Bengal or Dacca cottons, and many of the Berar and Surat—such as the *Kumari hatti* of South Kanara and *Punasa pratti* of Ganjam, as also some of the China cottons.

#### Var. 2nd.—OBTUSIFOLIUM.

This is the small blunted-leaved form met with in Ceylon and on many of the hill tracts of India.

Cotton is the principal article of export trade from Bombay. There are eight leading kinds: *Hinganghat* and *Amrāoti* from the Central Provinces, Berár, Khándesh, the Nizam's country, and the North Deccan; *Broach* and *Dholera* from Gujarat, Kathiawar, and Cutch; *Saw-ginned Dharwar* and *Coompta* from the Southern Maratha Districts and Sholapur; *Westerns* from Madras; and *Iráni* from Persia.

#### SILK COTTONS.

Interest has recently been taken in the subject of "silk cotton" and *kapok*. The following are the plants which yield this floss, enumerated in the order of their importance:—

*ERIODENDRON ANFRACTUOSUM*, DC.; *MALVACEÆ*.—The *Kapok*, or white silk cotton; the *Elavam paruthi* of Madras.

This tree is particularly plentiful in the Konkan and Western India generally, but it grows in most parts of India, and its cultivation could be extended. As a road-side tree, while affording shade, it might thus be made to yield a distinct revenue to the country.

Both in English and Australian trade the word *kapok* is by some dealers used as synonymous with "silk cotton," but it seems desirable that this should be avoided. Up till the past few years silk cotton has been accepted as the floss of *Bombax*, or the *semal* of India. The two fibres have not only different values, but are likely to enter widely different markets. The *kapok* of Java seems superior to the *kapok* of India, but this may be corrected by more careful selection of seed in cultivation. At the present moment it is, however, doubtful if a single consignment of *kapok* has been sent from India to Europe.

*BOMBAX MALABARICUM*, DC.; *MALVACEÆ*.—The *Semal*, or red silk cotton.

This is the commonest of the silk cotton trees, occurring throughout the peninsula, but more particularly on the eastern side, ascending the hills to 4000 feet in altitude.

Hitherto this fibre has been found too short and too light for textile purposes, and, moreover, the dirty state of all consignments, burdened with the seeds, has precluded the *semal* from competition with the Java *kapok* in upholstery.

*COCHLOSPERMUM GOSSYPIUM*, DC.; *BIXINEÆ*.—The *Kambi* or *Galgal*.

A common tree of the lower hills of India from Garhwal, Bandelkhand, Behar, Orissa, and westward to the Deccan. It has large yellow flowers, and is not uncommon in cultivation.

throughout the country, especially in South India. The fibre is soft and silky but very short. It could be supplied at a much lower rate than the *kapok* and has a resistance about it which prevents it from matting like the *semal* when used in upholstery. With the exception of the sample shown at the last Exhibition in London, it is believed, this fibre has not as yet been placed in the hands of the European manufacturer.

*CALOTROPIS GIGANTEA*, R. Br.; *ASCLEPIADEÆ*.—The *Madar*.

This and other members of the *Asclepiadaceæ* and *Apocynaceæ* yield silky hairs—the coma of the seeds. These are generally classed as silk cottons, but with the exception of *madar*, none of these have as yet been experimented with. The natives of India regard the *madar* silk cotton as much cooler than *semal*, and affirm that it has a soothing effect when used in pillows.

During the Colonial and Indian Exhibition a cotton spinner explained that he had now been able to utilise this fibre by mechanically drawing it in with cotton in the preparation of yarn. The difficulty he now experienced was in procuring a uniform supply. It was agreed that the best plan to secure this necessary condition towards the establishment of a new industry was to induce the people of India to attempt its cultivation. It was presumed moreover that by selection of seed and cultivation the quality of the fibre might be greatly improved. With this object in view, a gentleman in India was induced to attempt the cultivation, and already the spinner reports his entire satisfaction in the results of the experiment. It may thus be confidently hoped that in a few years *madar* fibre (of which so much has been written during the past fifty years) may at last be viewed as an established new industry, that will greatly benefit the poor cultivators of a large tract of the less productive portions of India. As a wild plant it luxuriates in the waste, almost sterile and dry tracts of India.

FIBRES EMPLOYED IN BASKET-WORK AND IN THE MANUFACTURE OF MATS, &c.

This list might be greatly extended, but it has been deemed advisable to restrict it to the more important only. The various

species of bamboo are everywhere in India made into baskets, mats, &c., rice straw, and the stems of many other grasses such as *saccharum munjib*, also are extensively employed for the finer qualities of baskets and table mats.

*ANDROPOGON MURICATUS*, Retz.; *GRAMINEÆ*.—*Khas*, Hind.; *Khas-khas*, Beng.

A grass, abundant on sandy banks in Bengal, Upper India, the Coromandel Coast, and Mysore, where it is commonly planted to divide fields.

The roots are in India made into the aromatic-scented mats which are hung over doors and kept wet to cool the atmosphere in the hot season, and are also in great demand for making fans, &c.

*ARUNDO KARKA*, Retz.; *GRAMINEÆ*.—Vern. Names. *Karka*, *Nal*, Bengali; *Nudanur*, Hindustani; *Bag*, *Nari*, Panjabî.

This plant grows chiefly on the lower hills and outer slopes of the Himalaya, but an allied species is found in damp places in Bengal.

The stems are brought down to the plains and sold as *nal*. These are split open and formed into the square mats known as *darmá* mats, of which the houses in Bengal and a large part of the North-west Provinces of India are almost exclusively constructed.

These are sold very cheap, and at one of the conferences held at the late Exhibition, it was suggested an effort might be made to try and introduce these cheap mattings into England. They were thought likely to be in demand to line the inner sides of iron roofed houses or as matting for the floors of the houses of the poor.

BAMBOO.

The principal bamboos employed for baskets and matting are *Bambusa arundinacea* (in Central and South India), *B. balcooa* and *B. tulda* (in Bengal), and *B. arundinacea* and *B. brandisii* (in Burma), with *Dendrocalamus strictus* wherever that species could be obtained. The houses of the people of three-fourths of India are made almost entirely of bamboo and *darmá* mats, but in Burma they are mostly of bamboo split open into flat slabs, neatly platted into mats.

In some parts of Bengal, such as in Midnapur, *Dendrocalamus strictus* is split into extremely fine pieces, and woven into

*Almud Cotton from Suez to Britain* *Edin (NLS) MS 1060* *296*  
*26.10.1789.* *296R - 299R*

The Right Honorable  
Charles Earl Cornwallis *H.C.G.*

V (33)

b

Governor General in Council &c &c

Fort William

My Lord

The Interests of the Nation and Company, being  
the Invariable Principle of your Administration, I flatter myself that a Scheme  
having for its object these great purposes, will meet your Lordship's concurrence & Reception.

The surprising rapid Increase, and Progress of the cotton  
Manufactures in Great Britain, is become, an Object of vast National Magnitude,  
and Importance, affecting in a very high degree the Industry, & Commerce of the  
Country, as well more fully appear from the Representations of the Delegates of the  
Manufacturers, which have been communicated to the Public in April, and June 1788,  
from which, the following remarks are made, and which, for the Illucidation  
of the Utility of my Plan, I beg leave to lay before your Lordship. —

1st That from the Year 1781, the Consumption of Raw Cotton  
Wool has increased surprisingly in Great Britain, in the following Ratios. —

Cotton Wool applied to Manufactures { and to be worth in Sterling Money

In 1781	5101990 lb Weight	L Shrs £ 2,000,000
In 1782	11406810	do 3,900,000
In 1783	9546179	do 3,700,000
In 1784	11280238	do 3,950,000
In 1785	17992888	do 6,000,000
In 1786	19151867	do 6,500,000
In 1787	22600000	do 7,500,000

2.<sup>d</sup>

That these 22,600,000 Millions of Pounds of Cotton Wool  
are the Growth of the following Countries.

From the British Islands - - - - -	6,600,000 Pounds weight
From the French & Spanish Settlements - - - - -	600,000 lb
The Dutch Settlements of Surinam &c. - - - - -	1,700,000 do
The Portuguese &c. Brazil &c. - - - - -	2,500,000 do
Smyrna and Turkey - - - - -	5,700,000 do
East India, sea Ostend - - - - -	100,000 do
<hr/>	
Total	22,600,000 Pounds weight

3.<sup>d</sup>

That upwards of two thirds of the whole 22,600,000 Millions of  
Pounds of Cotton Wool is purchased from Foreigners, at the Expence to the Nation  
of at least 1 Million 3, to 500 Thousand Pounds Sterling per Annum. —

4.<sup>d</sup>

That the Value of these 22,600,000 Millions of Raw Cotton  
Wool is generally increased by the labour, and Manufacture from 100, to 500  
Pounds. —

5.<sup>d</sup>

That the quality of the different Cotton Wool is great, that  
of Surinam and Brazil being the best, and the finest, and that the British  
Manufactures cannot be carried on without them, and that the East India  
Cotton from Surat, called the Amood Cotton, of which the Manufacturers  
in 1787 obtained 100,000 lb, is better, finer, and superior to all, and in  
consideration of its quality that they paid five Shillings Sterling per Pound  
for it. —

6.<sup>d</sup>

That the Manufacturers are desirous of purchasing  
six Millions of Pounds of the Surat Amood Cotton. —

7.<sup>d</sup>

That they prescribe the manner in which it ought to  
be prepared, & cleansed to be as free from Seeds and Dirt as possible

Tha 10

8.

That the Manufacturers by their Delegates propose to engage to take from the company, Six Millions of Pounds of Sural Amood Cotton at 3/- Sterling per Pound, deliverable in England, by which offer not only the company, but the Nation also would receive great Advantage, and Benefit.

These Delegates have stated, and clearly proved the immense Benefit, and innumerable advantages which the Nation derives from the Manufacture of Cotton, and that in the Spinning, and Manufacturing thereof, 350,000 Persons were employed, 150,000 Men, 90,000 Women, and 100,000 Boys, and Girls, mostly taken from the different Parishes, and Hospitals in Great Britain; that by the help of 145 Water Mills, upwards of 20,500 Engines, which Machines together do work 1,945,100 Spindells, which only employ 110,000 Men, Women, and Children, by which small number of hands they are enabled to spin as much Cotton yarn, or thread as without them would require above a Million of Persons in the common Way. These Delegates do further state, and represent, the great Concussion which all the British Cotton Manufactories sustained in 1787, by the nearly double Importation of Cotton Cloths from India, and which were sold for about 50/- per cent less than in preceding Years, threatening Great Britain with the Ruin of her Cotton Manufactures, and which must naturally have happened, but for the timely Intervention of many Respectable Individuals, who stepped forward in aid of the Manufacturers, with the loan of half a Million Sterling, in Support of their Credit, and for the Security of the Public. —

The Concussion to the British Cotton Manufactures occasioned by the very great quantity of India Cotton Cloths sent home for the company, and on Freight, has happily terminated, the reduced prices for which the Freight Goods sold, have just askap in a great degree.

degree to applications for Freight, and no more cloths being now sent home, than what the Company commonly provide for the English markett, India Cottons are regaining their former prices, and the British Cotton Manufacturers their former prices, and Sales - and it is reasonably to be expected, that infutur, they will not be alarmed with the prospect of Ruin as in 1787, In which year it is stated, that the following cottons from India were Imported, and sold.

In 1787 -	Pieces of Muslins -	304762 -
	of Calicos -	403875 -
	of Nankeens -	83009 -

The Annual Average Importation and Sales for Total 791,646 pieces  
the seven preceding Years from 1780, to 1786 inclusive were.

Pieces of Muslins -	185964.
Calicos -	253450.
Nankeens -	27380.
	Total 466,794 pieces

The unexpected and greater Imported quantity - - - - - 334852 pieces  
The large Importation of India Cottons had for its  
Consequence, the sudden Reduction of price  
The fine Cossas Muslins which Sold -

In 1783 at 15/- per piece

Sold in 1787 at 100/- difference in price about 50/-

Inferior Cossas Muslins Sold in 1783 Sold for 5/- per piece  
in 1787 - - - for 3/- difference 60/-

Coarsest Cossas Muslins in 1783 Sold for 3/-  
in 1787 - - - for 1/- difference about 100/-

Doreus or Striped Muslins in 1783 Sold for 15/-

In 1787 - - - for 100/- difference 50/-

Mulmuls or thin Muslins in 1783 Sold for 9/-

In 1787 - - - for 67/- difference 33/-

Now

Now that the Exportation of Muslins from Bengal is confined to the Company's Investment, the Manufacturers at home will be relieved from their apprehensions, and the principal motives for the representations of their Delegates to the Public, and to Administration are removed.

The object of this plan is to fulfill another Representation of these Delegates, the Importation of the quantity of Cotton from India which is deemed necessary for carrying on the Cotton Manufactures in England, and which they state to be attended with the greatest Utility, and Advantage to the Company, and to the Nation as it certainly will be to the Company, they will receive every large part of their Territorial Revenue from Bengal with a gain of  $33\frac{1}{3}$  per cent, The Nation will annually save the sum of about a Million and a half, to the Increase of the National Capital, and will no doubt be employed in other Branches of Industry, Commerce or Agriculture.

It being probable that the Company cannot at present convey to the Cotton Manufacturers of England six Millions of Pounds of Surat Amood Cotton or 20,000 Bales of 300 Pounds each, or any considerable part thereof, I will undertake, and engage to convey the aforesaid quantity to them in the course of the year 1791, also for the year 1792, on the following conditions, by which, as I have said, the Nation, and Company will be great Gainers, the former in about one and a half Million, the latter at least in 225 to 230 Thousand Pound, but most probably in £ 300,000 and the whole sum advanced by them here will be repaid them without risque, and on the delivery of the Cotton in England.

Convinced of this fact, I do hereby Engage to procure, and to deliver in the River Thames, and port of London

unto the Directors of the East India Company, in the course, or currency of the year 1791, free from every charge whatever, the quantity of Six Millions of Pounds Weight of the best, and cleanest Surat Amwood Cotton Wool, to be packed in 20000 Bales of about 300 Pounds Averdupoize Weight, to be shipped on good and sufficient English India built ships, for which purpose the necessary Passports, Papers and clearances are to be granted by the Right Honble the Governor General in Council, and that at the rate of two Shillings and three Pence  $\frac{2}{3}$  p pound averdupoize, the said Six Millions of Pounds of Cotton Wool at that rate, making a total sum of Six hundred Seventy Five Thousand Pounds Sterling Money, and for which the Honble company have been offered by the Delegates of the English Manufacturers, Three Shillings Sterling p Pound Weight, which price if sold for no more but most probably it will sell for a higher price,  $3\frac{1}{6}$  to  $4$  p pound, will yield to the company a clear gain of nine pence in the pound amounting to £ 22,5000 or  $33\frac{1}{3}$  p cent on the sum advanced in terms of this contract £ 675000. —

I will further engage to assure the whole amount of £ 675000 with the Public Offices in London, and to lodge the Policies at the India House, as a security, to the company against all sea risques, and I will effect said assurance in London, on or before the last day of March 1791. —

Respecting the ships which may be employed in carrying the aforesaid 20000 Bales of cotton to England, the company shall have the privilege of Freighting, and chartering them as may seem good to them, but in the event of their not doing either, they are to dispatch the ships for India without delay and as soon as the season of the year will permit their return to India, if chartered, and freighted by the company.

Company, the Terms of Freight p Ton, to be regulated by Company, and  
Commanders of the Ships as may be agreed on between them. The Ships on  
their return to be allowed to take in the necessary Ballast, Water & Provision  
for their Voyage. —

For the aforesaid quantity of six Millions of Pounds  
of Surat Cotton Wool, The Right Honble the Governor General in Council are to  
pay me here, at the rate of Two Shillings and three Pence  $\frac{2}{3}$  Pounds Weight  
Overduoize, making the sum of six hundred Seventy five Thousand Pounds  
£675000 at the Exchange of Two Shillings the current Rupee and in Certifi-  
-cates, bearing an Interest of 8 Gent p Annun in the following Proportions  
and at the following Periods vizt.

£1125000 £112500 or  $\frac{1}{6}$  the first Term to commence on the Signature  
and Execution of the Contract

1125000 ... 112500 or  $\frac{1}{6}$  Second Term three Months after the first  
1125000 ... 112500 or  $\frac{1}{6}$  third Term three Months after the Second  
1125000 ... 112500 or  $\frac{1}{6}$  Fourth Term three Months after the Third  
1125000 ... 112500 or  $\frac{1}{6}$  Fifth Term three Months after the Fourth  
562500 ... 56250 or  $\frac{1}{12}$  Sixth Term three Months after the Fifth  
562500 ... 56250 or  $\frac{1}{12}$  Seventh Term when all the Ships are despatched

I annex hereto an Abstract of the Advantages which  
would arise to the Nation, and Company from an adoption of this plan  
which I hope will meet the approbation of your Lordship. —

I have the honor to be with profound Respect and Esteem.

My Lord

Calcutta

26<sup>th</sup> October 1789

Copy /

Your Lordship's  
Most Obliged & Obedient  
Humble Servant  
(Signed) George Smith

Amount of the Sales of Muslins and Callicoes (including Private Trade) from 1783 to 1787 imported from each Presidency in India. (12)

	Bengal	Madras.	Bombay.
1783	Muslins ... £ 621,975 ...	£ .	£ .
	Callicoes ... 290,351 ...	—	2,240.
	<u>£ 912,326</u>	<u>£ .</u>	<u>£ 2,240.-</u>
1784	Muslins ... £ 687,081 ...	£ 20,107 ...	£ 7,219.
	Callicoes ... 460,268 ...	101,916 ...	671
	<u>£ 1,147,349</u>	<u>£ 122,023</u>	<u>£ 7,890</u>
1785	Muslins ... £ 847,011 ...	£ 82,442 ...	£ 1,050.
	Callicoes ... 592,584 ...	82,952 ...	—
	<u>£ 1,439,595</u>	<u>£ 135,394</u>	<u>£ 1,050.</u>
1786	Muslins £ 844,263 ...	£ 8,236 ...	£ .
	Callicoes ... 529,331 ...	71,612 ...	—
	<u>£ 1,373,594</u>	<u>£ 79,848</u>	<u>£ .</u>
1787	Muslins £ 850,325 ...	£ 22,084 ...	£ .
	Callicoes ... 579,307 ...	61,601 ...	—
	<u>£ 1,429,632</u>	<u>£ 83,685</u>	<u>£ .</u>

East India House

31<sup>st</sup> March 1788.

Errors excepted.

Memorandum

There are no colored prohibited  
Piece Goods included in this account.

MS. 1064

ff. 10v-11r

AII.6

Edin(L.S.) MS 1064

An Account of the Cost and Sale of the Quantity of  
from India with an Account of the Profit and Loss thereon

ff 10v-11r

Imported from Bombay.

in the year.	Bales.	In. A.D.	Rupas.	Price in Indian
1783	70 baled	27,440	5,108 at 2. Each	£ 638.10. --- 5½ pds
	<u>90</u>	<u>29,425.</u>	<u>3,587</u> .....	<u>448.7.6</u> in 3½ d.
	160	56,865..	8,695.....	1,086.17.6
1785.	<u>238</u>	<u>99,202.</u>	<u>12,085</u> at 2. Each	<u>1,510.12.11</u> ... 3½ d.
Total.	398	66,156,067. At 20,780	.....	£ 2,597.10.5

Profits and Loss on above

Import

To cost of 160 Bales	as above	£ 1,086.17.6
To Custom		
To Freight and Demorage		6,550.---
To Charges Merchandise 5% cent		99.15.2
		£ <u>7,736.12.8</u>

Import

To Cost of 238 Bales	as above	£ 1,510.12.11
To Custom		
To Freight and Demorage		6,880.---
To Charges Merchandise 5% cent		236.4.2
		£ <u>8,626.17.1</u>

Cast India House  
27<sup>th</sup> February 1787.

Cotton that has ever been imported by the Company  
con - distinguishing the Place from whence imported.

Sale of the Cotton imported off Bonra. —

Bales.	N <sup>t</sup> . Sale Wt.	N <sup>t</sup> . Sale Amot.	Selling prices.
70 baled with 26,863	.... £1,314. 2. 6	from 12 $\frac{1}{4}$ to 13	
90. ....	24,463 ....	551. 7. 9	from 4 $\frac{1}{2}$ to 7
160. ....	51,326 ....	1,865. 10. 3	
<u>238</u> ....	<u>94,661</u> ....	<u>4,724. 3. 7</u>	from 11 to 16
Bales 398. ....	16145. 987. ....	£ 6,589. 13. 10	

Imports. (Wiz)

1783.

By Net Sale of 160 Bales — as above £ 1,865. 10. 3

By Sojs — 5,871. 2. 5

£ 7,736. 12. 8

1785.

By Net Sale of 238 Bales — as above £ 4,724. 3. 7

By Sojs — 3,902. 13. 6

£ 8,626. 17. 1

Average Prime Cost and Sale Amount of Cotton Yarn imported from India in the following Seasons.

Imported	Bengal						Bombay					
	Invoice weight	Cost	Average cost ft lb a 2.13 ft lb. Rup.	Sale weight	Average sale Price per lb. Rup.	Invoice weight	Cost	Average cost ft lb a 1/2.6 ft lb. Rup.	Sale weight	Average sale Price per lb. Rup.		
In 1774	16,12,394	61,0135,152	6.15 <sup>50</sup> /100	16,11,796	5.2 <sup>82</sup> /100	16s —	Rup! —	—	16s —	—	—	—
1775	11,400	34,460	6.9 <sup>46</sup> /100	10,042	5.6 <sup>44</sup> /100	—	—	—	—	—	—	—
1776	10,650	32,500	6.10 <sup>78</sup> /100	10,010	5.4 <sup>28</sup> /100	6,720	3,654	1.15 <sup>91</sup> /100	6,670	2.6 <sup>98</sup> /100	—	—
1777	8,343	24,312	6.6 <sup>67</sup> /100	7,074	5.3 <sup>69</sup> /100	6,720	3,375	1.3 <sup>7</sup> /100	6,658	2.11 <sup>29</sup> /100	—	—
1778	14,784	40,430	6.1 <sup>22</sup> /100	14,084	5.1 <sup>6</sup> /100	6,720	3,737	1.4 <sup>60</sup> /100	6,532	2.5 <sup>3</sup> /100	—	—
1779	—	—	—	—	—	—	—	—	—	—	—	—
1780	—	—	—	—	—	—	—	—	—	—	—	—
1781	10,175	31,203	6.15 <sup>00</sup>	9,655	6.6 <sup>69</sup> /100	3,360	1,997	1.5 <sup>09</sup> /100	3,341	2.6 <sup>2</sup> /100	—	—
1782	—	—	—	—	—	—	—	—	—	—	—	—
1783	—	—	—	—	—	9,270	4,040	1.3 <sup>65</sup> /100	9,229	2.5 <sup>22</sup> /100	—	—

13. The custom on Cotton Yarn is near 6/-lb

The quantity of Cotton Yarn sold in Private Trade for the last two Years was 13,344 — selling Price from 6 to 15 average 10.7/-lb — Prime

East India House

28 Feb'y 1787 www.cpsindia.org

41.10

## "SPECIMENS OF INDIAN TEXTILES"—WHERE ARE THEY?

**A**CCORDING to Bolts, whose "Considerations on Indian Affairs" was published within ten years after the battle of Plassey:—

"The oppressions and monopolies in trade which have been introduced of late years but particularly within the late seven, have been the principal causes of such a decrease in the real revenues of Bengal, as may shortly be most severely felt by the Company. For the Ryots, who are generally both landholders and manufacturers, by the oppressions of gomastas in harassing them for goods, are frequently rendered incapable of improving their lands and even of paying their rents; for which on the other hand they are again chastised by the officers of the revenue and not infrequently have by those harpies been necessitated to sell their children in order to pay their rents or otherwise obliged to fly the country."

Again, the same author wrote:—

"We come to consider a monopoly the most cruel in its nature and most destructive in its consequences to the Company's affairs in Bengal of all that have of late been established there. Perhaps it stands unparalleled in the history of any government that ever existed on earth, considered as a public act, and we shall not be less astonished when we consider the men who promoted it, and the reasons given by them for the establishment of such exclusive dealings in what may there be considered as necessities of life."

It is recorded by Bolts that the Indian weavers

"upon their inability to perform such agreements as have been forced upon them by the Company's agents, universally known in Bengal by the name of *Mutchulcahs*, have had their goods seized and sold on the spot to make good the deficiency; and the winders of raw silk, called *Nagoads*, have been treated also with such injustice, that instances have been known of their cutting off their thumbs to prevent their being forced to wind silk."

It is not necessary to mention all the measures which in the early days of the East India Company led to the ruin of Indian industries. But all those measures did not bring about the total extinction of Indian manufactures and industries. For after all knowledge is power and the manufacturers of England were ignorant of many of the processes employed by Indian artisans in the

manufacture of their articles and wares.\* The holding of the first International Exhibition in 1851 was not only an incentive to the manufacturers of England to produce articles for the Indian markets, but it indirectly afforded them an opportunity to learn the trade secrets of Indian craftsmen. The English manufacturers left no stone unturned to wring out of the Indian artists the secret processes by which the latter succeeded in manufacturing their beautiful articles.

A couple of years after the first International Exhibition, took place the renewal of the Charter of the East India Company. Several witnesses who appeared before the Parliamentary Committees appointed to inquire into Indian affairs gave it in their evidence that English manufacturers should be afforded facilities to have an extensive market for their articles in India.

At the same time Dr. John Forbes Royle, who had been in charge of the Indian Department of the first International Exhibition, impressed upon the Court of Directors the importance of forming a Museum in London to permanently exhibit the products and manufactures of India. It is needless to say that the Court most gladly adopted his scheme, because the Museum was to be established at the expense of India and it was to afford bread and butter to a large number of the inhabitants of England. But while completing the arrangements of this Museum he died in January 1858. Dr. Forbes Watson was appointed as his successor. It was during his tenure of office that the last step leading to the destruction of Indian textile manufactures was taken.

What this step was has been very well described by Dr. Watson himself. He wrote:—

"Specimens of all the important Textile Manufactures of India existing in the Stores of the India

\* "We as a manufacturing people are still far behind them (the Indians)."—Sir Thomas Munro. See *The Modern Review*, Vol. II., p. 541.

## "SPECIMENS OF INDIAN TEXTILES"—WHERE ARE THEY ?

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Museum have been collected in eighteen large volumes, of which twenty sets have been prepared, each set being as nearly as possible, an exact counterpart of all the others. The eighteen volumes, forming one set, contain 700 specimens, illustrating in a complete and convenient manner, this branch of Indian Manufactures. *The twenty sets are to be distributed in Great Britain and India—thirteen in the former and seven in the latter*—so that there will be twenty places, each provided with a collection exactly like all the others, and so arranged as to admit of the interchange of references when desired."

The passage which we have italicised in the above extract shows that the authorities did not possess any sense of proportion when they distributed thirteen sets in Great Britain and seven only in India.

The distribution of the seven sets in India was an afterthought. It was not the original intention of the authorities, as is evident from what Dr. Forbes Watson wrote:—

"The original intention was that the whole of the twenty sets should be distributed in this country (England.) Further consideration, however, points to the expediency of placing a certain number of them in India: 1st, because this course will facilitate those trade operations between the two countries which it is the object of the work to promote and encourage; and 2ndly, because it is possible that the collection may be of direct use to the Indian manufacturer. ....

"It seems to be clearly for the advantage of India that every facility should be given to the introduction, from this country, of such manufactures as can be supplied to the people there more cheaply\* than by hand labour on the spot. The many will thus be benefited, and the hardship which may possibly fall upon the few will not be serious or long felt, since their labour will soon be diverted into new and, in all probability, more profitable channels.

"The chief advantage, however, which is likely to attend the distribution in India of a certain number of the sets of Textile Specimens will, it is believed, arise from the opportunity which will thereby be afforded to the agent in India of directing the attention of his correspondent here (England) to the articles suited to the requirements of his constituents."

We have italicised the last paragraph, as in it the writer unmasks himself.

The places to which the thirteen sets were allotted in Great Britain and Ireland were as follows:—Belfast; Bradford; Dublin; Edinburgh; Glasgow; Halifax; Huddersfield; Liverpool; Macclesfield; Manchester; Preston; Salford and the India

\* As to this cheapness it should be borne in mind that the poorer classes in India for whose benefit cloth was sought to be made cheap have always used the coarser fabrics. These products, of the handlooms, are even now cheaper than Manchester goods considering that the former last much longer. But our fabrics were formerly actually cheaper in price than English textiles, as Mr. Robert Brown said before the Lords' Committee which sat before the renewal of the E. I. Company's Charter in 1813. See the January (1908) number of this review, p. 28, and the December (1907) number, p. 545.

Museum, London. Dr. John Forbes Watson was sorry that this distribution still left "some important places unsupplied. These are, however, in almost every instance situated near to one or other of the selected localities."

Regarding the distribution of the seven sets in India, Dr. Watson recommended "that a set be placed in each of the following places, viz.: Calcutta, Madras, Bombay, Kurrachee, the North-Western Provinces, the Punjab, and lastly in Berar.

"With respect to the three last-named divisions either Allahabad, Mirzapore, or Agra in the North-Western Provinces, Umrtsur or Lahore in the Punjab, and Oomrawatte or Nagpore in Berar, will probably be found the most suitable, but it may be left to the respective Governments of the divisions in question to decide on the exact locality."

The set for the North-Western (now the United) Provinces is not kept in any one of the cities recommended by Dr. Watson. It is kept in the Provincial Museum, Lucknow, to which place it was transferred from the Allahabad Museum in September, 1878. Lucknow is not a centre of any textile industry and therefore the set is kept there!

Dr. Watson proceeded—

"Regarding the conditions on which the gift should be presented,—the first should be that due provision should be made for its permanent protection, and that freedom of access be afforded to all properly recommended and practically interested persons.

"The sets should be assigned in trust to the chief commercial authorities in the selected places, for the use not only of those connected with the district in which they are deposited, but of non-residents also, who can show a practical interest in Textile manufactures. The proposed plan of sending seven of the sets to India, diminishes the number of commercial centres in this country which will receive a copy, and it therefore becomes more necessary that those which do get one should be required to make it easy of access to agents, merchants, and manufacturers who reside in those which do not."

It was made a condition that the authorities in the selected districts should undertake:—

"That access to the work be given to any person bearing an order to that effect signed by the President, Vice-President, or Secretary of the Society of Arts; the Presidents, Vice-Presidents, or Secretaries of the Chamber of Commerce; the Chairman or Secretary of the Association of the Chambers of Commerce; the President, Vice-President or Secretary of the Cotton Supply Association, the Chairman, Vice-Chairman or Secretary of the Cotton-Brokers' Association; the Chairman, Vice-Chairman or Secretary of the Liverpool East India and China Association; by the Presi-

dents, Vice-Presidents, Chairmen, Vice-Chairmen, or Secretaries of such other Associations for the promotion of Commerce as now exist or may hereafter be formed; and by the Reporter on the products of India."

So it was not difficult for any one to consult the work in Great Britain. But in India the existence of this work is hardly known to 999 out of 1000 educated persons—much less to the weavers and other uneducated artisans. It would be interesting to know if the sets deposited in India have ever been consulted by even any educated Indian. These might have been consulted by some interested Anglo-Indians but not, we think, by any educated native of this country.

Since these sets were prepared at the cost of India and now, thanks to the Swadeshi movement, an impetus has been given to the textile industry in this country, is it not time and is it not fair and just that all the thirteen sets which are in Great Britain should be brought to India and kept in important centres of commerce and industry in this country? As a first step, may we not demand that the existence of the seven sets in India should be made widely known? They should be made easily accessible to all Indians actually engaged in manufacturing textile fabrics.

These twenty sets of 18 volumes each were to be "regarded as Twenty Industrial Museums, illustrating the Textile Manufactures of India, and promoting trade operations between the East and West, in so far as these are concerned."

Of course, it was meant more to benefit the West than the East and this Dr. Watson himself admitted, for he wrote:—

"The interests of the people in India, as well as those of the people at Home, are concerned in this matter, and both interests must be considered. Our remarks in the first instance, however, will apply more particularly to the latter."

"About two hundred millions of souls form the population of what we commonly speak of as India; and, scant though the garments of the vast majority may be, an order to clothe them all would try the resources of the greatest manufacturing nation on Earth. It is clear, therefore, that India is in a position to become a magnificent customer."

"If we attempt to induce an individual or a nation to become a customer, we endeavour to make the articles which we know to be liked and needed, and these we offer for sale. We do not make an effort to impose on others our own tastes and needs, but we produce what will please the customer and what he

wants. The British manufacturer follows this rule generally; but he seems to have failed to do so in the case of India, or to have done it with so little success, that it would almost appear as if he were incapable of appreciating Oriental tastes and habits."

"There are probably few things beyond the understanding of our manufacturers, but it will be admitted that some education in the matter is necessary, and that without it the value of certain characteristics of Indian ornament and form will not be properly realized. This supposes the means of such education to be readily accessible, which hitherto has not been the case, simply because manufacturers have not known with any certainty what goods were suitable. To attain to skill in meeting Eastern tastes and Eastern wants will require study and much consideration even when the means of study are supplied; but up to the present time the manufacturer has had no ready opportunity of acquiring a full and correct knowledge of what was wanted."

"The deficiency here alluded to, will, we believe, be supplied by these local Museums."

"The 700 Specimens (and we again point out that they are all what is called working samples) show what the people of India affect and deem suitable in the way of textile fabrics, and if the supply of these is to come from Britain, they must be imitated there. What is wanted, and what is to be copied to meet that want, is thus accessible for study in these Museums."

Thus it was all from motives of philanthropy that specimens of Indian textile fabrics were made accessible to the manufacturers of England.

But even up to the year 1866, the Indian weaving industry had not totally ceased to exist. For Dr. Forbes Watson wrote:—

"\*\*\* The British manufacturer must not look for his customers to the upper ten millions of India, but to the hundreds of millions in the lower grades. The plainer and cheaper stuffs of cotton, or of cotton and wool together, are those which he has the best chance of selling, and those which he would be able to sell largely, if in their manufacture he would keep well in view the requirements and tastes of the people to whom he offers them."

"We know India now-a-days as a country whose Raw Products we largely receive. We pay for these partly in kind and partly in money; but India never buys from us what will repay our purchases from her, and the consequence is that we have always to send out the large difference in bullion, which never comes back to us, disappearing there as if it had been dropped into the ocean. We buy her Cotton, Indigo, Coffee, and Spices; and we sell her what we can in the shape of Textile and other Manufactures. It must not be forgotten, however, that there was a time when India supplied us largely with Textiles. It was she who sent us the famous Longcloths, and the very term Calico is derived from Calicut where they were made. She may never resume her position as an exporting manufacturer of goods of this sort, \* \* \* This is clear, however, that it will be a benefit to the masses of

the people of India to be supplied with their clothing at the cheapest possible rate—let this be done by whom it may. If Great Britain can give Loongees, Dhotees, Sarces, and Calicoes to India which cost less than those made by her own weavers, both countries will be benefitted. \* \*

"The machinery and skill of Britain may thus do a present service to India, by supplying her with material for clothing her people at a cheap rate, an end to which these collections must certainly lead by showing the home manufacturer what it is that the natives require."

Regarding this act of philanthropy, one Christian officer wrote:—

"Every one knows how jealously trade secrets are guarded. If you went over Messrs. Doulton's pottery works, you would be politely overlooked. Yet under the force of compulsion the Indian workman had to divulge the manner of his bleaching and other trade secrets to Manchester. A costly work was prepared by the India House Department to enable Manchester to take 20 millions a year from the poor of India: copies

\* In this connection it is necessary to remind our readers what Mr. Tierney, a member of the House of Commons, said in a speech delivered in that House as far back as 1827:

"The general principle was to be that England was to force all her manufactures upon India, and not to take a single manufacture of India in return. It was true they would allow cotton to be brought in; but then, having found out that they could weave it by means of machinery, cheaper than the people of India, they would say, 'Leave off weaving; supply us with the raw material, and we will weave for you.' This might be a very natural principle for merchants and manufacturers to go upon, but it was rather too much to talk of the philosophy of it, or to rank the supporters of it as in a peculiar degree the friends of India. If, instead of calling themselves the friends of India, they had professed themselves its enemies, what more could they do than advise the destruction of all Indian manufactures?"

were gratuitously presented to Chambers of Commerce, and the Indian ryot had to pay for them. This may be political economy, but it is marvellously like something else."

[Major J. B. Keith in the *Pioneer* September 7, 1898.]

It is much to be regretted that no writer on Indian economics has so far referred to the part which the holding of Exhibitions and the distribution of specimens of the textile manufactures of India have played in ruining the weaving industry of India. Perhaps the imposition of the tariff and the transit duties would not and could not have so effectually destroyed Indian industries had not the authorities made the Indian artisans betray under compulsion their trade secrets to the manufacturers of England.

Owners of cotton mills and hand-loom factories all over India should move in the matter in order that (1) the seven sets of Indian textile manufactures already in India may be made easily accessible to Indian manufacturers and (2) the thirteen sets in Great Britain may be restored to India and placed in suitable centres here. This will help greatly in the revival of genuine Indian patterns and colours.

*TUW*

IT is no use denying that the Message of His Majesty the King-Emperor has been, and could not but be, regarded by the Indian community as a disappointing document. It adumbrates no reforms, contains no definite promises, leaves little room for hope and gives no proof of successful grappling with the political problems that have cropped up in India as the inevitable result of the new spirit which even Lord Morley admitted is abroad in the land. It only contains some political platitudes which have been given currency to by English tacticians both Conservative and Liberal.

It pales into insignificance by the side of the famous Proclamation of Queen Victoria the sincerity of which cannot be doubted, and which is redolent of an aroma of sympathy

which does not breathe in the Message of the King-Emperor, the latter lacking even the grace, dignity and the finish of the former. The history of the Queen's Proclamation is well-known. Writes Mr. Wilson, the author of the *Life and Times of Queen Victoria*, the Queen—

"objected strongly to the draft of it which was submitted to her, and begged Lord Derby to write one out for her in 'his own excellent language,' keeping in view 'that it was a female Sovereign who speaks to more than a hundred millions of Eastern people on assuming the direct government over them after a bloody civil war, giving them pledges which her future reign is to redeem.'

Such a Proclamation should, says her Majesty, "emphasise the ideas of generosity, benevolence, religious toleration, liberty, and equality before the law. What offended her

daccamus cot



## “DACCA MUSLIN”\*

M R. Chairman, Gentlemen and Fellow-students, before I give you an idea of the manufacture of the Dacca Muslin, I should like to place before you a short history of this fabric, showing how the Indians in those days maintained an unapproached and almost incredible perfection in their cotton fabrics. From very early days of civilization, India has been famous for the manufacture of cotton piece goods, and the muslins of Bengal particularly received much appreciation from the ancient Greeks, Egyptians, and Arab traders; who used to import a considerable amount of these fabrics into their respective countries from the different provinces of India.

As regards their fineness, specially those manufactured in Bengal, many travellers to India, bear testimony as to their super-excellence.† “Some of their muslins might be thought the works of fairies or of insects, rather than of men,” but these were seldom exported to the foreign countries. From two Arabian travellers of the 9th century, we learn that “in this country (India) they make garments of such extraordinary perfection, that nowhere else are the like to be seen. These garments are for the most part round and wove to that degree of fineness that they may be drawn through a ring of a moderate size”. In the 13th century, Marco Polo mentions in his travels that “the finest and the most beautiful cottons that are to be found in any part of the world are produced in the coast of Coromandal and Muslipatam”, although these fabrics were really much inferior to those woven in Bengal. From “Tavernier’s Travels” we understand that these fine fabrics were produced in very small quantities, and the merchants were not allowed to export them, as the governor of the province was obliged to send them all to the Great Mogul’s Seraglio and the principal Wazirs or Lords of the Court. Many interesting stories are told concerning the fineness of some of the muslins. The Hindoos amuse themselves with two stories—(1) that the Emperor Aurungzebe was very angry with his daughter, for showing her skin through her clothes; whereupon the young princess remonstrated in her justification, that she had seven *jamahs* or suits on; (2) that in Nawab Alliverdy Khan’s time a weaver was chastised and turned out of the city of Dacca for his neglect, in not preventing his cow from eating up a piece of *abroan*, which he had spread and carelessly left on the grass. The very poetic name *Shubnam*—“Evening dew”, (as the particular type of muslin was called), suggests that the

It is quite surprising to notice, how these people could turn out such astonishing fabrics with their crudest appliances and where the raw material was treated so grossly, and where there was so little division of labour. This anomaly can be easily solved if we understand that what we call our scientific knowledge in the present time and which we acquire only by continual observations, throughout the major portions of our lives, was a second nature to them. This remarkable fine sense of touch was so very natural to these people, that Orme in describing the silk manufactures of Bengal says, “The women wind off the raw silk from the pod of the worm, a single pod of raw silk is divided into 20 different degrees of fineness, and so exquisite is the feeling of these women, that while the thread is running through their fingers so swiftly that their eye can be of no assistance, they will break it off exactly at the assorted change, at once, from the first to the twentieth from the 19th to the 2nd.” In these days of steam engines, and motors, when every thing seems to be running at its utmost speed, when one can hardly perceive any sign of rest, one will be perfectly amused to watch the rapidity and the accuracy with which the humble handicraftsman is accomplishing his task; the whole process seems outwardly to be so simple, that it may excite the inexperienced bystander to try a hand at it himself. He sits down and tries, he fails

\* This paper was read before the Manchester Municipal School of Technology Textile Society by Mr. Probodh Kumar Dutta: under the Chairmanship of Prof. Fox, M.Sc., Tech. Hd. of the Textile Dept. of the above School.

† History of the Cotton Manufacture of Great Britain, by E. Baines, p. 56.

and practises at it for days together, with all his energy; he calls for his sound scientific knowledge, which really does not render to him any appreciable help and then at last he comprehends “that the patient Hindu handicraftsman’s dexterity is a *second nature*, developed from father to son, working for generations at the same processes and manipulations.”

I think, it would not be out of place, if we go deep into the subject and satisfy our curiosity by examining the Indian handicraftsman’s mode of life and the surroundings in which he moves. In answering this point I will quote the words of Dr. Birdwood, in his lecture given before the Society of Arts, February 26, 1879, on “Indian Pottery” at the Paris Exhibition: “We cannot overlook this serenity and dignity of his life, if we would rightly understand the Indian handicraftsman’s work. He knows nothing of the desperate struggle for existence which oppresses the life and crushes the very soul of the English working man. He has his assured place, inherited from father to son for a hundred generations, in the national church and state organization; while nature provides him with everything to his hand, but the little food and less clothing he needs; and the simple tools of the trade. The English working men must provide for house rent, coals, furniture, warm clothing, animal food and spirits and for the education of his children before he can give a mind free from family anxieties to his work. But the sun is the Indian workman’s co-operative landlord and coal merchant, upholsterer, tailor, publican and butcher; the head partner from whom he gets almost everything he wants and free of all cost but his labour contribution towards the trades union village corporation of which he is an indispensable and essential member. This at once relieves him from an incalculable dead weight of cares, and enables him to give to his work, which is also a religious function, that contentment of mind and leisure, and pride and pleasure in it for its own sake, which are essential to all artistic excellence.”

But those days have gone by, the Indian handicraftsmen no longer enjoy the same bliss, which we have just learned from Sir Birdwood’s lecture. He himself deplores their present condition in his book on “Indian Arts”—“But of late these handicraftsmen, for the sake of whose works the whole world has been ceaselessly pouring its bullion for 3,000 years, into India, and who, for all the marvellous tissues and embroidery they have wrought, leave polluted no rivers, deformed no pleasing prospects, nor poisoned any air, whose skill and individuality, the training of countless generations has developed to the highest perfection; these hereditary handicraftsmen are being everywhere gathered from their democratic village communities in hundreds and thousands to the colossal mills of Bombay, to drudge in gangs at manufacturing piece goods, in competition with Manchester, in the production of which they are no more intellectually and morally concerned than the grinder of a barrel organ in the tunes it evolves. I do not mean to depreciate the proper functions of machines and modern civilization, but machinery should be the servant and never the master of men. It can not minister to the beauty and pleasure of life, and can only be the slave of life’s drudgery. It should be kept rigorously in its place, in India as well as in England.”

## GEOGRAPHICAL POSITION AND MANUFACTURING PLACES.

I shall try to deal with the subject, which I hope will be interesting to you, from its technical side. In the beginning of my paper I have mentioned, that the art of spinning and weaving was practised throughout India from remote antiquity; and that no part of this vast country could bring this art to so perfect a state as we find it in Bengal. The locality most celebrated for the manufacture of the cotton fabrics is the district of Dacca, one of the principal divisions of Eastern Bengal, \* situated between  $24^{\circ} 20' 12''$  and  $23^{\circ} 6' 30''$  N. and between  $89^{\circ} 47' 50''$  and  $91^{\circ} 1' 10''$  E. long. It is bounded on the N. by Maimensing, on the E. by Tipperah, and on the S. and W. by Bakarganj and Faridpur. The district consists of a vast level plain divided into two sections by the Dhaleswari river. The northern part again, intersected by the Lakshimia river, contains the city of Dacca, and as a rule lies well above flood-level. The soil is composed of red ferruginous *kankar*, with a stratum of clay in the more elevated parts, covered by a thin layer of vegetable mould, by recent alluvial deposits. The country lying to the south of the Dhaleswari is the most fertile part of the district. It consists entirely of rich alluvial soil, annually inundated to a depth varying from 2 to 14 ft. of water. The villages are built on artificial mounds of earth, so as to raise them above the flood level. Every village in the district used to carry on this business to a small or large extent, but the principal manufacturing towns where muslins were made, were the city of Dacca and the villages of Sunargong, Dumroy, Teetbadee, Junglebaree and Baztpore.

Besides these stations, there were several other places in this and the neighbouring districts, where manufacturing of cotton goods formed the principal industry. Some of these *aurungs* (manufacturing stations) were directly under the Dacca factory, and used to supply large quantities of calicoes, dimities, and inferior goods formerly exported to England by the East India Company.

## COTTON FOR DACCA MUSLIN.

The district itself produces the cotton, required for manufacturing the Dacca muslin. The plant is annual and attains a height of 4 to 5 ft. It is a variety of the *Gossypium Herbaceum*, though Dr Roxburgh† speaks of it as different from the common herbaceous cotton plant of Bengal on the following points:—*viz.*—(1) “In its being more erect with fewer branches, and the lobes of the leaves more pointed. (2) In the whole plant being tinged of a reddish colour, even the petioles and nerves of the leaves, and being less pubescent. (3) In having the peduncles which support the flowers longer and the exterior margins of the petals tinged with red. (4) In the staple of the cotton being longer, much finer, and softer.” Two varieties of cotton are raised—(1) *Photee* or finest kind, which has been cultivated in the district from time immemorial, and is grown only in certain localities situated along the banks of the Brahmaputra or its branches and the Megna. (2) *Bairaiti* which is raised in the eastern part of Bengal. In 1800, the

\* Encyclopaedia Britannica (10th Ed.)—“Dacca.”

† Roxburgh’s “Flora Indica,” Vol. III, p. 184.

commercial Resident of Dacca speaking of the sites of cultivation for *photee* cotton, remarks\*—

A tract of land extending from Feringy Bazar, 12 miles S.E. of Dacca, along the banks of the Megna to Edipore, 20 miles N. of the sea, occupying a space of about 40 miles in length and in some places as far as 3 in breadth, and situated in the pergannahs of Kidderpore, Bickrampore, Rajenagur, Cartickpore, Serampore and Edipore, is allowed to produce the finest cotton grown in the Dacca province, and I believe, I might add, in any part of the world, since no cotton that has yet been compared with it, whether the produce of India, or of the islands of Mauritius or Bourbon, whose cotton is celebrated for superior quality, has been found equal to it." The superiority of this cotton can be accounted for by the following facts. "As the tide rolls it in with the water of the Megna, which overflows part of the country during three months in the year, deposits, as it subsides, sand and saline particles which very considerably improve and fertilize the soil which consists of light sand and brown earth. Besides the above sites the banks of Luchia from the Dulaserree river to a little above Roopungee, about 16 miles in length, and a few miles on the banks of Brahmaputra, north of the Dulaserree, furnish the greater part of the kapas used in the Dacca province. Of the rest, some is grown in Buldecal, Bowal and Alepsing and some imported from Boosna in the adjacent District of Rajeshyi."

#### ITS CULTIVATION.

In the preparatory operations, or for its cultivation the agriculturist in the first place takes special care in keeping the seeds in good condition. During the rainy season (July, August, September) when the seeds are very much liable to be deteriorated owing to too much damp present in the climate, the ryo puts the seeds with their wool on them into an earthen jar (its mouth being tightly packed) the inside of which is carefully smeared with ghee (clarified butter) or oil—this makes the vessel damp proof—and allows it to hang from the roof of his kitchen which is the only place where the fire is kindled. They are sown in November in parallel rows about a  $1\frac{1}{2}$  ft. apart, and a distance of about 4" from each other in the rows—each seed being moistened with water before it is dropped into the ground. Two crops are raised, one in April and May, while the other in September and October. The former yields the finest produce and is grown extensively.

About 4 $\frac{1}{2}$  lbs. of seed, sown in a field measuring 25 sq. yds. will yield about 160 lbs. of kapas (seeds and wool unseparated), provided the season is favourable. It has been estimated that nearly 2 lbs. of seed cotton contains about 1/5 of the weight of the lint cotton, and which according to the Commercial Resident, varies in the fineness of the staple about  $\frac{1}{2}$  of the above weight, which adheres to the seed, is capable of being spun into finest thread, while the remaining part is used for thread of inferior degrees.

The *Burusis* (betel-leaf growers) were considered to be the best growers of cotton in those days, but the cultivation has declined with the manufactures of the district and it is said that the cotton has somewhat deteriorated in the fineness of its staple."

\* "Letters from the Commercial Resident of Dacca to the Board of Trade, Calcutta," dated November 30th, 1800.

#### SPINNING (INTRODUCTION).

Before I describe to you the primitive methods of spinning, I would like to draw your attention to the crudest appliances which they used to handle. Here nature supplied them everything in its simple and pure form; but it must be admitted that the men who first brought into use these simple means really possessed very highly inventive qualities; because\* "spinning is not an inherent human capacity as it is in spiders". Surely "imagination and intelligence were present at the birth of the first spun thread." Our machinery of to-day are nothing but elaborate imitations of these simple forms. As we shall proceed in describing the processes, we shall see how much our present and past mechanics owe to the inventive genius of some in that dark and distant epoch.

#### PICKING AND CLEARING, GINNING AND OPENING.

When the cotton is picked from the pod, the seeds come with it; after being picked, it is necessary to clean it thoroughly from many foreign matters; and therefore fragments of leaves, stalks, etc. are carefully picked out with the fingers. All this laborious task of cleaning, is done by the women, who also spin the yarn.† "The seed cotton is then carded with the jaw bone of the *boalee* fish;‡ the teeth of which, being small, recurved, and closely set, act as a fine comb in removing the loose and coarser fibres of the cotton, and all extraneous matter, such as minute particles of earthy and vegetable matter from it". The next process to be considered will be better understood by the term "ginning." This is accomplished by placing a small quantity of combed cotton upon a smooth flat board, and then by means of an iron spindle moving it backwards and forwards with the hand, the seeds are taken out of the fibres without being crushed. "Bowling" comes next, which we will better understand by the term "opening" or "scutching" or "blowing," when the cotton fibres receive a series of continual blows, from a hand bow which actually does the function of the beater in an opening machine, and which is constructed of a piece of bamboo with two elastic slips of the same material inserted into it, and strung with a cord usually made of catgut, twisted together. The bamboo slips are *moveable* within the centre piece, and in proportion to the extent they are drawn out, or pushed back, the tension of the cord is increased or diminished." This process of blowing brings the cotton into a downy fleecy condition and when spread out can be easily lapped round a thick wooden roller. This roller is afterwards taken out, and the cotton is pressed between two flat boards. It is next rolled round a piece of lacquered reed of the size of a quill; and finally enveloped by means of a thin skin of the *Cuchia* fish which prevents the cotton from being soiled or dirty, whilst it is held in hand during spinning. So far we have the preliminary preparations of spinning; now we shall go direct to the spinning proper, where we shall see, with what simple apparatus, these women could spin such exquisitely delicate yarn, which has startled the whole civilized world for its extraordinary fineness.

\* Textile Industries, Vol. I, p. 1.

† Cotton Manufacture of Dacca, p. 16.

‡ Silurus Boalis. See Hamilton's "Fishes of the Ganges".

#### SPINNING PROPER.

The spinning apparatus consists of (1) the roll of cotton carefully covered with a thin skin, (2) a metallic spindle of 10" to 14" in length, almost as thick as a stout needle—though sometimes a slender piece of bamboo is used instead of the metal, (3) a piece of shell or some substance which is smooth as well as hard, embedded in clay, (4) a hollow stone or clay pot carrying some chalky powder. The whole appliance is generally carried on in a flat bamboo basket. A bit of unbaked clay is attached in the lower end of the spindle; thus giving it sufficient weight in turning it steadily on the hollow smooth surface of the shell. The spinner holds the spindle in an inclined position keeping the heavy end always in contact with the smooth surface, and turns it round with the thumb and fore-finger of her left hand. Whilst the cotton is supplied at the sametime with her right; being particularly careful in drawing out single filaments from the roll. The chalky powder keeps the fingers always dry.

When a certain length of thread is thus spun, it is wound on the spindle. The process exactly resembles the modern mule spinning as far as its principle of intermittent spinning operation goes; here the spindle is stationary, whilst the feed part always recedes from the spindle point, which we see exactly reversed in our present mule spinning. In order to attenuate the fibres successfully in the dry weather, the spinning was often accomplished over a shallow vessel of water, the evaporation from which keeps the surrounding atmosphere humidified to the necessary degree; this enables the spinners to form the filaments into threads successfully. The Dacca spinners generally worked from soon after early dawn to 9 or 10 o'clock, and from 3 to 4 in the afternoon till half an hour before sun-set; the time being the most suitable for fine spinning.

#### STANDARD WEIGHT.

The method of measuring the length as well as the weight of a given skein of thread was very crude. The spinners and weavers generally used to judge the fineness of the thread by sight only. A *hath* (cubit) was their unit length which is equal to almost 10", a distance covered by the whole length between the knuckle of the elbow joint and the tip of the middle finger. Their weight unit was a *Rattee* (about 2 grs. Troy). These are tiny seeds of oval shape, of deep red colour with a black spot on the top, and they are obtained from a particular plant of a shrubby nature.

The standard quality of yarn used for the manufacture of these fine muslins, varied from 140 to 160 cubits in length to one *rutttee*, which comes to about 316s. to about 366s. of the present system.

#### PREPARATION OF THREADS FOR WEAVING.

I shall now describe the preparatory operations of weaving and weaving itself. Our first consideration in this chapter would be the process of winding. The weaver gets his thread from the spinner in the form of skeins wound on small pieces of hollow reed. Before he commences the process actually, he allows its thread to be steeped in water for a few hours as it is. The winding appliance consists of (1) a reel made of thin smooth splits of bamboo, which is mounted on the upper end of a long stick, (2) a piece

of bamboo, one end of which is divided into two parts, and thereby acting as bearings to hold a piece of stick on which is mounted the hollow reed, (3) a smooth coconut shell over which the reel shaft revolves. The weaver holding the split bamboo piece by means of his toes in front of him, turns the long stick of the reel with one hand keeping all the time the reel in its vertical position, while the first two fingers of the other hand act as guides to the yarn in its passage from the reed to the reel. When the yarn is in the form of a skein, it is first placed on a small wheel made of thread and fine bamboo splits, from which it is afterwards drawn off and wound upon a reel.

The thread meant for warp, is generally a little thicker than the weft. The warp in order to stand the unavoidable strains during the process of weaving, is required to undergo the following processes.

#### SIZING.

It is first steeped in water for 3 consecutive days during which period the water is changed twice, on the 4th day it is taken out thoroughly rinsed by means of two sticks which are put into the skein and twisted in opposite directions. It is then left upon the sticks and exposed to the sun to dry in its tightly twisted condition; which is afterwards\*\* untwisted and put into water mixed with fine charcoal powder, lamp black or soot scraped from the surface of an earthen cooking vessel. They are kept in this mixture for 2 days, then rinsed in clear water, wrung out and hung upon pieces of stick placed in the shade to dry. Each skein having been again reeled is steeped in water for one night, and is next day opened up and spread over a flat board, upon which it is smoothed with the hand, and rubbed over with a paste or size made of *Khoie* (fried paddy), and a small quantity of fine lime mixed with water." After being sized the thread is wound upon a reel, every turn of which is kept as wide apart as possible, in order to get it dried quickly. It is afterwards exposed to the sun. All the threads are then rereeled and sorted, and divided into 3 grades according to their fineness: (1) The finest for the right-hand side (2) the next finest for the left hand side, (3) the coarsest for the centre.

#### WEFT PREPARATION.

The weft is prepared two days before the actual weaving. A quantity of thread for one day's work is steeped in water for 24 hours. It is then rinsed and wound on a large reel, and then lightly sized in the above way, and dried properly. This is a daily job continued until the cloth is finished.

#### WARPING.

This operation is usually done outdoors. The weaver selects a spot near his house, where he can arrange his warping appliance to its best advantage. The apparatus consists of four short bamboo posts, which are fixed at measured distances, depending upon the length of the cloth to be woven, and several pairs of rods, between them. They are arranged in two parallel rows with sufficient space between them. The weaver holding a small wheel of warp yarn in each hand, walks backwards and forwards along the two rows all the time laying down the two

\* Cotton manufacture of Dacca, p. 29.

threads over the posts. The intermediate pairs of rods, are intended for supports and as well as to form the end-and-end base; which is accomplished by crossing his hands between each pair of rods. At right angles to the handle of the swift there is a thin rod having a glass ring at its end and through which the thread passes.

#### REEDING.

This is done sometimes immediately after warping, and in some cases not until the warp is wound upon the back beam. The reed is made of very fine bamboo splits, firmly fixed between two split canes. The finest reed that is used in weaving Dacca muslin contains nearly 2,800 dents in 40" space. The whole bundle is hung from the roof of the weaver's hut while one end is unfolded, and spread out nicely and hanging down to within 2 or 3 ft. from the ground. The reed is fastened by means of thin cords, and it hangs in front of the unfolded yarn. Two men take their seats one on each end of the warp and having cut a certain number of the looped ends by means of a knife, they begin to draw the threads with the reed. The drawn ends afterwards are gathered and knotted in bunches thus keeping the reed with the warp.

#### BEAMING.

The beaming process resembles greatly the modern Yorkshire Dressing: when every thread requires careful attention, in respect to their order and tension. The operation is generally done outdoors. The warp is bundled round the reed, and a bamboo rod is passed through the knotted bunches at the termination of the reeding. One man holds this bundle, while the other end is unfolded, and a thin slip of bamboo stick having been passed through the loops, is received into the longitudinal groove of the endbeam, and is fastened by means of string. The beam is then supported on two loops formed by stout cords, which in their turn are suspended from 2 short wooden posts. The selvedge threads of the two ends are brought to a distance commensurate with the intended breadth of the cloth. The portion of the warp thus being unfolded and nicely spread out, the man who holds the bundle, stretches it evenly; whilst two workmen proceed to arrange the threads in the middle. Eventually the threads are brought into their parallel state, by means of an elastic cane, which has been previously softened and beaten out at one end into the form of a brush. The cane is held in the form of a hand bow, and it gently taps over the stretched ends. When a certain length of the warp is thus arranged, it is wound on the end of the beam by means of a winch handle; the next unfolded portion is similarly treated; and the process is continued until the whole length of the warp is properly dealt with.

#### WEAVING.

The loom is of a very simple construction; it consists of four bamboo posts fixed firmly in the ground. They are connected sideways by two rods, which support a few transverse rods, to which the slings of the lay or batten and the balances of the healds are attached. The breast beam or cloth beam has a

longitudinal groove in which fits a thin rod carrying all the looped ends of the warp. Both the back and the cloth beam rest upon short bamboo posts, the top part of which has been scooped out in order to form a sort of bearing. Each beam has a winch handle by means of which each can be turned; the beam is prevented from turning in the opposite direction by means of a stick, one end of which is inserted into the mortise of the beam, while the other end is fixed in the ground. The slay consists of two broad pieces of wood each with longitudinal grooves into which the reed is received and made fixed by means of iron or wooden pins. It is suspended from the front transverse rod, and in adjusting it properly a good amount of experience and practice is necessary, because the range of its movement determines the degree of force which should be applied to a weft in a particular texture of a fabric. This is considered to be one of the nicest operations in setting this sort of loom. Each heald is equally counter-balanced by weights, which are attached to the other ends of the slings, the slings being passed over the transverse rod of the loom-frame. The treadles are made of bamboo or pieces of wood, and they are contained in a pit dug in the ground 3' x 2' x 1 $\frac{1}{2}$ . The shuttle (10" to 14" length x  $\frac{3}{4}$ " breadth) weigh about 2 ozs. It is made of very light wood, and it has two spear-shaped points. Considerable amount of space is provided in its centre, in which is placed a moveable iron wire longitudinally, upon which the reed of the weft is mounted. The weft is passed through an eye made in the side of the shuttle. The temple consists of two pieces of wood connected together by cords, their outer ends being armed with iron pins; by means of which the cloth is kept stretched. Every part of the loom being perfectly adjusted, the weaver takes his seat upon a mat or board placed close to the pit, and depresses one of the treadles, thus forming a shed of about  $\frac{1}{2}$ " depth. The shuttle is then thrown by one hand through the shed with a slight jerk and received by the other on the opposite side; the reed then beats up the shot of weft thus placed. When 10" to 12" of cloth is woven, lime water is sprinkled over it in order to prevent it from being damaged by the insects; and then it is wound upon the cloth-beam, and thus simultaneously unwinding a certain length of yarn from the back beam. Mustard oil is occasionally applied to the shuttle, reed, and slay, in order to lessen friction during the process of weaving.

#### PRODUCTION.

The time taken to weave a muslin 20 yards x 1 yard, can be seen from the following statement by the Commercial Resident:—"The preparation of the *tana* or warp thread of a full piece of plain or striped cloth of the Dacca station employs two men, according to the quality of the thread, from 10 to 30 days. The weaving of such cloth employs 2 persons, one to weave, the other to prepare thread and attend the loom—if of the ordinary or middling plain assortments, from 10 to 15 days—if of the fine, 20—the super-fine, 30—the fine super-fine, from 30 to 45 and if the cloth be of the fine superfine *dooreas* or *Charkana* (checks) assortments, 60 days..... A half piece of *mulmulkhas* of the finest kind...cannot be manufactured in less than 5 or 6 months."

The following list gives us, the names of some of the muslins with their particulars:

#### DACCA MUSLIN

NAME.	NO. OF THREADS.	AVERAGE WEIGHT.	DIMENSIONS.	REMARKS.
1. <i>Mulmulkhas</i> ...	1,800 to 1,900	3 oz. 2 dwt. 14 grs.	10 x 1 yds.	Made and reserved for the private use of the king. It is described as so fine that "it will pass through a ring."
2. <i>Jhuna</i> ...	1,000	8 $\frac{1}{2}$ ozs.	20 x 1 yds.	"Jhuna"—"Thin." Net-like muslin worn only by Indian dancers and singers and by ladies of the wealthy class.
3. <i>Rang</i> ...	1,200	8 ozs. 4 drs.	20 x 1 yds.	Net-like texture, 1 in a dent.
4. <i>Abrawan</i> ...	700 to 1,400	9 ozs. to 11 $\frac{1}{2}$ ozs.	20 x 1 yds.	{ "Ab" (Persian)—"Water" "Rawan" (,, ,)—"To flow."
5. <i>Circur Ali</i> ...	1,900	4 ozs. to 4 $\frac{1}{2}$ ozs.	10 x 1 yds.	Manufactured for the use of the Nawabs of the Province. It was included among the articles for the Viceregal Court, the cost of which was defrayed from the revenues of the Jaghires "Circur Ali."
6. <i>Khasa</i> ...	1,400 to 2,800	10 $\frac{1}{2}$ ozs. to 21 ozs.	20 x 1 to 1 $\frac{1}{2}$ yds.	"Khásá"—"Elegant."
7. <i>Subnam</i> ...	700 to 1,300	10 ozs. to 13 ozs.	20 x 1 yds.	<i>Subnam</i> —"Evening Dew." It has been described that this fabric when spread over the bleaching field, could scarcely be distinguishable from the dew on the grass.
8. <i>Alábâlle</i> ...	1,100 to 1,900	9 $\frac{1}{2}$ ozs. to 17 ozs.	20 x 1 yds.	<i>Alibâlle</i> —"Very fine."
9. <i>Tanzeb</i> ...	1,900	10 ozs. to 18 ozs.	20 x 1 yds.	<i>Tanzeb</i> —"Ornament of body." In England it is known as <i>Tanjeb</i> .
10. <i>Turundum</i> ...	1,000 to 2,700	15 ozs. to 27 ozs.	20 x 1 yds.	
11. <i>Nayansook</i> ...	2,200 to 2,700	.....	20 x 1 $\frac{1}{2}$ yds.	"Agreeable to the eye"—"Nayan"—eye. "Sook"—pleasure.
12. <i>Buddunkhas</i> ...	2,200	12 ozs.	10 to 24 x 1 $\frac{1}{2}$ yds.	Here the weft is not so compact as in "Nayansook."
13. <i>Sirbund</i> ...	2,100	12 ozs.	20 to 24 x $\frac{1}{2}$ to 1 yds.	Head dress as used for turban.
14. <i>Kumese</i> ...	1,400	10 ozs.	20 x 1 yds.	Cloths used for making garments like shirts.
15. <i>Jamdanee</i> ...	1,700	.....	.....	Embroidered on loom. It resembles lappet weaving of the modern days.

Before I take my seat, I must tell you, that Mr. Fox has been kind enough to bring some samples of these fabrics, which you may have a look at before you leave this room. I also take this opportunity to express my gratitude to my worthy professor, who has encouraged and helped me in every way to present this paper before you; and I also thank my friends who have assisted me in different ways.

#### PROFESSOR FOX—

Gentlemen, Mr. Dutta has given us what I am sure you will all consider a very interesting paper. Some years ago, I was considerably interested in this "Dacca Muslin" industry, and I went to some little trouble to find out if possible why the Indian weavers, adopted some of the methods Mr. Dutta has told us about. He has told us about steeping the yarn for days sometime

in water, sometime in charcoal or lamp black. I wanted to know what effect this would have; so I got some English yarns and treated them exactly as the Indian weaver treats his yarn, as Mr. Dutta has explained. I found that from ten equal lengths of cotton in its natural condition the average count was 19·85s. and the breaking strain 52·8 grains. After steeping in water and treating in the manner explained to us, I tried a similar set of threads, the count was 19·95s. and the breaking strain 58·1 grains. But after submitting a third set to the entire process, the count was 19·95s. and the breaking strain 57·7 grains. It gave an increase in strength of 9·37 while it altered the appearance of the threads considerably; they had a smoother surface, they became thinner, and the lamp black gave a darker appearance than was possessed before this treatment. There was a number of very interesting things got with this manufacture; and I thought I should like to know more about these yarns. We have heard of the "Woven Wind" and the "Morning Dew" and the cattle not being able to see whether they were dealing with grass or textile materials; I heard so many poetical and other descriptions of these muslins, that one was naturally anxious to know what the articles were really like. Well, I went to the trouble to analyse some of those samples; I don't know that I had the best samples, but I analysed those that were available; and I found as Mr. Dutta has told us that the warp and the weft were alike sized. I had not sufficient cloth to discharge off the size in the first instance, so I took the average count of warp and weft sized together, and I found, in one piece the average gave 40·45 counts; while that is very fine, I tried another sample and got 52·45 yarn, and a square yard of cloth made from this fine material only weighed 130 grains. I see here people who are engaged in manufacturing cotton goods; I see others who are engaged in merchandising them; but, I question, if there is one in the room prepared to take an order for a piece of cloth of that description, 52·45 yarn in the sized condition; and the weight 130 grains to the square yard. But I took my examination a little further and examined some of the threads; these threads vary considerably in their diameter, broadly speaking not so regular as machine-spun threads; but the finest part of the finest thread contained four fibres in a cross-section, and the coarsest part of the finest thread examined by me had only nine fibres in the cross-section. We are not accustomed to either spin or to handle such materials. The diameter of the finest part of one of these threads was the  $\frac{1}{1000}$ th part

of an inch. We get plenty of cotton from India, where a single fibre has a greater diameter than the diameter of one of the threads I am speaking of; and the coarsest diameter of the same thread so far as I could make it out was  $\frac{3}{1000}$ "; that is, the coarsest part of the thread was three times the diameter of the finest part. Then I removed the size, and tested the material again without size; I found the finest part of the thread to be  $\frac{1}{1333}$ " and the coarsest  $\frac{1}{300}$ ". Now when we have facts like these before us, we can forgive folks for wearing nine suits of clothes and not being able to tell one was not in the nude; we can forgive many of the descriptions which bear fanciful and long drawn names.

This industry so far as I could make out has not been a spasmodic one; it is certainly as old as Christianity. I have evidence of the early manufacture of these materials in the third century—accounts of the travellers who were in India in the 3rd century, and spoke of these muslins as being something very unusual in their fineness; we have evidence from other sources as Mr. Dutta has told us to-night of the Greeks and Romans making great efforts to get hold of these cloths; and if we go all through the centuries, we find that this industry was practised; but still I am inclined to think that it attained to its highest state of perfection in the sixteenth century, in the Mahomedan rule; they were probably Hindu weavers, but muslins were demanded in the greatest number, and demanded the greatest attention in the sixteenth century, and showed the finest results that could be obtained. We have been told to-night of Indian muslins selling in England at 30-a yard; that is quite true, but those muslins are not the muslins I have been speaking about; for these exceedingly fine muslins were not allowed to leave the country; they were manufactured chiefly for the seraglio for the rulers of India. We get their second or third rate articles, the first rate being retained at home for home consumption.

One other thing you would probably be surprised to hear that the threads of the warp were divided into three sets; the finest set was placed in one part of the fabric, the coarsest in another part and the medium threads in the third part; it was found to be impossible, even in the days when most of these yarns were spun, to get sufficient quantity of yarn of the same count throughout, and hence it was customary to find at least three different counts of yarn in the same warp.

## THE ARCTIC THEORY—WHAT IT POSTULATES

WHEN Sanskrit was discovered by the West about a century ago European scholars were startled to find a close resemblance between it and many European languages. Next followed the discovery of Zend which was found to have an intimate affinity with Sanskrit. Sturdy European scholars like Bopp, Max

Muller, Burnouf, Roth and Goldstucker became fired with zeal to investigate these languages and study their literatures. Bopp wrote his Comparative Grammar, Max Muller published the Rigveda, Burnouf studied the Zend Avesta and Roth collected the Nirukta and prepared the St. Petersburg Lexicon. These were mighty

## THE ARCTIC THEORY—WHAT IT POSTULATES

works and created new and highly interesting fields in the domain of science. The science of language got an unprecedented impetus, ethnology received a great stimulation, "pagan" religions began to be understood, mythology seemed to be intelligible and even nursery tales ceased to be considered as productions of opium dens and foolish pratings of garrulous grandmas. An affinity was found to exist not only between a number of ancient Asiatic and European languages, but also between the religious faiths of the peoples inhabiting the countries in which such languages have been in use since ancient times. The first conclusion drawn from this interesting finding was that these languages or faiths were derived from either one of themselves or from some common pre-historic language or faith which had been lost to mankind. The idea of the motherhood of any one of these languages or faiths in relation to the others was given up by most scholars before long, and it was generally accepted that they all represented a sisterhood with a lost parent. Sanskrit, Vedic Sanskrit in particular, which had at first been supposed to be the mother or at least the eldest sister, was then denied this high position. Even so early as 1884 Professor Sayce wrote in his preface to the Third Edition of his "Principles of Comparative Philology":

"Since the publication of the second edition of my work in 1875, a revolution has taken place in the Comparative Philology of the Indo-European languages. Sanskrit has been dethroned from the high place it once occupied as the special representative of the Aryan Parent Speech and it has been recognised that primitive sounds and forms have, on the whole, been more faithfully preserved in the languages of Europe than in those of India."

And he continued to hold this view till the end of his days. Ethnologists, who base their conclusions on biology and anthropology instead of on philology, strongly protested against this view saying that "language and race have nothing in common, or at least are in no way correlated" (Keane). It was a German philologist, however, who first propounded this Ethnological theory (Cuno, 1871.) With the foundation of the sciences of Comparative Ethnology, Craniology, Archaeology and Linguistic Palaeontology, considerations of origins of races and their distribution naturally came within the province of these sciences. Then the Ethnologist, waking up from the delusion which he had allowed his too impetuous brother, the student of language, to infect him with, found that

"peoples" at the same time means, peoples speaking Aryan languages irrespective of their race. As regards mythology, it has been considered mainly "as a chapter of the Science of Language and as a chapter of the science of thought" (Max Muller).

"Just as the discovery of the Sanskrit language led to the foundation of the science of Comparative Philology, an acquaintance with the literature of the Vedas resulted in the foundation of the science of Comparative Mythology by Adalbert Kuhn and Max Muller"—(Macdonell).

Next, we step on grounds which are more or less controversial. The first race of orientalists were led to suppose, by the remarkable affinity which they found to exist between the different Aryan languages, that the nations which used them all belonged to one and the same stock and this they called the Aryan stock. "From a primitive unity of speech scholars inferred a primitive unity of race" (Taylor). Here began a bitter quarrel between philologists and ethnologists, a quarrel which has unfortunately led many a brilliant scholar to ignore truths on his opponent's side and indulge in acrimonious recriminations. Max Muller in his Lectures on the Science of Language, First series, 1861, says:—

"The genealogical classification of languages has an historical meaning. As sure as the six Romance dialects point to an original home of Italian shepherds on the seven hills at Rome, the Aryan languages together point to an earlier period of language, when the first ancestors of the Indians, the Persians, the Greeks, the Romans, the Slavs, the Celts and the Germans were living together within the same enclosures, nay, under the same roof."

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BM 1298. L. 3.

James TAYLOR (Surgeon): A Sketch of the  
Topography and Statistics of Dacca, Calcutta 1840  
(Printed by order of Government)

A. I. 12

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Dacca muslins  
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The finer  
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encouraged the manufactures of the country,\* and under her patronage the Dacca muslins acquired great celebrity. They became at this time, the fashionable dress of the Omrah at the Imperial and Vice-regal Courts of Hindostan, while the finer fabrics, so exquisitely delicate, as to be styled in the figurative language of the East " webs of woven wind," "abroan," running water, or "shubnein," morning dew,† were exclusively appropriated to adorn the inmates of the seraglios. Throughout succeeding times the Dacca muslins have maintained their high reputation, and even in the present day, notwithstanding the great perfection which the art of weaving has attained in Britain, these fabrics are unrivalled, and in point of transparency, beauty and delicacy of texture are allowed to excel the most finished productions of the loom in any country in the world. "Yarn continues to be spun, and muslins to be manufactured at Dacca." Dr. Ure writes in 1836 "to which European ingenuity can afford no parallel, such indeed as has led a competent judge to say it is beyond his conception, how this yarn greatly finer than the highest number made in England can be spun by the distaff and spindle, or woven afterwards by ANY machinery.‡

All the fine muslins are made of the desee or indigenous cotton of the district. The cot-

\* Cotton manufactures of Britain by Dr. Ure.

† Tasikh Khafy Khan.

‡ So named, from being, when wet, not discernible from either.

ton imported from Mirzapore yields the thread for the bastas, hummums and other assortments of cloth of an inferior quality. The Arracan cotton ranks next to the Mirzapore: it is imported in small quantities, but is never used, as has been represented, in the manufacture of the fine muslins. Bhoga cotton, the produce of the Garrow and Tipperah hills, is employed exclusively for the manufacture of the coarsest description of cloths, which are worn by the poorer classes. The importation of these different kinds of cotton has greatly diminished, however since the influx of British yarn into the district, and probably does not amount to one-sixtieth of the quantity imported in 1787. The cotton is cleaned by the women who spin the thread. The instruments which are used to separate the seeds from the wool are the cherkee and dullun cathee. The former is the common hand mill, or pair of fluted cylinders, which is in use throughout the country, and which is employed here to clean cotton for the second rate qualities of thread. The dullun cathee is used to clean small quantities of the material for the finest thread. It is simply an iron pin that is rolled upon a flat board, upon which the cotton is laid; and which is made a little thicker at its middle than at the extremities, which project beyond the sides of the board, so as to admit of its being worked or rolled by the hands or feet. It is on the same principle as the Maharatta machine which

The cotton  
of Mirzapore.

The Arra-  
can cotton  
next in value.

The Bhoga  
cotton used  
exclusively for  
the coarsest  
description of  
cloth.

Cotton  
cleaned by  
the women.  
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from the wool.  
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the Maharatta  
machine.

has been described by Dr. Lush of Bombay, and of which there is an engraving in the "papers on cotton, &c." lately published by the Court of Directors. The only difference between the two implements consists in a board being used here instead of the stone slab, which is employed in the Maharatta country. About Dacca, the dullun cathee is of a small size, and is worked with the hands, but in Mymensing the roller is moved by the feet, which are protected by wooden soles, similar to those used in the Maharatta country.

*Said to injure the fibre of the cotton less than the mill.*

*Further measures adopted to free it from its husks.*

*Mode of carding the cotton when a fine thread is required.*

The dullun cathee is said to crush the fibre, less than the mill. The next step is to tease the cotton, or to free it from the remains of husks. This is done by means of a small bow made of bamboo, with a string of catgut or moonga silk. In the town there are a few persons, who make the bowing of cotton a distinct trade, but what they clean, is never used for the manufacture of thread, but is exclusively applied to the manufacture of quilts and articles of winter clothing for the Mussulmauns. The cotton that is used for the finest thread, undergoes a carding before it is teased or bowed. The instrument, which is employed for this purpose, is the dried jaw bone of the Boali fish (*Silurus Boalis*). This part forms an arch about 2 inches in diameter, and presents on its inner surface a great number of very fine recurved teeth: it is used in the manner of a comb, and allows only the fine fibres of the cotton

to pass through it. After this process of carding, the cotton is reduced to a state of downy fleece by means of the bow; and is then carefully spread out upon the smooth surface of the dried skin of a Cheetul or Cuchia fish. This is next rolled up into a small cylindrical case, which is held in the hand during the process of spinning.

All the thread is spun by women, who generally employ their leisure hours in the business. The coarser kinds, consisting of the Bhoga and other inferior qualities of cotton below No. 30 of English yarn, are manufactured by the churkhee or wheel; but all above that number, are spun with the tukwa or spindle. A tukwa for the finest quality of thread, is a fine polished steel spindle about ten inches in length, and of the size of a large needle; with a small ball of clay attached to it, about an inch from its lower extremity. It is held in an inclined position, with its point resting upon the hollow surface of a broken cowrie shell or a piece of turtle's egg imbedded in a small mass of clay, which serves as a stand for it: and is revolved between the finger and thumb, while the cotton, which is held in the left hand, is gradually raised from it, and the filaments, as they are drawn out, are formed into a thread. This is the mode of spinning that is practised here, by which, a person expert at the business can form a thread upwards of four miles in length from

*Coarser kind of thread spun with the churkhee.*

*The finer by the spindle.*

*Manner of using the spindle.*

The best spinners Hindoo women.

Specimen of Dacca thread at the India House.

one rupee or sicca's (180 grains) weight of cotton. The best spinners are Hindoo women from 18 to 30 years of age. After 30 they begin to fall off, and at 40 their sight is generally impaired, and they are incapable of spinning very fine thread. They usually work in the morning and afternoon, when the light is less dazzling to the eyes, and there is moisture in the air to prevent the thread from breaking. "The cause of the perfection of the muslin manufacture of India," as Dr. Ure observes, "must be sought for in the exquisitely fine organization of the natives of the east. Their temperament realizes every feature of that described under the title nervous by physiologists." The depressing passions, I may further remark, materially influence their handiwork, the most expert spinners being incapable, while suffering from grief or any domestic affliction, of manufacturing even the second rate qualities of thread. There is a specimen of Dacca thread in the Museum at the India House, which was presented to it many years ago by Sir Charles Wilkins; and which has been much admired for its fineness. It was weighed and measured by the late Sir Joseph Banks, and was found to be in the proportion of 115 miles, 2 furlongs and 60 yards to the pound avoirdupois of cotton.\* Thread however has been spun in England of the length of 167 miles

\* Baines' "History of Cotton Manufactures."

to the pound weight of staple, but this yarn, which ranks as No. 350, is of too great a tenuity to be manufactured or woven into muslins in Britain. The finest, that muslins are ever made of there, is No. 250, which is in the proportion only  $119\frac{1}{3}$  miles to the pound weight of cotton, though it is seldom that a number above 220 is used. No. 250 has been imported into Dacca, and muslins have been made of it; but it falls far short of the finest quality of native thread. Thread is spun here, and can be woven into muslin, which is in the proportion of 7200 yards to 1 tolah or 180 grains weight of cotton, or upwards of 160 miles to a pound of the staple. I had lately in my possession a specimen of this kind which was spun in 1837. It was very carefully weighed and measured and was found to be 200 yards in length, and 5 grains in weight. The Dacca thread is generally allowed to be softer than English mule twist, and the cloths made of it, it is well known, are much more durable, although from imperfect bleaching, they do not always look so well as the English muslins. It is said to be irregularly twisted, and that it appears under the microscope like an ill-made hair rope bristling with loose strands. The filaments vary in their diameter from  $\frac{1}{1600}$  to  $\frac{1}{1500}$  of an inch, and are flat and ribbon-shaped. It is on this shape of the filaments in their separate state, that the transparency of the Dacca muslins depends, and it is said, that if

The finest thread of which muslins in Britain are made.

The finest thread that is used at Dacca for weaving.

Specimen in the author's possession.

Dacca muslin more durable than English.

Cause of the transparency of Dacca muslins.

American cotton not reported favorably by the Dacca spinners

Formerly spinning afforded employment to all ranks.

Rapidly declined since the introduction of British yarn.

they were more closely twisted they would form an opaque yarn like the British thread. The more cylindrico-spiral, the longer and more elastic the filaments of cotton are, the better adapted they appear to be for manufacture by machinery, and less suited for spinning with the fingers. Accordingly the American cotton, which possesses these several qualities, is well adapted for the British looms, but cannot be manufactured into the finest thread here. A small quantity of Sea Island cotton, which was sent to the Commercial Resident in 1811 was subjected to a trial and the result was unfavourable, the spinners not being able to make good thread of it, and pronouncing it to be unfit for the manufactures of the Dacca aurungs. The spinning of thread afforded employment to all ranks and classes of the inhabitants of the district in former times. This branch of industry began to be affected in 1824, when British yarn was first imported into the district, and since 1828 it has been in a rapidly declining state. Most of the cloths, that are now manufactured here, are made of British twist ranging from No. 30 up to No. 200. Numbers 60, 70 and 80 are principally used. The following is a comparative statement of the different numbers of English twist usually imported into Dacca, and of the correspond-

ing qualities of country thread, with the prices of each kind.

No. of English thread.	Weight of Country thread corresponding to the English numbers.			Price of $\frac{1}{2}$ of a Morah or 1 and $\frac{1}{4}$ of a Hank of English thread.			Price of $\frac{1}{2}$ of a Morah or 1 and $\frac{1}{4}$ of a Hank of Country thread.			Comparative statement of prices between English twist and of country thread.
	Sicces.	As.	Gds.	Rs.	As.	Gds.	Rs.	As.	Gds.	
200	1	0	0	0	3	0	0	13	0	
190	1	0	18	0	2	15	0	10	0	
180	1	1	15	0	2	15	0	6	0	
170	1	2	16	0	2	10	0	5	0	
160	1	4	0	0	2	10	0	4	0	
150	1	5	7	0	2	10	0	3	10	
140	1	6	17	0	2	5	0	3	0	
130	1	8	12	0	2	5	0	3	0	
120	1	10	13	0	1	15	0	2	15	
110	1	13	5	0	1	15	0	2	0	
100	2	0	0	0	1	5	0	2	0	
90	2	3	11	0	1	5	0	1	15	
80	2	8	0	0	1	5	0	0	15	
70	2	12	0	0	1	1 $\frac{1}{2}$	0	1	15	
60	3	5	5	0	1	2 $\frac{1}{2}$	0	2	0	
50	4	0	0	0	1	5	0	2	0	
40	5	0	0	0	1	7 $\frac{1}{2}$	0	2	0	
30	6	10	0	0	1	10	0	2	0	

The English thread, independent of its English cheapness, will always be preferred by the thread prefer. natives, on account of its uniform size, and red by the natives.

To procure country thread of a certain quality is a task attended with considerable labour and expense; it can only be done by visiting the different marts in the district, and it is estimated that two-thirds of the time occupied in preparing the fine muslins, are spent in searching for thread suited for the manufacture.

Difficulty of procuring country thread of a certain quality.

Number of  
the different  
kinds of cloth  
manufactured.

Proportion  
made of Eng-  
lish twist and  
country  
thread.

Flowered,  
spotted, strip-  
ed and chec-  
quered mus-  
lins.

Finer des-  
criptions of  
flowered mus-  
lin made of  
country thread.

Sent to the na-  
tive courts of  
Hindostan.

There are about thirty-six different kinds of cloth manufactured in the district, and it is estimated that of the whole quantity made, 6-8ths are manufactured of English twist, ranging between numbers 30 and 200: one and half of an eighth of country thread below No. 30 and one half of an eighth of fine country spun thread above No. 200 of English yarn. The muslins that are manufactured of thread, above the latter number, consist of plain fabrics which are generally made to order, and are called "mulmul khas." It is said that in the time of Jehangire a piece of Abrowa muslin could be manufactured, measuring 10 cubits in length, by 2 cubits in breadth, and weighing only 5 siccas or 900 grains, the price of which was 400 rupees. The finest that can be made in the present day, of the same dimensions as the above, weighs about 9 siccas or 1600 grains, and is sold at 100 rupees. Flowered, spotted, striped and chequered muslins are manufactured in considerable quantities. The finer descriptions of flowered or Jamdanee muslins are made of country thread, but a large proportion is also manufactured of No. 200 of English twist. They are sent to Oude, and the different native courts of Hindostan, but the whole quantity annually manufactured does not exceed one lac of rupees in value. This manufacture appears to have been introduced by the Mussulmans, and is still chiefly in their hands. During the Moghul Govern-

ment, the weavers of Jamdanee muslins paid a tax, and were prohibited from selling cloths above a stated value to foreign merchants.

The weavers  
formerly  
taxed.

A large proportion of the cloths, manufactured of English thread, are plain fabrics, which are embroidered in the city, and exported annually to the Persian Gulf and the Red Sea. Cloths are also made of cotton and tussur silk, and of plain and coloured thread mixed, and constitute about one-eighth of the manufactures of the district. All these different kinds of cloth are distinguished by names denoting the fineness of their texture, their pattern, the origin of their manufacture, or the uses to which they are applied as "Abroan running water, and Shubnem, or night dew," as being when wet not discernible from either; "Doorea or double threads," "Charkouna or chequered," "Circar Ali or the Newab's household," &c.

Cloth made  
also of cotton  
and tussur  
silk.

These dif-  
ferent kinds  
of cloths dis-  
tinguished by  
names denot-  
ing their tex-  
ture, &c.

The mode of weaving is much the same as that practised in other parts of the country. The process is rude enough, though, it may be observed, it is not quite so simply conducted as European travellers have described it to be. The weaver, instead of erecting his loom under the shade of the nearest tree, as he is generally represented to do, always plies his business under the roof of his own dwelling, or under a shed raised for the purpose. To admit sufficient light, the hut is open on all sides: a pit is dug in the floor, to afford room for the lower part of the gear, and

The wea-  
ver always  
plies his loom  
under shelter.

Number of implements used in manufacturing muslins,

Principally composed of bamboo and reed and very simple.

Mode of dressing the thread and forming the warp.

Separating the warps.

The Shuttle.

for the weaver's legs as he sits at work, and above the loom he erects a sort of canopy, consisting of a mat or two supported on four bamboos to protect the web, from dust and rain dropping from the roof. The total number of implements used in converting the raw material into thread, and weaving the latter into the finest muslin is said to amount to 126. They are all made of small pieces of bamboo or reed tied together with twine or thread, and are of a style of workmanship so rude and simple that almost every weaver can make them himself, although to save time and trouble they are usually sold ready made in the bazars. The thread is dressed with starch made of parched rice, and after exposure to the sun for some time is wound off upon two small wheels, which are held by the weaver, one in each hand, as he forms the warp. This latter operation is done between four bamboo stakes driven into the ground. An instrument like a comb is used to separate the threads of the warp, every alternate thread of which passes through a corresponding loop or ring of a thread chain which is connected with the gear above and the treadles below. There are two of these chains of thread loops which are attached, one to each treadle, and by means of which the threads of the warp are alternately raised and depressed, to allow the shuttle to pass between them. This latter implement it may be mentioned, is not so sharp pointed as the English shuttle, and instead of having a fixed

bobbin inside, the thread of the woof is wound upon a small piece of reed which revolves upon an iron pin or wire. The most favourable time for weaving the fine muslins, is during the rains, at which season the moisture in the atmosphere prevents the thread from breaking. In dry hot weather, it is requisite, while weaving the finest fabrics, to have beneath the web shallow vessels of water, the evaporation from which keeps the warp moist, and it appears to have been from this circumstance, that the idea of the Dacca muslins being fabricated in water, originated.\*

Most of the weavers are Hindoos. They weave the plain muslins in Dacca, Dumroy, Teethibadhee, Junglebaree and Sunurgong. At the latter place the Mussulmans who form the principal body of weavers there, are engaged in making the jamdancee muslins, Coarser cloths are made by the lower castes of Hindoos and Mussulmans called Joogees and Joolahs.

The rainy season most favorable for weaving the fine muslins.

In the hot season water used to keep the warp moist.

Weavers mostly Hindoos.

At Sunergong mostly Mussulmans employed on making the jamdancee muslins.

There is never more than two or three yards of the web uncovered, during the process of weaving. The starch used for the Shenen muslins is mixed with a small quantity of lamp black, and hence the name Sibnem signifying "half dark" or twilight according to the weaver's interpretation.

\* On viewing the Indian yarn, it is easy to see how from the want of cohesion it should require to be woven on some occasions under water in order to give it support as the anatomist develops slimy textures which float in the same medium.—See on the "Cotton Manufacturers of Hindostan."