SURFACE TREATMENT OF TEXTILES
5. **DYES AND DYEING**

Prior to the application of any dye to the woven cloth, it was washed and bleached.¹ Tavernier (1667) emphasises the use of lemon in bleaching cotton.² He says that the people of Kasimbazar used to bleach silken fabrics with a lye made of the ashes of the plantain.³ Roques in his account of the 17th century cloth-printing in India refers to 'half bleaching'.⁴ The Beaulieu MS of 1734 tells us that rice water and lime were customarily used in bleaching ordinary cloth.⁵ This washing and bleaching of cloth prior to dyeing was resorted to in order to remove the extraordinary gumming, starch and 'beating' practised by the weavers to hide loose weaving.⁶ Warp threads corresponding to parity with the weft required to make the fabric even and smooth, so that it could properly receive the dye or pattern through printing blocks and prevent the surface bloom from crack.⁷ In the second place, washing and bleaching prior to colour


2. Tavernier, II, p.5.

3. Ibid., II, p.3


7. Roques, p.4.
application, obviously ‘cured’ the cloth of impurities.\textsuperscript{8} It was largely done at Baroach,\textsuperscript{9} Baroda,\textsuperscript{10} Lakhawar,\textsuperscript{11} Saman,\textsuperscript{12} Navsari,\textsuperscript{13} Lucknow,\textsuperscript{14} Masulipatam and Kashmir.\textsuperscript{15} Unfortunately, we do not find any description of properties of water in these localities. Brackish water was always avoided to keep the lustre of the dyes.\textsuperscript{16}

Once the cloth was bleached and whitened, it was ready for dyeing. Various natural dyes were employed for imparting colour. Natural dyes were those of vegetable and animal origin. Of them, indigo enjoyed the primary position. In textile technology, it was an essential element in both bleaching and dyeing.

The historiography of indigo production technology during medieval time lags behind that of trade in it.\textsuperscript{17} Our understanding of the

\begin{itemize}
  \item \textsuperscript{8} \textit{E.F.I.} 1646-1650, p.2.
  \item \textsuperscript{10} \textit{E.F.I.} 1646-1650, p.2.
  \item \textsuperscript{11} \textit{E.F.I.} 1618-1621, p.192.
  \item \textsuperscript{12} Ibid., p.168.
  \item \textsuperscript{13} Tavernier, II, p.5.
  \item \textsuperscript{14} \textit{E.F.I.} 1646-1650, p.78.
  \item \textsuperscript{15} Bernier, pp.403-4.
  \item \textsuperscript{16} \textit{E.F.I.} 1622-1623, p.104.
  \item \textsuperscript{17} Cf. W.H. Moreland, \textit{India at the death of Akbar}, pp.102-5, 112,
\end{itemize}
development of medieval manufacturing technology is comparatively of recent origin. At the present state of our knowledge; we have begun to

Contd....


recognise the crucial importance of indigo production in the growth of the textile industry. Looking at the potential of indigo production during the 17th century- or perhaps till the invention of chemical dye in the mid-19th century - we can safely say that it induces a study, howsoever preliminary in its nature, of its technology involving "fresh material", "reassessment" and "reinterpretation".

Indigo (*Indigofera tinctoria*) is believed to be a native of India. It was used in Egypt as early as c. 2500 B.C., though on a small scale.\(^{19}\) From there it spread later to Syria and Palestine.\(^{20}\) In India, we find references to it as *kala* or *asikni* in the *Atharvaveda* which could be dated to B.C. 1000-600.\(^{21}\) Later references follow.\(^{22}\) The first, epigraphic reference could possibly be traced in an inscription of the 6th century A.D., where we find direct mention of the term *nila*.\(^{23}\) This particular inscription refers twice to *nila* in the context of categories of professions


20. Ibid.


23. D.C., Sircar, "Charter of Vishnusena. Samvat 649" *Epigraphia Indica*, XXX (1953-54), New Delhi, 1987, pp.183-191. It has been dated back to A.D. 591. I am grateful to Professor B.N.S. Yadava (retd.) Department of History, Allahabad University, Allahabad for this information.
excluded from forced labour, and also with reference to indigo dyer (nila dumphaka) and indigo-vat (nila-kuti). The dumphaka had to pay the tax of three silver coins for a nila-kuti. Indigo had acquired a prominent position as a cash crop between A.D., 1000 to 1300.

Jagadish Narayan Sarkar is to be credited with pioneering the study of the processes of manufacture of indigo. However, some of his suppositions may be disputed. There seems no basis for his assumption, for example that only one vat was used at Sarkhej in contrast to more than one at Bayana. The studies of Iqtidar Alam Khan and K.K. Trivedi where field-work has been correlated with contemporary textual evidences have been confined to the Bayana tract. There is much fuller information, however, on Sarkhej indigo owing to two Dutch accounts viz., those of Geleynessen de Jongh (1632-1640 in Gujarat)

24. Ibid., The term nila-dumphaka possibly applied to manufactured blue dye from the indigo plant and nila-kuti may mean an indigo factory. According to D.C. Sircar, the term dumphaka was perhaps derived from the Sanskrit drimphaka which meant “one who presses”. The use of this particular term is interesting because of the action involved in indigo manufacture.

25. V.K. Jain, Trade and Traders in Western India A.D. 1000-1300, New Delhi, 1990, pp.21-63.


Mattheus van Heck (1681-1700). Van Heck's is possibly the most detailed contemporary description of the implements and processes used in the manufacturing of indigo at Sarkhej.

The best indigo in India grew in the Bayana tract near Agra, and the next best in quality at Sarkhej near Ahmadabad. It was indigo raised in these two tracts that mainly entered India's oversea trade. The Bayana tract comprised villages around five chief places. Pelsaert provides us information about these villages and mentions their distance from the nearest of the four of the five chief places. Under Bayana, he lists twenty seven villages: Ebrahemedebat (1 kos), Serco (4 k), Otschien (Ujjain) (6 km.), Patehiouna [Pachauna?] (5 k.), T'sonoua [Sanowa] (4 K.), Pinijora [Piraru?] (6 k.), Maunana (6 k.), Birampoer (4 K.), Melecqpoer [Malikpur] (4 k), Berettha (Barata) (5 k.), Azenaulie (4 k); Batziora [Bachora] (4 k), Pedaurle (4 k), Gordaha (5 k), Helleck (7 k), Nade Beij (10 k),


29. Ibid.


Pehekertsie (7 k), Koreka (5 k), Khondier (5 k), Rodauwlker (Rudawal khera) (4k), Nimbera (Nibheira) (7 k), Berouwa (5 k), Ratsiona (7 k) Indiara (4 k), Tseneorpana (5 k), Lathehora (7 k). The second group (main seat: Khanua) comprised 13 villages: Khanua (approx. 50 km west South West of Agra),

32. Mahal (2 k), Roubas (Rupbas) (2k), Tsertsondad (Sirsunda) (1½ k), Daber (2 K), Mahalpoer (1k), Danaghgam (2 k), Bockolie (Bakhauli) (1 k), Barrawa (1 ½ k), Ordela, (3/4 k), Ziasewolie (Jajawali) (1½ k), Phetapoer (Fatehpur Sikri?) (5 k). The third group comprised 13 villages. Bhasawar (around 100 kms to the west of Hissounla (4 k), Tserres (2 k), Borolie (1 1/4k), Ziarathara (3 k), Pantla (2 ½ k), Chachauli (3 k), Tsonoher (6 k) and T'sonkeri (6k). The fourth had nine villages. Hindaun (around 100 kms to the west southwest of Agra),

33. Khera (2 k), Jamalpur (2 k), Kottopoer (2 k), Paricanepoer (3 k), Wazirpur (6 k), Surot (5 k), Sittoiali (6 k), Nardoulie (6 k). The fifth principal place was Todabhim (18 k from Bayana). It had also many villages under it but its indigo was not as violet in colour as elsewhere.

Thus 'wet leaf' process was generally practised in indigo manufacture in this area. 

34. In the 'wet' or fresh leaf process, the plants

32. Pelsaert writes that it was 10 kos west of Bayana.

33. Pelsaert, p.260, indicates it to be 10 kos east of Bayana whereas it is to the north of Bayana.

34. Pelsaert puts it at 10 kos from Bayana, p.260.

were put into water tanks or vats immediately after being taken off the field. W. Finch (1608-1611) and Pelsaert (1626) speak of two vats, one in which the stalks and leaves were ‘allowed to steep’, letting out the dye; and the other, at a lower level received the dye-laden water. The water was first stirred strongly by manual labour to absorb the dye particles, and then allowed it to lie still for 16 hours. The dye settled down at the bottom, from which it was collected after the tank was slowly emptied water through a low hole. This was the practice at Bayana. In such cases the stalks and leaves must have been taken out after having been steeped in it. The vats were built of very good cementing lime. After beating, the extract was dried in the sun generally.

Boilers were not used by Indians in this process. But, boilers seem to have been employed as early as the early 16th century in what has been designated the ‘dry leaf process’. Salbancke says that at Bayana indogo


37. Mundy, II, pp.221-222; Tavernier, II, p.8.

38. Tavernier, II, p.8, says, ‘After the Indians have cut the plant they throw it into the tank made of lime, which become so hard that one would say that they were made of single piece of marble. Pelsaert, pp. 66-7 describes the use of plaster made of unslaked lime, milk, gum and sugar.

plants "Being cut downe, it lyeth on heapes for half a yeare to rot, and then by oxen it is troden out from the stalkes, and afterward its ground very fine, and then boiled in fornaces, and so sorted out in severall sorts..."\(^{40}\) Salbancke's testimony remains unique, for according to modern descriptions of the indigenous practice, the dried leaves are simply put into the steeping and beating vats largely in the same manner as for the fresh leaf.\(^{41}\) But see below for the process of boiling attested from south India in late 17\(^{th}\) century.

As for Gujarat, Jambusar was a well-known indigo producing site. It was a large village, situated on the road of Cambay, around 10 miles from Broach.\(^{42}\) It along with neighbouring villages supplied indigo as good as those of Sarkhej.\(^{43}\) However, Pieter van den Broecke (March 1622) noticed that "in the village Jamosar (Jambusar), ... the indigo de matto is made, called in Industan (Hindustan) Singilli, .... considered worst (slimsten) of the entire India."\(^{44}\) The term `indigo de mato/matto' is also used by Pieter van den Broecke in describing the indigo made at

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40. J. Salbancke, *Purchas His Pilgrimes*, III, p.84.

41. *D.E.P.I.*, IV, pp.434-5, In the European planters' factories, the indigo 'pulp' obtained from the boilers was again put into a boiler to prevent fermentation (ibid, p.436).

42. Van Dam, II (3), p.7.

43. Ibid.

Cihiri (mod. Shihir in Mukalla) near Aden. The term ‘mato’ is a Portuguese term for forest or jungle. Moreland has interpreted the term ‘singilli’ for ‘jangli’. It seems that it was possibly not true cultivated and so indigo and so not of good quality. It was used for dyeing black and blue baftas. Nevertheless it was generally accepted to be an inferior variety. Indigo was also produced in Cambay, which was also an important port for its export. Ahmadabad held a high repute for cultivation and manufacture of indigo, with Sarkhej practically a suburb of it. Baroda was another indigo producing area.

Geleynssen de Jongh writes that there were twenty five principal villages or small towns (hoofdorpen ofte cleyne stedekens) in Ahmadabad which had 2,898 villages and small places under them. Under these twenty five principal villages was the famous locality of Sarkhej

45. Ibid., I, p.41.
46. Ibid., II p.380 Hence it will not be correct to assert that it was used only for dyeing black baftas, see, Ghulam Ahmad Nadri, “Indigo Industry and Trade in Gujarat in the Seventeenth Century”, p.7-8.
48. Ibid.
49. Van Dam, II (3), pp.7-8.
51. An Atlas of the Mughal Empire, p.26, sheet 7B.
½ miles north of Ahmadabad).\textsuperscript{52} What was produced in small villages situated around this village Sarkhej, indigo was made and sold at Sarkhej.\textsuperscript{53} Therefore, it appears that the Sarkhej tract was much smaller than the Bayana tract.\textsuperscript{54}

Indigo was planted in June in the black sandy soil which used to be sooty sand.\textsuperscript{55} Plant cutting was first done in the last week of October or first week of November.\textsuperscript{56} The first and second cuttings were called \textit{ballera} and the third was known as \textit{baldewa}.\textsuperscript{57} In the first half of the 17th century, Geleynssen de Jongh describes only the dry-leaf process. But by the end of the 17th century, the wet-leaf process had also come into vogue at Sarkhej. Mattheus van Heck refers to the application of both the processes,\textsuperscript{58} although the Dutch East Indian Company (V.O.C.) itself procured the indigo made from dry-leaf process.\textsuperscript{59} It seems perhaps

\textsuperscript{52} \textit{Remonstrantie van W. Geleynssen de Jongh}, pp.40, 46.

\textsuperscript{53} Ibid.

\textsuperscript{54} See Irfan Habib, \textit{An Atlas of the Mughal Empire}, for Bayana indigo tract, 6B, 27±, 77±), 8B 27± 77±; for Sarkhej tract, ibid. 7B, 22+, 72+, see also Notes on pp.20, 26.

\textsuperscript{55} \textit{Remonstrantie van W. Geleynssen de Jongh}, p.46.

\textsuperscript{56} Ibid.

\textsuperscript{57} Van Dam, II(3), p.73.

\textsuperscript{58} Ibid., p.74.

\textsuperscript{59} Ibid.
that the wet-leaf process was not as good as that of Bayana. This assimilation of a new process indicates the range of diffusion. The question of adoption and adaptability of this relatively new technique in the perspective of Sarkhej is central to the problem of transmission of a manufacturing process. This was, induced, presumably owing to the expansion of demand for indigo by various sections of traders. The impact of such technological changes depended on the identification of social stratum which demanded its diffusion, and controlled its application and consumption.

Indigo from green leaves was termed in Gujarati (though it appears) "silapoankeniel". "Silapoanke" appears thus to indicate green leaves. This was confined to Sarkhej, because most or perhaps all the vats were located there. Its annual turnout was about 200 and 300 man (one man = 36½ Dutch pond). This was mostly used by the highly professional dyers and beaters (kloppers) of Ahmadabad. The overseas traders kept themselves away from it because of the comparatively high price which used to range from 25 to 40 rupees per man 34¼ to 34½ Dutch ponds. This abrupt rise in price possibly contributed to the sharp decline in the quantity of indigo, exported during the last decade of the 17th century. The long distance merchants usually preferred "soukapoankeniel" (dry

60. Ibid.

leaves), i.e., dry-leaf processed indigo. These two kinds of indigo had two distinct forms, the first being flat and the other round. The indigo makers used to meet the deficiency of local production by procuring leaves from surrounding areas after the monsoon was over. This was mostly done in November and December.

Hence Geleynssen de Jongh’s account of indigo manufacture is of considerable interest: The leaves were dried in the field under the sun and, thereafter, these were struck off from the branches. These leaves were then put into a square tank or water vat which had a depth of one fathom (i.e. 6 feet) and therein it remained for 4 to 5 days. Then it was stirred (omgeroert) and messed about (gemorselt) with the help of a big staff. This water now obtained the blue colour, but the pigments gradually sank due to the rotting of leaves. Afterwards, it was transferred into three more vats a little of the thickness of the leaves remained. It was left idle for one or two days. Thereafter, the vat was stirred again and drawn off (getapt) in two more tanks where it was allowed to stay for the whole night. The indigo being heavy, used to settle down when the water was drawn off. The thick one that settled at the bottom, was passed through a strainer, dried in the sun and then cut into pieces.


63. Ibid.

64. Remonstrantie van Geleynssen de Jongh, p.47.
So far the dry leaf process is concerned, our sources offer descriptions that we have already touched upon. Nevertheless, the account of Mattheus van Heck still holds good and stands head and shoulder above previous descriptions. The following discussion is mainly based on a summary translation of Van Heck's draft. First of all, none of our previous sources informs us about the implements employed in the preparation of indigo. Mattheus van Heck refers to numerous implements required in indigo production. His list shows as many as fourteen accessories needed in this craft:

1. *mandaan*, the gibbet (galg) at the depth of the well.
2. *koos*, a leather bag with an iron ring (*beuqel*).
3. *Wet*, the leather rope/string (*touw*).
4. *tabarrad*, two oxen.
5. *thaloe*, a small water trencher (water bortje) on the well.
6. *kodaly*, spade (*aertijser*).
7. *denthaly*, wooden rake (houte herk), 3 to 4 pieces.
8. *matthan*, churning plunger/churning staff (*karnpols*) 8 to 10 pieces.
9. *matthan* or *karwala*, pots, which were short or rather narrow at the necks (*hals*), but thick in the belly and were circular inside.
10. *oundhani* or *cransje*, where the pots were set up, they were plaited off with Osier (twig) (teen) or straw.

65. See above foot note 2.
11. *datri*, earthen dishes at the columns of water.

12. the *sipi* or shell, to scrape through (bijeenschrappen) indigo pulp placed on the cloth, where the indigo was stored up.

13. *longo*, a piece of cloth, that was held before the hole of *ner* (male vat).

14. *loy*, a piece of thick cloth, with which the indigo was driven out of *mada* (female vat) into the *sjaernia*.

The ‘kocx’ or well were of various sizes and depths. They could be deep or shallow (ondiep) according to the situation of the place. The water was reasonably sweet, so much so that it could be used in caboose. The water was lifted by one or two oxen in a leather bag (koos) and stored in square tank (*sjabatsia*) placed on the one side of the well. The water flowed from the *sjabatsia* into the drain (goot). They were masonry drains. The furrow/groove (groef) led the water from the well or or *sjabatsia* to the drain. This proximity to source of water was indispensable in manufacturing indigo. Then, there were two tanks (not deep) which used to be circular or square, to store the required water. One was called *ner* (male) being a round and flat tank. With a diameter of 6-3/10 el (15-2/11 feet). Its had a depth of 1-5/32 el or (2-26/33 feet) up and down. It had a flat and smooth base except near the drain. A hole was made between the brim and the bottom. It was called *mori* where a

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66. It was also called *near* (*nehar*) or *nolars* (nalas?) Cf. Van Dam, II(3), p.74.
little hole was made at the base. It was done to free the water from heavy and sandy substances. The water was retained here to allow the sediment to deposit prior to its use, presumably to prevent the muddy water from impregnating the dye with a quantity of dirt which could have affected the quality of the dye.\(^7\) Secondly, the stagnant and foul water could impart to the sediment a harmful property which could retard the process of settling and drying.\(^8\) In the course of its flow, the liquid could sink and make a resting place. This \textit{ner} was the steeping vat wherein the dry leaves were first softened (geweeckt) and mositened (bevogtigt werden).\(^9\) The size of the reservoir (‘backge’) as well as the number of vats depended on the amount of plant which was expected to be treated. There used to be another vat which was called \textit{mada} (female). A cavity was made in the bottom of \textit{ner} which had its exit in the \textit{mada}. The \textit{mada} was a vat of larger depth. Since the brim rose (stijght) half a foot above the cavity and bottom of the \textit{ner}, the body of the vat was taken under the ground.\(^7\) This was done to obtain the supply of water from the \textit{ner}. They might differ sometimes in their measurements. Van Heck had measured some and found that the \textit{mada} (or the beating vats) and \textit{ner} were normally of

\(^{67}\) \textit{D.E.P.I.}, IV, p.428.

\(^{68}\) Ibid.

\(^{69}\) Mattheus van Heck informs that taxes were settled at this stage. See Van Dam, II(3), p.76.

\(^{70}\) Van Dam, II(3), p.76.
the same size. Measured by Van Heck these were found to be about 6-3/10 or 15-2/11 feet in diameter or they were 19-4/5 ell or 47-55/77 feet in circumference and 1-5/32 ell or 2-26/33 feet deep, at the top and bottom. The bottom of the mada was not flat but descended in oblique direction towards the middle and ended in a still deeper vat called condi, the mixing vat. It had a width of 7/8 ell (2-1/44 feet). It was spherical (kogelront) from the ground in the centre and had a depth of around 1 ell (2-9/32 foot), being on one side of the bottom provided with a water discharging hole. To this vat (mada) was attached another known as ‘sjaernia’. This was a vat of unspecified size. Those which our author saw at Sarkhej had the inner wall of almost of the size of 7 or 8 el in circumference, or little less or little more than 2½ el wide, the depth like that of the mada.71

This vat was without a hole and it was open only at the top. A sloping (afhellend) small flight of steps (stoepje) of stones was raised against it in order to pour out (uitgieting) the surplus surface fluid. It was the collecting vat (vergader back), usually in a square shape. The attachment (tsaamgeheght) of the frame of the vats or tubs (kruijpen) was set with walkable (bewandebare) broad brim and thick walls. It was observed that one or the other side of the condis or vats for mixing were a little separated and were put firmly in square form.72 As many as 6 to 8 vats and few small ones were arranged in the manner shown in the

71. Ibid.
72. Ibid.
diagram (Fig.1). The big vats were called condijs and the small ones, (kleyne kollighden) (empty space) and pandoa, i.e., foot washers. The big ones were 1½ ell (3.27/44 feet) and the small around 3/8 ell (154/176 foot) wide and deep.

The ner was filled with water upto the height of a palm through the channel (de neher). It remained there for the whole day. It was believed that the morning breeze would make the substance poorer. The dry leaves of the weight of 40 mans (1380 Dutch ponds) were put into the ner, but 1/4th of it, that is, 10 mans or 345 Dutch ponds would consist of filth. Upon soaking, it became a little soft. Water was put into it from the second water tank with the help of earthen dishes (datri) and the leaves were usually brought to the collar of the vat. These leaves in the ner threw up foam (schuym). After this, the same was drained out into the mada (the beating vat) which acquired darker green colour then that of poorer leaves. Here it was stamped upon heavily (geklets) else the finest and the best-gloss would perish. The liquid would now take a dark-green or dark colour. This process induced chemical reaction by the contact of fermented liquid with oxygen in the air. We do not hear of the use of

73. Ibid. p.77.
74. Ibid., p.78.
75. D.E.P.I., IV, p.431. Watt describes all the chemical reactions in great detail.
lime water which facilitates precipitation. Perhaps this method was a late addition.\textsuperscript{76} Violent beating had its own hazards. It could break up the grain of the emerging dye.\textsuperscript{77} The wet sediment was then laid to rest from midday to the next morning. Already the turbid and stodgy (swaar) elements sank downwards in the direction of condi. The liquid would show a poorer and lighter green colour. The one which had settled down would be of a browner hue and was passed freely through the mori. However, because the bottom sloped down and a hole could not possibly be made lower than the brim, there would still remain a good quantity of disposable (weghwerpelyk) liquid which was thrown out with the help of pots (karwalas). This was dumped outside the vat and the bottom became visible.

It seems that a little turbid sediment, which was allowed to sink in the condi, was dumped at the side of the vat. At the same time, one or other, the condi. or middle vat was filled again, but that was so designed, that the condi, discharged hardly any thing other than water. A full thick piece of cotton cloth (loy) around 6 ells long and 1\frac{1}{4} ell broad located with both the ends tied (vast knopen), received the dark and turbid liquid from the condi of the mada, was scooped out with the help of baskets (opgemant), as two labourers held the cloth so wide as was possible, and

\textsuperscript{76} Ibid. Watt reports about such a practise in the 19th Century.

\textsuperscript{77} D.E.P.I., IV, p.432.
carried on shaking the substance passed into the collecting vat (*sjaernia*) through the *loy*, the cloth also holding back such leaves, sand and other stuffs which had slipped from the *ner* into the *mada*, while the good substance of the indigo sank at the *condi* and from it as well it was laddled out. Then the labourers would go down and clear away the underlying leaves for soaking it again. This gentle (*saghte*) action of pressing down and drawing up continued for 3 to 4 hours and "goodness" (*kracht*, lit. strength) of the leaves moved up. Now the two labourers, provided with a reasonably thick cloth called *longo*, opened the *mori* (exit) of the *ner*. The green (*ooggroen?*) liquid took its course through the *mori* while the *longo* was held by two labourers, who propped up the flowing leaves in the *mada*. In between, one person stirred round and round the leaves with a wooden rake which had 5 to 6 teeth. It was called *dantaly*. This stirring was such that it made a cross channel (?) (kruys kanals) by the accumulation in four portions in the *ner*. This facilitated the flow of water adroitly towards the *mori*, from where it was finally drawn off (afgetapt sijnde). The used leaves were dried and sold off for a meagre price by the foremen (*meester knecht*) and other labourers to the farmers who used it as fertilizer or for "freshing up their land (koeling van het lant)".  

The green liquid, thus prepared in the *ner*, was poured (beswangert, lit. impregnated) up to one third or a little more or less in the *mada* or the

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78. Van Dam, II(3), p.79.
second vat. By and by, eight persons on a board, of which four were men and four women, were engaged according to some “unknown superstitions” of the Muslims. The men were divided crosswise and the women occupied the places in between. Each of them was provided with a churning staff. With these instruments they stirred the liquid straight up and down in the mada. During this operation, one labourer would go into the vat and press out the liquid in the middle with the whole body. He continued to up and down for a quarter of an hour and then he came out of the vat. After it, the churning action started straight away. It was very evenly done so that the liquid could be pressed from all the sides. It used to be raised up to 3 to 4 feet above the brim in the middle of the vat. Men and women equally contributed to the stirring. This operation used to last for three hours. Perhaps by this time froth would disappear. Only then was the beating discontinued. Meanwhile, some time was spent on leaves of inferior quality which had earlier been found to be greasy or poorer. They were soaked and steeped till 2,3 or 4 preparations were made and after that these were dumped into the ‘sjaernia’. There they started mixing with the accumulated liquid. It could produce approximately ¼ man (i.e. 17 ceers) of dry indigo. It was dumped on

79. Ibid.

80. Ibid., p.80.

81. D.E.P.I., IV, p.432. Watt also refers to approximately similar operation in the beating. However, he does not refer to any labourer entering into the vat and moving the liquid with his whole body.
mouri which was a superfine red sand dust found near Sarkhej. This was done before the surplus water was baled out from the sunken substance below and then it was released.

The useless fluid was drained out. A flat ground was arranged. It had a square shape of 6 ell (in length and 4 ell) in width. A space of a foot was dug out, Over this pit, a closely woven cloth (sjaal) stitched together to meet the required expanse was spread out. In this the mixed indigo-paste was put in. The useless liquid would drip down through the cloth. This was done for a full day (24 hours) or two days (48 hours), or as long as it was needed. Next, this dry paste was scraped through with the help of coconut-shell or potsherds from the sides of the cloth and hoarded up in the middle. This was done usually in the afternoon. This ‘pudding’ was then covered and left in the same cloth to dry under the sun till next day. When it was considered fit for making balls, the mass was put in lumps into the condi or pots with handles. In order to have the mass uniformly prepared, it was subjected to kneading in the condi. This was not to be made too thin. From this condi, the pudding was spread on an even ground and finally balls were made.82

There was an interesting social aspect to indigo manufacture. The Hindu peasants in Gujarat raised the indigo plant, but the manufacturing process was undertaken by Muslims. Van Heck clearly mentions that

82. Van Dam, II(3), p.81.
"the makers of the indigo are Muslims (mooren)". Evidently the situation remained unchanged till the 19th century when the Broach Gazetteer (1820) says of Cambay that the "Hindu peasants disliked growing it, because in making the dye much insect life is lost, while the Muhammadans, with whom this objection has less force..."  

Indigo was cultivated in peninsular India at various places. Its cultivation was reported from Jaitapur in West Deccan. Anthony Shorer refers to indigo cultivation in Nagalwancha in east Daccan. Indigo was grown in several parts of Coromandel, but the products of Masulipatam and Tierepopelier (Tirupapaliyur, factory established) in 1608 were considered best. There is a report of 22 June 1688, a description written

83. Van Dam, II(3), p.74.  
85. E.F.I. 1624-29, p.258.  
88. Tapan Raychaudhuri, Jan Company in Coromandel 1605-1690, p.9; see also, S. Arasaratram, Merchants, Companies and Commerce on the Coromandel Coast 1650-1740, p.54; Irfan Habib, The Agrarian System of Mughal India 1556-1707, p.47 especially footnote no.67.  
89. The author of this report is not known, see Dr. F.W. Stapel’s observation about the author in the foot number 2 in Van Dam, II(2), pp.192-193.
by Commissioner General Van Rheede tot Drakesteyn, lord of Mydregt of December 1688\(^9\) and Daniel Harvart’s report\(^9\) which provide significant information relating to various aspects of indigo manufacture.

All the abovementioned sources are unanimous on the question of choice of land to be used for indigo cultivation. It was cultivated on sandy fields. Havart writes specifically that the best soil for indigo cultivation was one in which two thirds area was under sand and one-third under clay.\(^2\) He, however, noticed that around Tegenapatam (Tegnapatam) situated on the south of Coromaldel, indigo was grown simply on sandy soil.\(^3\) It was because of variety of good soil.\(^4\) However its yield was reportedly very poor in the sandy-soil.\(^5\) According to Van Mydregt indigo grew “on sand and sandy clay fields, (because they are) nitrous in nature, the clayey earth is not good.”\(^6\) Mostly high and dry lands were preferred “because the rain, which ordinarily falls, is sufficient for the growth of

\(^{90}\) Ibid, p.201.

\(^{91}\) Harvart, II, pp.19-26 and III, pp.20-25.

\(^{92}\) Harvart, II, p.20.

\(^{93}\) Ibid.

\(^{94}\) Ibid.

\(^{95}\) Ibid.

this herb." The low land which could be watered stifled the growth of indigo and consequently produced a weak and watery indigo. It was observed in later 19th century that bright sunshine contributed to the quality of the dye. The report of June 1688 speaks of the area around Tegenapatnam where indigo was cultivated: "The land, where the large quantity of indigo is sown, extends itself from Tegenapatnam, where much of it is purchased, southwards at 6 and 7, [hours' journey] in the north 9 and 10, and in the countryside from South to the Northwest, 16, 18 and 20 hours; this seed, which is called auwerywirre (the Tamil word for the indigo plant is avery), is sown in the beginning of January...".

The land was ploughed once or twice approximately one foot deep around September and was left unsown till the end of the rainy season, till December, when the land was ploughed up once more. The seed, which was softened by the rainy weather, was sown with the help of a harrow. Within five days it used to sprout. As the plants appeared on


98. Ibid.

99. D.E.P.I., IV, p.413, refers to the dry land cultivation of indigo which depends on rain-based ploughing of the sandy soil.


102. Ibid. Watt refers to the use of a drill, see D.E.P.I., IV, p.413.

103. Van Dam, II(2), p.193.
the and obtained a size four fingers’ broad, then unwanted herbs were weeded out. The plant was allowed to grow till February when the leaves at the bottom become yellowish and bore fruit and seed, the first cutting should take place. Extreme care was taken in this operation. The small branches which came out from the main stem were to be left uncut to the diameter of an arm’s length. The crop was harvested three or four times in a year. The first cropping was done in March-April, second in May-June, third in July-August and the fourth in September-October. Each crop was ready for cutting with an interval of approximately three months. They were cut at about four fingers above the ground. If cut below that level they would not resprout. Plants were left for seed after the third cutting to be used for sowing in

104. Havart, II, p.20; see also D.E.P.I., IV, p.413.
105. Ibid.
106. Ibid.
107. Ibid., Havart speaks about three cuttings in a year whereas the reports of 22 June 1688 and December 1688 speak about four cuttings in a year, see Van Dam, II(2), pp.193-202.
the next season.\textsuperscript{112}

After the third cutting, the plants were incapable of any future growth.\textsuperscript{113} The remaining stubble was burnt because the ash provided manure to the cultivation of indigo.\textsuperscript{114}

Lopped off branches were placed on an smooth and hard ground situated near it for four hours in the afternoon (because the cuttings used to take place around 9:00 a.m.) so that it became dry.\textsuperscript{115} The report of June 1688 tells us that the leaves were cut in a bright sunny day because the leaves would then quickly dry for a day.\textsuperscript{116} Those leaves which still remained in the branches were threshed with sticks.\textsuperscript{117} But such leaves were not suitable for indigo extraction after they lost much of their substance due to harsh beating.\textsuperscript{118} Havart also speaks about the use of sticks in separating the leaves from the plants.\textsuperscript{119} These were then taken up and brought in baskets (manden) to a dry enclosure till the next day.

\begin{itemize}
\item \textsuperscript{112} Havart, II, p.21. But plants were allowed to seed even after the fourth cutting, see Van Dam, II(2), p.193.
\item \textsuperscript{113} Havart, II, p.21.
\item \textsuperscript{114} Ibid.
\item \textsuperscript{115} Havart, II, p.21.
\item \textsuperscript{116} Van Dam, II(2), p.193.
\item \textsuperscript{117} Ibid.
\item \textsuperscript{118} Ibid.
\item \textsuperscript{119} Havart, II, p.21.
\end{itemize}
Such leaves were called *auwery-elle.*\(^{120}\) The leaves after the first cutting, according to Van Mydregt unlike Havart’s account, were kept under the sun for 8 to 10 days and then placed in a closed place.\(^{121}\) They were then spread out upon a dry ground in the open air.\(^{122}\) Left to dry up, they were by beating and striking reduced to pieces.\(^{123}\) Then they were stored in a closed dry place which was protected from wind, piled up loose upon each other, on mats.\(^{124}\) It was kept like this for 25 days, till the leaves became fit for indigo extraction.\(^{125}\) Then drying up in the sun helped in two ways. Firstly it helped in drawing out water from the leaves; and secondly by knocking, twigs and small sprouts were separated and broken.\(^{126}\) This was necessary for indigo manufacturing.\(^{127}\)

We are told that one acre of land, square in size, called ‘cany’ was about 3200 square feet and was hired for one year,\(^{128}\) presumably by the

\(^{120}\) Van Dam, II(2), p.202; Havart, II, p.21.


\(^{122}\) Ibid.

\(^{123}\) Ibid.

\(^{124}\) Ibid.

\(^{125}\) Ibid.

\(^{126}\) Havart, II, p.21.

\(^{127}\) Ibid.

\(^{128}\) Van Dam, II(2), p.202. Therefore one cany was equivalent to 3200 feet or an area of 640000 square feet or ± 62600 M.
Dutch East India Company and 8 to 10 fanums were paid in rent.\textsuperscript{129} One pagoda was equivalent to 6 guilders and 18.5 fanums made one pagoda. Therefore the annual rent amounted to 3.23 guilders. Six mats (ceers) of seed were required to sow on such a block of land.\textsuperscript{130} According to Havart, about 12 markal [maten i.e. ceers] of seeds were needed.\textsuperscript{131}

According to the Report of 22 June 1688, one acre of land in good harvest yielded 20 to 30 maten (ceers) of indigo leaves for one fanam, and in the time of poor harvest sold for 8, 10, and 12 ceers per fanam.\textsuperscript{132} The cultivators used to earn 15, 20, 25 and 30 fanams from the seed.\textsuperscript{133} In times of good harvest, they could earn as much as 70, 80 to 90 fanams from the seed which they sold to others exclusive of the rent.\textsuperscript{134} According to Van Mydregt's report (Dec.1688), around 6 fanams were spent in wages in cultivating one acre of land. He estimated that an ordinary crop would bring a modest profit of 25 fanams and in a very good season it would be more than 75 fanams and in a very advantageous time it would be well over 5 cents (i.e. 1 cent was 100 per cent of the capital).\textsuperscript{135}

\textsuperscript{129} Ibid., pp.193-202.
\textsuperscript{130} Van Dam, II(2), p.193.
\textsuperscript{131} Havart, II.p.22.
\textsuperscript{132} Van Dam, II(2), p.193.
\textsuperscript{133} Ibid.
\textsuperscript{134} Ibid.
\textsuperscript{135} One square rod was equivalent to 10 Dutch decameter.
The two reports of June 1688 and December 1688, do not speak about source of water. However Havart writes that the prepared leaves were brought near a well or river whose water should be clean, clear, and not muddy irrespective of water being sweet or brackish.\textsuperscript{136}

The dry leaves were put into a few low wide-mouthed pots, one foot high and one and a half foot wide in the mouth contained three parts (parrea?) water in order for the leaves to soak in it.\textsuperscript{137} Narrow mouthed vessels, these were three feet high and inside three-fourth part wider than the height. They used to be filled with indigo water to be churned in order to extract indigo out of the water into which it first dissolved. What is surprising is the fact that these were earthen pans, being called 'tutti chaals' by the natives.\textsuperscript{138} The low wide-mouthed pots, two third filled with water were then filled with prepared leaves. Each pot could contain twenty four pounds.\textsuperscript{139} The leaves were stirred, from morning till 10 o' clock, and then after the midday left under the hottest sun for two hours.\textsuperscript{140} During these four hours the leaves first began to swell, and consequently a foamy stuff like yeast was thrown up which finally turned

\textsuperscript{136.} Havart, II. p.22.

\textsuperscript{137.} Havart, II, pp.22-23.

\textsuperscript{138.} Van Dam, II(2), p.194.

\textsuperscript{139.} Havart, II, p.23.

\textsuperscript{140.} Ibid.
very purple. ¹⁴¹ It was the sign of knowing that the leaves had been adequately soaked. ¹⁴²

Then a thick cloth was firmly bound over the mouth of collection pots and ladled out in another narrow-mouthed pot, from the soak-pots. ¹⁴³ First the watery substance of the soaking pot was of green colour. It was stirred again, and then poured through the cloth in collecting-pots. Thereafter the softened leaves were pressed with both hands over that cloth and that was put again in the soaking pots. Fresh water was poured in once again and once more the contents were stirred and kneaded. Then water was ladled out as earlier, into collection-pots. The leaves were once more pressed by hands and the sap thereof was run through the collected indigo-laden water. The pushed out leaves were then put in the softening pots. Thereafter they used to take the scoop-pot and covered all around with pressed out leaves, was therein buried. Fresh water was poured on it so long that the scoop pot began floating. This water was bailed out when the dye from the leaves had dissolved in water. It was again poured into the collection-pots as earlier. This work was continued till the water no more showed any greenness. The leaves now remained good only for use as fertilizer especially in the rice fields. Each collection

¹⁴¹. Ibid.

¹⁴². Ibid.

¹⁴³. Ibid., pp.22-23.
pot having been filled from each softening pot, a piece of cloth was bound on the mouth of the collection-pot. Then this purple foam would float and the rest of the water would be strong green. Later it was churned like milk.\textsuperscript{144} The churning continued till the foam became white and eventually turned into a light blue colour. The water would become completely black. When it was sufficiently churned, after one or two hours and sometimes even four hours, with churning stick, the pot was covered with cloth and left undisturbed to allow turbidity to sink and so separate from indigo.

Next morning around 8 o'clock, the plug was taken out from the hole that was around one elbow above the lowest ground of the collection pots. All thin moisture was let out as appeared reddish. Still in the pot a purple foam floated, and at the top of the water a few red and yellow spots of shine appeared. This ground sap was poured out. The remaining slush was kneaded twice or thrice and was put in wooden cup in order to be spread on a bed of sand to dry up.\textsuperscript{145} It was placed on a cloth and let to dry under the sun. So dried, the indigo was now ready for the market.

In this way it has been estimated that genuine indigo was approximately made 11000 seers or 19,250 Dutch lbs. from good substantival leaves weighing 480 lbs.\textsuperscript{146}

\textsuperscript{144} Havart, II, p.24.

\textsuperscript{145} Harvart, II, pp.24-25.

\textsuperscript{146} Van Dam, II(2), p.196.
Besides this process, they also used to manufacture indigo by boiling the indigo slime. This provided a beautiful colour but at the expense of the strength.147 Since the use of boilers in Indian Indigo production has not been otherwise described an extract from the report of 22 June 1688 is given below:

"The unadulterated boiled indigo is prepared from the pure stuff, such as the nature produces, as has been described, taking out the indigo-slime, that is fetched from the pots, firstly, put not on any sandy bed, but on the contrary poured into an earthen tray, and the same would be set on fire, to boil. During this boiling the same would be stirred continuously, since it rises up so swiftly, that it would not otherwise be held back. Consequently the stirring should continue long as to keep it from rising allowing to boil quietly, approximately two hour’ long, till the same (the foam?) gets a copper-red colour. It is now taken up from the fire, and put on a bed of sand, covered by a piece of cloth in order to draw out the humidity. The (remaining) water may be poured out yet since the earthen tray, where the same is boiled, is too hot to handle, one takes the tray out of fire and let it stand, till it becomes little cooler and capable of being handled, when one pours slime from that on to the sandy bed, as above said; the liquid part being pressed out from the said slime, one takes off from the cloth and put it in a pot. It is then firstly would be beaten like starch, till it gets dried in the sun on a piece of cloth, that is laid on ash,

147. Ibid, p.204.
so that indigo is now made. This boiled indigo sticks together by the boiling, because of which reason the same is not so brittle as the uncooked, pure stuff; still through the fermentation the same loses much of its strength, so consequently that which is to be used as dye is not so profitable as the, pure stuff, as indicated above. The cooked indigo, of which a sample is being sent, has among the natives the name of neelam goen serkee. Out of a little less or more from 11,000 mats (seers) or 19,250 lbs. of leaves, 480 lbs. (of indigo) can be made...

"Yet there is another kind of cooked indigo that is made by the natives, that is nowhere so good as narrated earlier, because the same is manufactured from crude indigo, that is too weak and so is further rubbed (?) in pieces. After that is well rubbed, it is put in earthen tray, that is filled with water, then is well stirred, and then allowed to settle down, and the sediments being coarse and fine, mixed settle down at the bottom. (The indigo) sediments sinking to the bottom the water is taken away gently from above, and poured into another tray till again there are no (indigo) pigments in the water, standing still. After the water is entirely clear, one pours it out gently from above. At the bottom is the indigo, from that finally the best sediment and subtle dirt can be taken, as one can see well enough. After that this water, as above said, is run off from the indigo, ... (The indigo) is cooked together with the back of a tree ... called by the natives maga marram inside the tray putting it on the fire, and allowing the boiling in the manner, as said here- above. When the small cakes, that are laid on the cloth in round balls, about half the
humidity is extracted out and the indigo is carefully made into small square biscuits"

"The third kind of cooked indigo is made by the inhabitants, mostly like the first, the solitary distinction therein is this, that the fine sand and slime which through rubbing from the cloth, is diluted into the water, and so reaches the pot, settling down at its bottom. Taken out from there, along with slime it is mixed with other. It on the contrary, a man desires pure stuff, durt is not allowed to enter the indigo, so that this kind of stuff is more or less slimmed by 1/5, and so, may not have the name of pure cooked indigo"

The Dutch East India Company had an indigo dye-house at Tegenapatam, or Diwanapatam for dyeing the cloth purchased there.\footnote{148. Ibid., p.198.} The reason ascribed for operating the dye work there was that the indigo of south Coromandel was cheaper than the indigo from North Coromandel which grew around the quarters of Palewanze (Palavancha) situated close by Nagalwanze (Nagalavancha) though the north indigo was considered better than that of South.\footnote{149. Havart, I, pp.48-49.} Secondly the indigo from South was in demand for the reason that cloth dyed in purely northern indigo would have made the cloth more expensive.\footnote{150. Havart, I, pp.48-49.} The indigo produced in South Coromandel,

\footnote{151. Ibid., Havart, III, pp.20-21.
at Tegenapatam was considered soaked-indigo and 'turbid'\textsuperscript{152} and was certainly better but was three times more expensive.\textsuperscript{153} It was also considered stronger and better.\textsuperscript{154}

The export of indigo from South was always one of the chief concerns of the Dutch East India Company.\textsuperscript{155} The demand for Southern Indigo kept pace with the expansion of the Company's activities in the subsequent period.\textsuperscript{156} Besides the increasing demand from Holland, the rising price of indigo in Surat and North India also contributed to expansion in the demand of indigo from the southern peninsula.\textsuperscript{157} On an average the demand from Holland fluctuated between 170,000 to 100,000 lbs. upto the 1630's.\textsuperscript{158} In the middle of the seventeenth century it was around 30,000 lbs.\textsuperscript{159} It yielded a gross profit of 234 per cent by 1667-68.\textsuperscript{160} By 1690's it was estimated that twenty thousand pounds of indigo

\begin{itemize}
\item 152. Havart, III, p.20.
\item 153. Ibid.
\item 154. Ibid., p.21.
\item 155. Tapan Raychaudhuri, pp.162-163.
\item 156. Ibid, pp.163-164.
\item 157. Ibid, p.163.
\item 158. Ibid.
\item 159. Ibid, p.164.
\item 160. Ibid.
\end{itemize}
from the South were sent annually to Holland.\textsuperscript{161} Havart is obviously not taking into account the quantity that was used in Company's dye house and handled by local merchants. In the Company's dye-house dyeing was carried on continuously because twenty-two dyers were employed and paid wages on a monthly basis.\textsuperscript{162} They were daily dyeing thirty packs of guinees cotton cloth, 15 packs of Salempuris, and Bethilles.\textsuperscript{163} What is rather striking is the fact that coarsest kinds of cloths were preferred for dyeing.\textsuperscript{164}

\textit{Al} (Morinda Citrifolia) was another vegetable dye. In Akbar's time this crop was raised in the 'parganas' of Phaphund and Kalpi,\textsuperscript{165} Kutia and Kalinjar.\textsuperscript{166} In the 19\textsuperscript{th} century too it was absent from most of the Gengetic plains; being confined in Uttar Pradesh, it was confined to Bundelkhand region and to the southern parts of Fatehpur and Kanpur.\textsuperscript{167} Thus the area of its cultivation remained unaltered from the \textit{Ain}'s time to

\textsuperscript{161} Havart, III, p.21.  

\textsuperscript{162} Ibid.  

\textsuperscript{163} Ibid.  

\textsuperscript{164} Ibid.  

\textsuperscript{165} \textit{Ain-i-Akbari}, II, p.362.  

\textsuperscript{166} Ibid, p.351.  

\textsuperscript{167} \textit{D.E.P.I.}, V, p.263.
Its cultivation was entirely abandoned shortly afterwards. Indian madder (Rubia Cordifolia) was found in Ghazni (Northern Afghanistan), the Himalayas and in Sind. It was also imported from Persia.

Dye was also obtained from myrobalans. It was found in the mountains of Kumaun and Garhwal and in Gujarat.

In the Deccan and South India, chayroot (*Oldenlandia umbellata*) was an important vegetable source, yielding a red colour. It was grown around Machhilipattam, Divi Island, Nizampattam, Ganjam and Pulicat.

Cesare Federici (1588) refers to the use of chay root. He writes, "also they make in Sane Tome, great store of red yarne, which they dye


170. *Ain-i-Akbari*, II, p.434; Pelsaert, p.32.


with a roote called *Saya*, and this colour will never wast, but the more it is washed, the more redder it will shew: they lade this yarne the greatest parte of it, for *Pegan* (Pegu), because that there they worke and weave it to make cloth according to their owne fashion, and with lesser charges.\(^{175}\)

Philippus Baldaeus (1672) is perhaps the first author to give a detailed treatment to the chay root. He informs us that from Paliacatta (Pulicat) to the further north were situated *Penna* and *Caleture*, and between these places the best kind of *Essaye* (chay) root was produced.\(^{176}\) He writes, “The Essaye (which also occurs in the islands of Ceylon) is a small root like an offshoot, the best kinds are half a yard long (i.e. 45.7 cm) and are dug out from the ground. In order to judge which is the best Essaye, the following is done: one should break them into pieces, and pay attention to deep red colour. Also it is taken into the mouth and chewed, and so if that is nitrous in taste, it is considered good. To test it on the cloth on which is to be dyed with Essaye is placed, one proceeds in the following manner. One should rub hard the cloth (dyed with the chay root) with the juice of lemon and then allow it to dry under the sun. If false, the red colour shall change its hue. There is also an oblong pentagonal fruit, named *Carunbolle*, whose juice is still more caustic than the lemon, and

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is also very good to test the virtue of the Essaye."^{177}

Baldaeus refers to the use of a poor substitute of chay root used in Orissa. He says, “One must keep a close watch, else one could be deceived by the deceitful nation: because they frequently use false Essay in painting (printing), named Sordaco, also a bark of certain tree growing in Orissa. You will find that the painting (printing) will be darkish red, and if the cloth is rubbed between the hands with fresh water, it will show him the (real) colour at once”^{178}

Lac is well known for its dyeing property. It was produced by an insect (Coccus lacca) feeding on plants. Lac was widely collected in India, particularly Gujarat,^{179} Uttar Pradesh,^{180} Assam,^{181} Bengal^{182} and the Deccan.^{183}

It was reported in the 1650s that at Surat water in which gum-lac had been steeped was sold to dyers “that dyes red seales (sela cloth).”^{184}

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177. Ibid.
178. Ibid.
179. Thevenot, p.44, says that it was gathered near Sankheda.
181. Tavernier, II, pp.221.
182. Ibid, II. pp.18-19.
183. E.F.I. 1624-1629, p.258.
By the mid-18th century, the *Nuskha Khulasatul Mujarrebat* transcribed c.1763, shows that thirty-two colours were obtained from various dyes.\(^\text{185}\)

The simplest way for applying colour to the cloth was achieved by simple immersion in the dye. The *Mifatahu'l Fuzala* (1468-69) refers to the dyer (*rang-rez*).\(^\text{186}\) An accompanying illustration depicts a dyer at work with two vats before him and the dyed pieces of cloth are shown hanging and drying behind (Pl.XVI).\(^\text{187}\)

Besides simple immersion in dye, colours were applied to cloth in various other ways, namely, by the tie-and-dye method, `bandhanon' or `gulband', the use of resists to confine the colours to patterns; use of printing blocks and by painting with pencils (*qalamkari*). (The `patola' method, which can be treated as a special form of dyeing is treated by us a form of weaving).

Among these techniques, the `tie-and-dye' or knot-dyeing (*bandhana*, anglicised `bandanna')\(^\text{188}\) method was practised in India since ancient times. There are two references to it in the *Harshacarita* (7th


\(^{186}\) *Mifatahu'l Fuzala*, s.v. *rang-rez*.

\(^{187}\) Ibid., f. 133b.

\(^{188}\) *Oxford English Dictionary*, s.v. *bandanna*, it suspects that this term was probably adopted first in Portuguese.
century). Moti Chandra has traced a reference to it in the Manasollasa, a 12th century work. Abul Fazl lists bandhanun among the kinds of cloth whose manufactures had prospered in Akbar’s workshops. The Bahar-i Ajam (c.1740) describes it under the name ‘gulband’ or ‘gulbandi’. It says, “Gulband” is a kind of cloth, which is dyed upon being tied up with threads, and in the language of India is called bandhanun”. Mirza Tahir Wahid is quoted for a verse in which he compares the spot (dagh) of the bandana or gulband to the pattern of the artist in chintz (chit). Yule and Burnell offer a quotation of 1752 for ‘bandanoes’ an obviously intermediate form between bandhanun

189. Banabhatta, Harshacarita, ed. P.V. Kane, 2nd edn., Delhi, 1965, Ucchvasa, I, kusumbharaga-patalam pulaka-bandha-citram candatakamantah-sphutam sphaṭikbhūmīrīv ratanidhanam dadhana’ (tr. on p.69, ‘wearing a petticoat red with safflower dye, variegated with spots of different colours and gleaming inside (the gown) as though she were a crystal spot bearing a treasure of jewels, Ucchvasa, IV, p.14, ‘bahuvidhabhakti nirmana nipuna purana paura puramdhrī badhyamanairbaddhaischa, tr. V.S.Agrawala, “References to Textiles in Bana’s Harshacharita”, J.I.T.H., IV, Ahmedabad 1959, p.66, “The ‘old matrons’ were skilled in many sorts of patterns (bahuvidha bhakti), some of which were in the process of being tied (badhyamana), and some had already been executed or got ready (baddha)”.

190. Moti Chandra, p.124.


192. Bahar-i Ajam, s.v. gulband wa gulbandi.

193. Bahar-i-Ajam, s.v. gulband wa gulbandi.
and mod. English 'bandanna'. The use of the word has continued into modern times.

Indian textile craftsmen of 17th century were familiar with two primary methods of multi-colour of pattern-dyeing. They were, first, the use of resists to confine the colours to pattern and, secondly, the use of mordants to take colours. Printing blocks were probably in use to apply the resists and mordants in China as early as 140 B.C. and in Egypt and Iran during 3rd-4th century A.D. In Europe, wooden blocks were used for simple colour printing till late in the 17th century. But the use of mordants and resists irrespective of the means of application, that

194. Long, quoted in Hobson-Jobson, s.v. bandana.
196. E.F.I. 1634-1636, pp.82-83, "Notwithstanding, wee intreated Fremlen to inform himself of the order thereof and whether it might not be done upon Coulored cloth as well as white cloth, whereunto he replies that it cannot be done but upon white cloth onely, and that in pieces not above 4 or 5 yards at the most, which is stayned after the forme of the fine paintings of Masulapatan, and put into so many dyefatts as there are severall colours, that part of it which must not take the dye being covered with a kind of earth, the rest which is uncovered takes the colour of the dye whereunto it is put".
197. Methwold in Relations of Golconda, p.35; John Fryer, p.90.
199. Forbes, IV, p.137.
200. Ibid., p.138.
is, whether with, printing or painting, gave far better results.

Here it would be appropriate to mention that dyeing of shawl wool was apparently not practised till Akbar tried it. We hear from Abu’l Fazl that Akbar endeavoured to dye tus wool and discovered that it did not receive red colour.\textsuperscript{201} Abul Fazl writes, “the white alcha also called tarhdar, has natural colours. Its wool is either white or black in colour. It is woven in three ways: (all) white, (all) black or mixed. The first (white) in old times could take no more than three or four colours. But His Majesty has made it many-hued (gunagun) [i.e. succeeded in applying many colours to it]”.\textsuperscript{202} In other words, Akbar tried to explore which dyes suited wool well.\textsuperscript{203}

\begin{footnotesize}
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\item Irfan Habib, “Akbar and Technology”, p.134.
\item Ibid.
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6. COTTON PAINTING

Calico-painting was an art, and its products were quite different from the printed calico though the name chhint (chintz) applied to both. The painted chintz was obviously a high value article and would have been produced only in small quantities.

India had acquired a distinct position for its painted cloth. But European references to painted cloth make it difficult to distinguish painted cloth from printed cloth, because the modern exponents of Anglo-Indian usage like Yule believed that the word 'pintado' was applied to all "printed goods",\(^1\) while 17\(^{th}\) century writers frequently considered it to be a mere synonym of chintz.\(^2\) Bernier (1664) refers to "Masulipattam chites" as "painted by hand".\(^3\) Tavernier (1667) describes, "the chites or painted cotton cloths which are called Calmendar (kalamkari) that is to say painted with a brush (qalam)".\(^4\)

Mulla Tughra, a 17\(^{th}\) century poet, refers to the pencil of the chintz maker when he says "If a friend does not have chintz of sharp (bad) pencil, then the chintz is no bribe (rushwa)".\(^5\) Mirza Tahir Wahid also

2. Eg. Mundy, II, p.98.
4. Tavernier, II, p.4.
5. *Bahar-i-Ajam*, s.v. chitsaz, chitgar.
refers to the chintz (chit) made by a painter (qalamkar). The Bahar-i-Ajam defines qalamkar as “cloth on which figures are drawn by pencil.” Later in Beaulieu’s MS c. 1734 and the two letters of Jesuit Father Coerdoux written in 1742 and 1747 give a detailed description of calico-painting practised in the Carnatic.

Cotton painting was a highly specialized craft of medieval textile industry. Regarding its antiquity or origin nothing can be said definitively, but will also be inappropriate to claim, as Irwin does, that “printed” as well as “painted cottons” were not made on the Coromandel coast in the seventeenth century. In his subsequent observations he himself seems to have revised his opinion. P.R. Schwartz has brought forth French evidence on Indian cotton painting in two of his studies. Both deal with

6. Bahar-i-Ajam, s.v. gulband wa gulbandi
7. Ibid, s.v. qalamkar
18th century documents. The evidence we could collect from 17th-century Dutch sources, therefore, assume significance. Pieter van den Burg (P.V.D.B.) wrote his account in 1677.\(^\text{12}\) And Hendrik Adriaan van Rheede wrote his account in 1688.\(^\text{13}\) Daniel Havart commented on this craft in 1693.\(^\text{14}\) Of these three, Hendrik Adriaan van Rheede's account is quite elaborate and will be discussed at some length here.

But, first, a few introductory words:

The Dutch had realized the importance of Coromandel Coast for the procurement of 'pintados' or 'painted' goods right from the time of their initial settlements at Petapoli in 1606.\(^\text{15}\) Petapoli had the advantage of producing superior quality painted cotton piece-goods on account of the dye produced there. The English factors writing on 25th October 1634 reported, "Pettipolee [Petapoli] must likewise be continued, chiefly for reds, because no other place affords the like colour; and these we shall also fitted with the finer sorts of cloth that is required for the southwards


\(^\text{13}\) Hendrik Adrian van Rheede's account is printed in Van Dam, II(2), pp.205-209.

\(^\text{14}\) Havart, III, pp.13-14.

\(^\text{15}\) W.H. Moreland, *From Akbar to Aurangzeb*, p.32.
factories....".\textsuperscript{16} Besides Petapoli, Palakollu was another important centre of cotton-painting.\textsuperscript{17} It has been estimated that painted cotton-piece goods at these two places were 30 per cent cheaper than emporium town of Masulipatam.\textsuperscript{18}

It seems that painted cotton piece-goods were not available on large scale. The problem of procurement was further accentuated by the attempts of the king of Golconda in 1635-1636. President Willoughby and Council at Bantam wrote on 31 January 1636:

"The which paintings in former times were procured near Musulpatnam. Which (as it seems) was before the great Magore and Persian took so great affection unto fine paintings; but after that they delighted therein, the said places adjacent Musulpatnam were wholly taken up for their use, with command from the king of Golcondah (whose country it is) that the painters should only work for them; whereupon the Dutch provided their paintings at Pullicatt and Pooloesere [Pondicheriri (Pulchari), and the English procured (not without both charge and difficulty) a factory in Armagon, to there provide their proportions also..."\textsuperscript{19}


\textsuperscript{17}. John Irwin, "Golconda Cotton Paintings of the Early Seventeenth century", p.14.

\textsuperscript{18}. Ibid.

This passage speaks of the intervention of the king of Golconda in the trade of cotton paintings. Cotton paintings were used for the king’s personal use and partly for his and his nobles’ overseas commerce with Persia. It had a ready market in the Mughal dominions also. Bernier (1665 A.D.) wrote about the Mughal imperial encampment and its extensive use of kanats, in which connection he talks of the painted chintz:

“These Kanates are of a strong cloth which is lined with chittes or cloths painted with portages with a great vase of flowers. In the centre of one side of the square is the royal Entrance, which is large and magnificent and the chittes of which it is made, as also those which face the exterior of all this side of the square, are much more beautiful and rich than the others... Beyond this are the private tents of the King. Which are surrounded by small kanates of the height of a man, and lined with painted chittes, of that fine workmanship of Masulipatam, which represent a hundred different sorts of flowers; and some are lined with flowered satin with long fringes of silk.”


22. Ibid.
of cotton paintings under the Mughals was for tent-hangings or more specifically for the decoration of *kanats* or screens used in surrounding the tents. This was presumably a continuation of 16th century practice. The *Kanat* depicted in 16th century paintings of the *Hamza-Nama* have been found to be very similar to those of Bernier's descriptions.23 Besides the southern provinces, cotton paintings were also manufactured at Burhanpur (Khandesh), 24 Sironj (Rajasthan), 25 Agra and Lahore during the 16th – 17th centuries.26 Nearly all major travellers and the companies have reported about these places as production centres of cotton painting piece-goods. It appears from Hendrick Adraan Van Rheede's account that Sadraspatnam had emerged as a strong centre of the cotton-painting craft. He writes, "the best painters of South coromandel were found at Sadraspatnam."27 Van Rheede observed that Sadraspatnam had clean water which provided the best lustre and firmness and made it distinct from paintings produced at other places.28 He writes further that "this


24. Ibid.

25. Ibid.

26. Ibid.

27. Van Dam, II(2), p.205.

28. Ibid.
manner of painting is not known in Europe".\textsuperscript{29} He found it so attractive that he took pain to write a detailed account.\textsuperscript{30}

Rheede tells us that the half bleached cloth was first prepared with an aqueous solution of fat and astringent (buffalo’s milk, mixed with myrobalan). It was followed by ‘beetling’. This provided a smooth surface to the cloth. Havart writes that \textit{Parcallas} (\textit{parkala} cloth) of twelve covids long, “that is little more than eight ells, were used.”\textsuperscript{31} The cloth intended for painting was prepared in two ways. Van Rheede writes, “.... And firstly they take the fruits, here named carica, being unripe, but at other places ripe, according to the quantity of water in full wetted with alum-water. The cloth prepared in this manner, received a yellow colour from the carica”\textsuperscript{32}

Apart from this, there was another method of preparation of the cloth for painting. “The second preparation is done with cansje (\textit{cangi}), being water, that is strained off from cooked rice, and with carica without milk, which is handled in the previously described manner”.\textsuperscript{33} The difference lay in the fact that those parts of the cloth “which they wished

\textsuperscript{29} Ibid., p.206.

\textsuperscript{30} Ibid.

\textsuperscript{31} Havart, III, p.13.

\textsuperscript{32} Van Dam, II (2), p.207.

\textsuperscript{33} Ibid.
to hold white, was painted hot and was covered, as the cloth was put into the dye vat."\(^{34}\)

Van Rheede informs us about the colours, which were in use during those days: "The colours, with which cotton are coloured or painted, are red, blue, green, purple and black. The red is from four and possibly a variety of roots and rinds, whereof the most beautiful is called Saya were (chay root), being a shrub as the common health, having small, oblong leaves, divided in many branches, bearing small white flowers of four pointed leaves, in whose calyx (kelkjen) many small oval elliptic seeds are enclosed. They grow on the east and north part of the island Ceylon, the whole of Madura the islands around that (?), also in Coromandel, but that of Manaar are the best of all. The roots alone of this small plant, as well the roots of health are not unlike, are used, the same cost at times 50 pagodas per bahar of 450 ponds".\(^{35}\)

"The second red is made of the runas, also named mandosti and choli (tsjoli), coming from Persia and Arabia, the best sells for 60 to 70 pagodas per bahar of 480 ponds".\(^{36}\)

"The third red is made of the wood, named sappan, being a kind of Brazilian wood".\(^{37}\)

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34. Ibid.
35. Ibid., p.205.
36. Ibid.
37. Ibid.
"The fourth is made of the bark of a tree, called pattashaya. Also caliatour wood gives a red colour, but these and other more good (colours) in order to vitiate or defraud the people, also the pattachaya of inferior quality is still more expensive".38

It is clear from the above description of the hierarchy of red colours and their prices that chay was preferred owing to its superior quality, coupled with its comparatively lower price.

Van Rheede provides information on the preparation of red colour. He writes, "The first two roots were pounded finely, woody stems are obtained from that, (are) placed in water, (than) set on fire, (it) is made so hot, (that) hand could not endure, is allowed to cook and (then) the cloth that one desires to be coloured, are put therein, as the same are prepared for that purpose, otherwise that will not accept any colour or retain it. And because one of these two are used, shall I take only chay-root, it being strange to observe, that they put a white cloth in the dye vat, and the same is drawn out again, worked through with beautiful red flowers, and foliage or tendrils, and the rest pure white. When it is washed it holds firm, that is, the colour will never come out."39

Van Rheede describes the tools used in painting thus: "The instruments, with which they work, are very few, consisting of two pencils or rather writing pens, one for the wax and the other for water colours;

38. Ibid.

39. Ibid., p.206.
... the rest small or big jars, containing hair or wool (for the brush). The pen, with which they paint or mark, is of iron, a span (i.e. nine inches) long, so thick as a writing pen. Below the middle it is divided into two- and-two-finger breadths or a little wider those split parts bent out in half circle, running below that round again parallel to the others, such as some compasses are made, in order to enable (lower part of the pen) to the open and close. The middle of these iron pens were entwined with human hair, the shape obtaining like a chicken, and also so big, muffled around with a cotton thread, in the manner of a ball of rope-yarns. In the even similar manner is the pen prepared for using water colours, that it is taken out from a piece of bamboo, split like a pen, and is cut sharp. They hold these pens in the full fist, the writing end under the hand, making in the movements a firm stroke, and so skilful (that) it is a wonder to see them working. As it happens, they sit in transverse manner, numbering seven or eight, in a round circle, the wide flat vat is filled with molten wax up to the middle, placed on a small fire. The heat is to remain always such that they may reach the entire vat with their right hand to fill their pens with wax. It is held up in hari and by pressure of the hand comes down to the tip (punt) of the pen and writes on the cloth in such a manner, as we can do with a pen. Each has a footstool for himself, sitting on the ground, upon benches their cloth is placed like a table. And they do so, when they work with watercolours, but they are bound to sit in a circle because each one has a small pot or potsherd, to
have his colour by himself. When they wish to paint a cloth of some interest, they do it with their tops, and such hair that falls in, to make patterns thereto. They sponge their cloth with charcoal, with which the prints or forms are printed usually in Europe, but here all happens with the pen. And when in Holland one finds a stain or soiled mark in the painted cloth (from India) it must have happened by the incapability or lack of care of the painter, they have tripped up or hit at the place with their pen where it was not intended”.

Next Van Rheede discusses the drawing over the charcoal traced outlines with a kind of pen dipped in mordants:

“In order to paint a white cloth, wherein red, blue, purple, green, black or yellow flowers are to appear, I have seen the work being done in the following manner. The cloth, being prepared with milk in the above mentioned manner, four flowers are drawn with water from the head of the pen made of bamboo or of reed. Looking like watery churned milk, with which the lines are marked, the colour changes into brown-red, and after a few moments thereafter, into pitch black. This ink is made of burnt smithscoal (i.e. fine coal, obviously charcoal) with vinegar of low quality rice, or the wine from the coconut trees, called suri, there is put in also a piece of iron, which however one used it on paper or common cloth, yields almost no black (colour). And this ink, is called kalikan here, all the black chintzes and grounds of cloths are made by it, the

40. Ibid., pp.207-208.
cloth, as one sees in Europe, can bear washing. After outlining the flowers with this ink, the leaves are outlined, the red should be painted with the sap of red sappan wood, grated, cooked and mixed with alum, added in such a manner, that the flower must be deep red. There they bring cloth covered entirely, or arsenised, this red colour, in itself is not durable. This being done, this cloth is put in the pot. Wherein the chay root, was prepared and was heated on a small fire. The cloth is hauled up and down many times, and is plunged incessantly in the water, Allowed to remain in it for three hours, and (then) taken out from that, washed, dried and put in the myrobalan water without milk; it once again is dried before being put into the bigger dye-vat and, like the first time, is allowed to remain there 2 to 3 hours there. When this comes out from there, many things still remain to be done. After being cleaned up with goat’s or sheep’s dung and water, the cloth is put on the ground, is spread out in the sun. It is washed in fresh clean water, continuously for three hours, this being a manner of bleaching. And this happens in the same manner twice, one after the other, which done, the cloth is washed, the white appears cleaner and the red fine, to wit, the red of the pot or the chay is favoured. At (those) places where the flowers were wetted with alum, a pale and pleasant red, and at places where sappanwood was painted, darker red like a shadow, making in this way a complete red flower upon a white ground, the other flowers being not different from the figure outlined in black”.

41. Ibid., p.208.
After describing the method of obtaining red flowers, Van Rheede discusses the process of painting blue flower with green leaves. He writes, “Now about to make a blue flower and green leaves, the whole cloth is covered or painted with hot wax, in the manner narrated earlier, those parts were taken out, to be dyed in blue, the cloth is steeped three or four times in and out entirely in the tub of blue dye, (then) washed off in cold water and is dried in the sun. After that it is put in and out of hot water, then stretched out, washed and dried, again for the third time washed with myrabolans and dried, in order to give other colours. (The parts which are to be green, are run with water of curcuma (corkema), called manjela here, and are yellow, also with the flowers’ of carika, along with little alum over the blue, which then would be green, but is unstable. Thereafter the purple flower is made, for which a brownish red dye is made from one part alum water, sixty parts common water, a small lump of pulverized korckuma, so big as a hazelnut, and one part sappanwood water, half of all; besides half sappanwood and fourteen parts vinegar of cooked coarse rice, everything are mixed together. The flower which should be extreme purple, is made with one part of the black ink, thirtieth part vinegar of canji and 10 to 12 drops of sappanwood dye, (they are) mixed together, all of which is done before being put in the dye-vat for the last time for half an hour. Washed clean and dried, the cotton cloth is snow-white ready with light and brownish red, blue, purple Columbine (i.e. dark red and blue) flowers, with green leaves and black ribs.”

This

42. Ibid.
long description is followed by a reference to the process through which fast colours could be obtained. Van Rheede writes. “Since all these water-colours, none of them are lasting, the cloth is now put in the general dye vat of chay root, because that gives permanence to the other, and itself being of a clear red colour. And in addition to this, all the painted cloths and chintzes are made, (and) reach Europe from Coromanded”.

The next important part of Van Rheede’s report is concerned with experiments to paint silk cloths. He writes, “I have always wondered about the beautiful colours, that are given to the cloth upon white grounds, and had thought many times why it could not be brought on silk stuffs, as in Japan, where it gets unquestionable forms and flowers”. Van Rheede says that he had tried in Bengal, Baticaloa (Ceylon) and Nagapattinam. His efforts were, however, doomed to disappointment: “However in several manners in the manner of cotton cloths, have been proved, one could not attach the colour of chay root upon silk. Because as the silk and a cotton cloth, prepared in the same manner, is put in the dye-vat and taken out at the same time, the cotton was of a beautiful red colour and the silk soiled and dirty. Nowhere it resembled the former, having not only no colour, but also having lost the shine of silk.”

43. Ibid.

44. Ibid.

45. Ibid.
7. COTTON PRINTING

Block printing is a process of reproduction of the desired or conceived designs or images on textiles from a reverse or negative image. It involved, says Needham, three essential elements: (a) a flat surface, originally cut in relief, having a mirror image of whatever is to be printed; (b) the preparation of the mirror image; and (c) the transfer of the impression of the desired design on the surface of the cloth. In brief, the pre-history of printing required familiarity with the process of reprography. This was preceded by (a) seals for stamping on clay ware and lac which being a soft materials took concave rather than convex stamps; (b) art of carvings on stone and metal which helped in taking of inked impressions and (c) use of stencils to duplicate designs on textiles and paper.¹ All these processes paved the way for the use of woodblock printing which with concave stamps later resulted in the development of printing from moveable types.² Needham has suggested that there was a close relationship between printing of textiles and paper. Both were manufactured from the same kinds of materials in the initial stages of their production. They had a similarity of physical forms and properties. Even their uses were interchangeable.³ Both required concave, not convex

². Ibid.
³. Ibid., pp.36-37.
stamps, and thus represented a radical departure from other kinds of stamps. Needham could find the earliest specimens of printed textiles in the discovery of silk fabrics at Ma-Wang-Tui, Chhangsha in China indicating printing on textiles of a set of continuous patterns dating back to as early as the second century AD. Wood-block printing on paper had started in China by 556 AD. But block printing on cloth has only been firmly dated in China from seventeenth century onwards. The earliest known example of block printed textiles in India comes from an Egyptian archaeological site. It possibly dates back to the tenth-eleventh century. The diffusion of block printing from China to India possibly took place through Central Asian route. Chinese textile technologists, paper makers and goldsmiths and painters were stationed at Samarqand and Kufah in the eight century AD. There were large number of settlements of Chinese artisans and craftsmen between Samarqand and the valley of Upper Yenisei in the north. Such settlements of Chinese


5. Ibid, p.132.

6. Ibid.


9. Ibid.
artisans in Central Asian territories and their proximity to India might have been instrumental in transmitting the technology of block-printing on textiles to India from China sometime between tenth-eleventh century AD. There is also the possibility that block-printing of cloth derived mainly from paper seal-stamps.

Archaeologists have tended to assume a very early date for cloth printing in India from their discoveries of clay stamps. A.K. Coomaraswamy found an earthenware block anterior to 5th century A.D.\textsuperscript{10} John Marshall dated ‘earthenware stamps for stamping of textiles’ to the Saka-Parthian period.\textsuperscript{11} R.C. Gaur took a terracota mould of Atranjikhera for a printing block, this was found in N.B.P. levels, datable to 5th-4th century B.C.\textsuperscript{12} Marshall reported a circular stamp of terracotta showing a floral pattern of first century A.D. from Taxila.\textsuperscript{13} He also reported about “stamps for stamping pottery, textiles etc.” from the second and the third strata of Sirkap. He found the patterns simple, geometric and scrolls and suggested that they were perhaps used for “stamping textiles”.\textsuperscript{14}


\textsuperscript{13} John Marshall, \textit{Taxila}, Cambridge, 1951, II, p.437, No.256 (Sirkap)

\textsuperscript{14} Ibid.
The identification of these clay moulds as printing blocks, however, remains dubious. First of all there seems to be an apparent lack of consideration of the force which pressing on a firm surface would impose on 'baked clay'. No earthenware stamps are otherwise known to have been in use for cloth printing in India, for Roques in his account of 17th century cloth printing in India refers only to wooden blocks.\textsuperscript{15} The individual specimens also make identification impossible. Thus, the Atranjikhera 'printing block' is not a stamp, but a mould, that is, it has a pattern inside of it which can only be impressed on plastic material. In other words, these stamps are concave and would be useless for printing cloth. Indeed, Gaur does not admit the possibility of the specimen being intended to impress "decorations over...... mud plasters of house walls",\textsuperscript{16} though surprisingly he does not take the reader into confidence about the internal mould like cavities of the stamp. The Taxila 'blocks' need to be examined similarly before one can pronounce on even the possibility of their use in printing.

R.J. Forbes considers block-printing to be of ancient origin in India.\textsuperscript{17} But he does not cite any evidence in support of his postulation.


\textsuperscript{16} R.C. Gaur, p.277.

\textsuperscript{17} Forbes, IV, pp.138-9; Hans. E. Wulff, p.224, following Forbes commits similar error.
There is, however, a controversial sentence in Banabhatta's *Harshacarita*, which reads "kutila krama rupa kriya-mana pallava prabhagair". P.V. Kane explains it as follows "On the dyed and dried cloth, some paintings of the various trees were being drawn. The paintings had very great beauty (prabhag). The paintings were being drawn on the inside of the cloth and hence they were done in the reverse order of nature (kutila-krama), so that the outside (that would be visible to others) would show the beautiful ‘pallava’ in their natural forms." So explained the text does not justify an assumption of block-printing, for with printing there is no need at all for any drawing or painting on the inside of the cloth. Nevertheless, Kane himself had reservation about his translation of the passage. V.S. Agrawala interprets it differently and says that the first two words (kutila krama) signify an undulating pattern. "They could also refer to a diagonal arrangement, with ornamental rows extending from one corner to the opposite, such as we find depicted on a costume in one of the Ajanta murals". The next word has had, from the time of Panini, the technical meaning in the sense of ‘symbol’, ‘design’, ‘figure’ and V.S. Agrawala considers it to be the same here. He refers to Panini’s


19. Ibid, pp.54-55.

20. Ibid.

words ‘rupad ahataprasamsayor-yap’, where the word rupa is clearly used for stamping symbols on metallic pieces.\(^{22}\) On the strength of this allusion to stamping, V.S. Agrawala, therefore, considers that block-printing was known during Harsha’s time.\(^{23}\) However, V.S. Agrawala’s argument does not conform to the general description given in the text. The text specifically refers to tie and dye technique and at most cotton painting. It refers to a term called bhakti-chchheda i.e. stencils with designs (used for painting the body of an elephant).\(^{24}\) He argues that the origin of the later term bhant used in Rajasthani, Gujarat and Hindi lies in the use of the Sankrit term bhakti which meant ‘pattern’.\(^{25}\) At Patan in Gujarat the term bhat was used for the patterns obtained through patola weaving till very late.\(^{26}\) So far as the interpretation of the term ‘rupa’ is concerned it did not necessarily mean or even obliquely suggest any appliance for printing a design on cloth. The term kutila-krama referred, as we have seen, to an undulating pattern. V.S. Agrawala was of the opinion that it could also refer to a diagonal arrangement, with ornamental

\(^{22}\) V.S. Agrawala, *India as known to Panini*, Lucknow, 1953, p.272.


\(^{24}\) V.S. Agrawala, *Harshacharita — ek Samskritik Adhyayana*, pp.74-75.

\(^{25}\) V.S. Agrawala, “References to Textiles in Bana’s *Harshacharita*”, p.66.

rows extending from one corner to the opposite which he finds represented in the *hamsa* motives arranged in curved and diagonal rows. Such an arrangement was not an exclusive characteristic of cloth printing. They could be procured equally easily in painted cloths. Secondly, the size of the ducks are too big to be printed. V.S. Agrawala had himself later dissociated himself from interpreting these *hamsa* patterns as printed ones. He asserted very clearly that they were in fact painted by painters.\(^\text{27}\)

Whatever the interpretation of Bana's text, it remains possible that block-printing was being practiced in India by the tenth-eleventh century A.D.\(^\text{28}\) Kalhana (1148-1149 A.D.) mentions a kind cloth called *Yamusadeva* stamped with an image of the sun (*Patam Yamusdevakhyam martandpratima amkitam*) which was brought away by king Mihirakula from Ceylon.\(^\text{29}\) The term *amkitam* has been translated as ‘stamped’ by Sir Aurel Stein.\(^\text{30}\) It can, however, also mean ‘marked’.\(^\text{31}\)

There is a reference to an ‘instrument’ (*yantraka*) in a 12th century work *Manasollasa*, with reference to dyeing which induces Vijaya

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30. Ibid., p.44.

Ramaswamy to argue in favour of the existence of cloth-printing in South India in the 12th century. However, the *Manasollasa* merely refers to the “material coloured by an artisan”. The term *yantraka* does not necessarily mean ‘a tool’. It could also mean ‘an artisan’. Moreover, the patterns described in preceding and subsequent passages do not warrant the use of printing block proper. Moti Chandra finds the word *uncho* for the profession of calico-printer (*chipakarakaruvisesah*) in *Paiyalacchi* of Dhanapala, a 12th century lexicon of indigenous words. In the same work, Moti Chandra finds the words *chimpao* or *chimpa* for calico-printer, from which modern *chipa* and *chipi* have originated. In an another interesting reference we hear from Abdur Rahman (1170-1213) about a particular kind ofmiscellaneously painted/(possibly) printed (*chitra vichitra*) cloth. Saint Namdeva (1270-1350) refers to

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32. Vijaya Ramaswamy, p.455.


37. Ibid.

himself as cloth printer and also held his caste of *chhipa* (block-printer) responsible for his ejection from the temple.\textsuperscript{39} Abdullah Wassaf (1300) refers to stamped cloth brought from Cambay by Muizzuddin, brother of Sultan Alauddin.\textsuperscript{40} Printed cloth of 13\textsuperscript{th} century have been reported from Egypt by Ruth Barnes.\textsuperscript{41} Maulana Daud (1370) refers to a cloth called *chhinpar netra* (i.e. (printed *netra*).\textsuperscript{42} In *Futuhat-i-Firuzshahi*, the term *chattah* has been used in the context of abolition of certain taxes by Firuz Tughlaq.\textsuperscript{43} S.A. Rashid takes it as some kind of municipal tax on a balcony. But Quraishi identifies it as *chapa* and describes it as a


\textsuperscript{40} Abdullah Wassaf, *Tazjiyatul Amsar wa Tajriyatul Asar*, tr./ eds., H.M.E. Elliot and J. Dowson, *The History of India as told by its own Historians*, III, 1st pub. 1867-77, rep., Delhi, 1990, p.43.

\textsuperscript{41} Ruth Barnes, pp.573-74; see also Jenny Balfour-Paul, *Indigo and the Arab World*, Surrey, 1997, pp.125, 228n. 74. Balfour-Paul suggests that some of these fragments including indigo dyed ones could have been of local origin since techniques of printing on cotton, including discharge printing using wooden blocks, existed in Egypt and Syria at that time. But resist-printed indigo-dyed fragments, mostly of Indian origin, have also been excavated at other sites in Egypt and the Red Sea port of Quseir al Qadim, which date back to the thirteenth and the end of fourteenth centuries.


tax on printed cloth.\textsuperscript{44} Furthermore, Moti Chandra finds the word \textit{chimpaka} for a female calico printer and \textit{chipa} calico-printer in 14\textsuperscript{th} and 15\textsuperscript{th} century sources respectively.\textsuperscript{45} Srivara (1459-1486) gives credit to Zainul Abidin, the ruler of Kashmir for introducing printing on silk.\textsuperscript{46} Jaisi (16\textsuperscript{th} century) refers to the word \textit{chapa}.\textsuperscript{47} By the end of the 16\textsuperscript{th} century we hear of the term \textit{chimpaya} (calico printers) in a commentary on the Jaina text \textit{Jambuddivapannati}.\textsuperscript{48} Arif Qandahari’s observations about Akbar’s interest in textile technology reflect his keenness in introducing new elements into it. He observed, that besides introducing [lit. inventing] new kinds of silken cloth, brocade, tapestry and carpets of silk and brocade in India which compared favourably with the works of Persia and Europe, Akbar had taken keen interest in “the making of designs (\textit{tarrahi}) that if Mani [the great artist] was alive, he would bite his fingers in astonishment at such design-making and dyeing”.\textsuperscript{49} Like

\textsuperscript{44} Futuhat-i-Firuz Shahi, tr. M. Omar, Aligarh, 1957, pp.31-32.

\textsuperscript{45} Moti Chandra, pp. 147, 168.

\textsuperscript{46} Kashinath Dhar, tr./ed., \textit{Srivara’s Zaina Rajatarangini}, Delhi, 1994, p.238.

\textsuperscript{47} Moti Chandra, p.179.


Arif Qandahari, Abul Fazl also refers to the term *tarh-ha* (designs).\(^{50}\) It has rightly been suggested that these terms refer to the designs on the printed block for printed chintz.\(^{51}\) It has been pointed out that Ghani Beg Asadabadi had made efforts “so much in the art of design-making (*tarrahi*) and inventing chintz-patterns (*ikhtira-‘i chit*), that those who were experts in that art admired and imitated him.”\(^{52}\) Similarly around the same time, Aqa Muhammad Shirazi “made strange, wonderful inventions, and achieved much success in making designs for chintz (*tarrahi-i chit*), which they make best in Sironj in all of India”.\(^{53}\) The Iranian background of these two master craftsmen in the service of Abdur Rahim, while these do not itself suggest the import of the technique from Iran, these possibly suggests a tendency to transfer Persian designs in drawloom weave (which had also possibly made its entry into medieval Indian textile craft) over to printed chintz.\(^{54}\) This is not very material, since the author of *Maasir-i-Rahimi* (1616) extols certain persons for designs (*tarhi*) from *chhint* (chitz) made at Sironj (as noted above), which

\(^{50}\) *A’in-i Akbari*, I, p.101.

\(^{51}\) Irfan Habib, “Akbar and Technology”, pp.132-133.


\(^{53}\) Ibid., III, p.1659.

\(^{54}\) Irfan Habib, “Akbar and Technology”, p.133.
could only be designs for printing blocks. Sironj was a notable centre of chintz (printed-cloth) manufacture. Thevenot (1666) speaks of printing blocks used for obtaining direct colour impression on cloth in Agra. Thevenot writing of the apparels used by the inhabitants of Agra, says, "When it is coled Weather, the Indians wear over their Shirt an Arcaluck or Just au corps quilted with Cotton and Pinked, outside whereof is commonly of a schite (chhit) or painted stuff. The colours upon then are so good and lively, that they be soiled wearing, yet they look as fresh again as at first when they are washed. They make the Flowers and other motley colours that are upon the Stuffs with Moulds" (emphasis added). The use of the word chit (Hindi – chhint for calico-printed in Isfahan) establishes India’s primacy in cloth printing. Tahir Wahid, a 17th century poet, who never visited India, says, “My lifeless body gets life from the chit makers by being used as a printer’s block”. Qalib, the appropriate Persian word for block-printing was also in currency, for Tahir Wahid, praising the ‘chintz-makers’ of Shiraz says, “One cannot

56. Ibid.
57. Thevenot, p.51.
58. Ibid.
59. *Bahar-i-Ajam*, s.v. chitsaz chitgar.
60. Ibid.
pass him by casually, for in his printer's block (qalib) is the soul of a fairy". In the Bahar-i-Ajam, the term chhapa is considered to be a Hindi word for the printing block, said to have been adopted 'recently' as chapa in Persian. The use of a particular component of the dye employed in cloth printing is also referred to. It was gulkama, a sediment left after the extraction of rose water, and which, says Bahar-i-Ajam, was used for printing cloth. The use of the Indian words chhap and chhint establish the dominance of India in cloth-printing 17th century. By 1667, Tavernier reported the decline of calico-painting, whereas calico was printed in large quantities for home as well as foreign markets (including Persia).

A Frenchman George Roques wrote in 1678 a detailed report on cloth printing in Ahmadabad. He says that the printer distinguished outlines by the lines and hollow of the first block. After it, another block was used of the same size and pattern. But in place of the raised outlines of the first block, it had a hollow structure. Its voids went directly on the imprint of the first. The remainder of the second block was without engraving to facilitate filling the ground with the desired colour. When the ground was dry, blocks with details of the design were applied in

61. Ibid., s.v. qalib.

62. Ibid., s.v. chapa, Qalib is the appropriate Persian word.

63. Bahar-i-Ajam, s.v. gulkama.

64. Tavernier, II,p.4.
between the black outlines of the first block. After these impressions were dry, another block with ‘rays’ (radiating lines?) was used, which gave shading to the flower by little lines. These were ordinarily of the colour of indigo.⁶⁵

The author of an anonymous article (1752) refers only to ‘en creaux’ engraving while describing Indian methods. He refers to two methods, the use of a printer’s block of the width of the cloth. He says that cloth was soaked in an Arabic gum solution.⁶⁶ It was most probably done to prevent the running of colours. This large block, corresponding to the width of the cloth, would have been a tiresome and inaccurate job owing to weight of the block, more so when the cloth was seemingly stretched between rollers, without any base underneath.

In the second process, a wooden frame was filled with very pure clay, “free of all stones and grit and well kneaded”. On this clay, the desired patterns were drawn. This drawing was then filled with colours prepared with spike oil. Great care was taken to avoid the spilling of the colours over the hollows of the drawing and the surface of the block was saved from colours.

Then, the cloth was fixed to the frame with nails along all the selvedge edges and it was tightly stretched. This cloth was watered with

⁶⁵. Roques, pp.7-8.

a solution in which gum Arabic had been dissolved. This operation was done in the open. Sun dried the cloth and removed the moisture from the colours. This moisture was too thick to pass through the gummed cloth and evaporate. Therefore, it used to get fixed to the inner surface of the cloth and the patterns were drawn.\textsuperscript{67}

Indian cloth-printing involved a complex manipulation of mordants and resists, which makes it distinct from the Chinese inked stamps of the (fourteenth century), and Europe's fixation of colours with blocks in the fifteenth century.\textsuperscript{68} Iran possibly received Indian cloth-printing in the sixteenth-seventeenth centuries, when Thevenot (1652) refers to cloth-printing in Isfahan. The practice survives in its original form in recent times.\textsuperscript{69}

\textsuperscript{67} Quoted in P.R. Schwartz, “French Documents on Indian Cotton Painting”, pp.41-42.


\textsuperscript{69} Ibid.
8. EMBROIDERY

Embroidery was practised for ornamenting the cloth in medieval India. It has been suggested that embroidery was known to Indians since the Vedic age.¹ They might have been embroideries, but in the absence of any evidence of the technique employed, this question must be left open, as it is likewise not possible to say whether India originally had tapestry or pattern weave.

Vijaya Ramaswamy has tried to identify the word Sadisarakkudam in the 16th Century with the Persian word ‘Karchob’. But she does not take the reader into confidence about the proper meaning of the word, and she has elsewhere argued in favour of existence and practice of drawloom on the basis of the same word.²

Unfortunately, we cannot reconstruct the earliest tool or practice of embroidery on such analogies, or by etymological speculations. We must hope for further reference of actual tool used.

¹ Moti Chandra, p.8, identifies, a clock adorned with gold (hiranyan atkan) as a work of embroidery. But he himself cast doubt about it by writing elsewhere of ‘interwoven or embroidered’ cloth Ibid., p.9 for late in 9th century A.D. in ancient India, he refers to a lower garment (uccanda) which was shot with gold thread (kanaka grabhita) (Ibid., p.105).

The first sample of actual embroidery with strong Chinese influence in design as well as technique has been traced, belongs to the Seljuk period (1037-1157 A.D.) in Iran. In India the first reference to the embroiderer’s wooden frame, *kar-chob*, is not very old. Sujan Rai Bhandari (c. 1695) writes of the craftsman of Agra that they “......are unique in their embroidery of gold and silver, using the *kar-chob* upon *chira* and other fabrics......” This is the earliest example I have found of the use of the word *kar-chob* for the embroiderer’s instrument. Indeed, the word *kar-chob* initially stood for the harness for lifting warp threads in the loom. The author of *Bahar-i-Ajam* (c.1740) specifically mentions that the word was Persian but older writers had not used the word in the sense of the embroiderer’s frame. *Bahar-i Ajam* goes on to add that “in it the garment is tightened in between the two wooden sticks”. From this Irfan Habib’s inference that it was a recent introduction or innovation seems to be correct for the dictionary does not give the Hindi equivalent which in any case seems to be non-existent.

Gold and silver wire embroidery done on embroiderer’s wooden frame consisted chiefly of two forms, viz., *zardozi* and *kamdani*. *Zardozi*

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is worked on velvet or satin with usually a heavy cotton lining to give support to the gold work. Gold wire embroidery is almost of necessity a 'laid' or 'couched' work. 'Laid' or 'couched' embroidery includes the forms in which the ornamenting material is laid on the surface of the textile and held in position by small stitches, usually brought from the back by a special needle for the purpose. In 'couching' embroidery, the ornamental material is upheld by some padding placed beneath for that purpose. Presumably the references to zardozi may imply either of these two embroideries.

Apart from the embroiderer's frame, there is explicit description of the use of needles in embroidery. The author of Bahar-i-Ajam quotes Saifi saying, "The moon which is embroidered with gold was stitching the heart with the arrow of sight (he or she) was finishing (ba-sar) stitching the forlorn heart with a needle of gold".7

Medieval Indian embroiderers often used pure gold and silver threads as well in embroidery. As late as the 17th century, Indians did not know the art of gilding. Tavernier (1667) commenting on this deficiency says, "The Indians not knowing the art of gilding silver, insert in their striped stuffs threads of pure gold, on this account it is necessary to count the number of threads to see if the stuff contains the requisite quantity, and the same should be done in the case of stuffs striped with

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7. Bahar-i-Ajam, s.v. zardozi.
silver....” It could be quite safely assumed that technically speaking, beaten, drawn and rolled gold and silver wires were used in embroidery. The art of gilding came later in the 19th century.

The Bahar-i-Ajam refers to guldoz as “cloth in which flower are stitched (i.e. embroidered”). Since it required ‘flowering work’, it possibly refers to what is called phulkari in Hindi, done by darn stitch, entirely from the back.

The Bahar-i Ajam refers to yet another embroidery technique, kashida, “In Khurasan, this is embroidery which a woman stitches on cloth and in India, it is called shai (spreading). In this, pattern is drawn over the surface of the cloth. The needle work was done in muga silk of an old gold colour. Kashida embroiderers worked entirely in darn stitch.

The Bahar-i-Ajam also describes the well known chikan. It says, “It is also called chikin, it is a kind of embroidery, and the cloth on which chikan is embroidered, is called chikan-dozi and the person who

8. Tavernier, II, p.22.


10. Bahar-i-Ajam, s.v. guldoz.


12. Bahar-i-Ajam, s.v. kashida.

13. Indian Art at Delhi, p.385.
embroiders on the cloth is called *chikan-doz.*’14 The ordinary satin stitch, combined with a form of button-holing, was its most frequent form.15 Iran had received this art from China sometime during 11th-12th century A.D.16 Most probably it too came to India from Iran at a subsequent point in time.

Figures were embossed upon cloth with an iron-tool in 17th-18th centuries. The *Bahar-i-Ajam* explains the word *uttu* as follows. “This is famous embellishment (*araiyish*) which is done on clothes.”17 It adds that the author had it authoritatively confirmed that “it is a hand-tool (*dast-afzari*) through which embellishment is performed”.18 The *Bahar-i-Ajam* explains the technique through two poetic quotations. Mirza Tahir Wahid says, “Do not tell about the torture of the beloved who is like an embosser (*uttu-kash*), because he (or she) has put me in the fire like *uttu*”19 Through this process of heating the hand-tool (*uttu*) in fire, the flower design was embossed. Saifi says, “Do not keep (*karam-bar*) uttu

14. *Bahar-i-Ajam*, s.v. chikan, chikin

15. *Indian Art at Delhi*, p.398.


17. *Bahar-i-Ajam*, s.v. uttu

18. Ibid.

19. Ibid. s.v. uttu-kashidan
on your face, because its fire affects (embosses) the flower on your face."20 Its importance diminished subsequently, and such embossed cloth did not find any representation in the exhibition of Indian art at Delhi in 1903.21 Zafarur Rehman Dehlavi regretted the waning of this art, for he could locate a solitary practitioner in Delhi.22

20. Bahar-i-Ajam, s.v. uttu-kashidan.


22. Istilahat-i-Peshawaran, II, p.164 (s.v. uttu).