

## THE HISTORY OF PAPER IN INDIA UPTO 1948

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An attempt has been made in this article to review the history of paper in India by looking at various references and actual materials from both non-Muslim and Muslim sources. The article also reviews the European sources (especially the British ones) on paper technology upto the early establishment of paper mills in India.

### INTRODUCTION

Many difficulties are encountered while researching into the history of paper. Paper is a material so friable and so easily destroyed by the environment, by fungal or insect attack, that very few ancient specimens have survived. Material evidence in the form of manuscripts have survived only under very special circumstances—in *stūpas* or libraries which have had protective environments. Dating and material analyses techniques of paper are usually destructive and so most scholars and libraries are reluctant to provide samples of paper for such studies. Much of the history of ancient paper has therefore to be discerned mainly from documentary evidence.

There are many conjectures as to when and how paper and its manufacture came into India. The general view often expressed is that muslims brought it into western India and that it came into eastern India from China *via* Nepal. One has to examine critically whether the former view is not due to the preponderance of Muslim sources and the lack of tradition for documentation in others.

In the east, the manuscript evidence begins from the 12th century onwards and these are in non-Muslim libraries. In both eastern and western India Hindu, Buddhist and Jain manuscript libraries made extensive use of paper, but only after the Muslim conquest of India. Unfortunately records of the invention, use, and manufacture of paper are scant in non-Muslim sources.

One has therefore only to conjecture from the material evidence that these libraries must have had manufactories which supplied them with paper.

### EARLY REFERENCES—BEFORE THE 8TH CENTURY A.D.

The earliest reference one could trace to a writing material resembling paper is to that of Nearchos (325 B.C.) which is in the historical works of the Greek, Strabo.<sup>1</sup> The earliest translation and existing manuscripts of Strabo's works-date between the 10th and the 15th century.<sup>2</sup> These require a more accurate translation. Nearchos who was an admiral of Alexander the Great refers to a writing material named *Sindosi*. Sindhu has been identified as the basin of the Indus traversed by Alexander in 325 B.C. *Sindosi* is described as well beaten cloth or well beaten linen both of which indicate a process similar to that of paper making. Unfortunately since there is no actual material evidence available, its existence may be considered a matter of speculation. However, this reference is a strong indication that paper and its manufacture did exist in the Indus region.

The second reference which is not so convincing is from the history of Nepal. It relates to one Yashodara fleeing from Patan with a manuscript written in letters of gold, in the year 255 of the Vikram era *i.e.* 170 A.D.<sup>3</sup> Since the fixing of gold to a palm leaf (which was the extant writing material) is very difficult it is conjectured that the manuscript must have been paper. Losty<sup>3</sup> however, opines that the date 255 refers not to the Vikram era but the Nepal era which makes it correspond to 1105 A.D., agreeing well with the earliest dated paper from Nepal (1105 A.D.) now in the Ashutosh Museum, Calcutta.

The third reference is in 671 A.D. when the Chinese traveller It-sing recorded that he actually witnessed the use of paper in India.<sup>4</sup> Unfortunately no specimens of these have also been found.

Some evidence of the existence of paper can also be derived from etymology. In the 8th century Chinese lexicon the Chinese word for paper *tche* has an equivalent in Sanskrit *kakali* or *kakari* and one is tempted to identify these with *kāgad* or *kāgaj*, the words presently used for paper.<sup>5</sup> *Kakali* or *kakari* however, at present mean feathers. The word *tche* has another equivalent, *caya*, in the supplement of the same lexicon whose meaning remains uncertain.

### THE MACARTNEY AND GILGIT MANUSCRIPTS (5TH TO 8TH CENTURY A.D.)

The earliest evidence of paper manuscripts probably of Indian or of extra Indian origin with Indian scripts are those that have survived in the *stūpas* of Kuchar in Central Asia<sup>6</sup> and those even closer to India in Gilgit in the

Karakoram.<sup>7</sup> These manuscripts have been dated on paleographic evidence to between the 5th and the 8th century A.D. Of the Central Asian manuscripts the Macartney manuscripts are written in Brāhmi with an Indian hand.<sup>6</sup> Losty<sup>3</sup> points out that these manuscripts do not resemble the earliest examples of Chinese ones of the 2nd century A.D. from Tunghuang, whose paper is of far superior quality. Both the Macartney and the Gilgit manuscripts with Indian scripts are of paper of very poor quality, they are in the *pothi* format with a single hole near the left and approximately correspond to the size of the birch bark manuscripts with which they were found. Thus the new technology of paper in these finds imitated the size and shape of the birch bark manuscripts along with which they were found. The material analysis of the Macartney manuscripts was undertaken by Wiesner<sup>8</sup> who found them to be coated with gypsum which appears as a thick white coating.

From these findings one can conjecture that some form of paper making was practised either by scribes knowing Indian scripts in Central Asia and Gilgit or the whole manuscript was manufactured in India by Indian scribes and later imported into Central Asia and Gilgit.

## THE MANUSCRIPTS OF EASTERN INDIA

### 11TH TO 15TH CENTURY A.D.)

The earliest evidence of paper manuscript in India is dated as belonging to 1105 A.D. It is titled *Pañcarakṣa* and is at the Ashutosh Museum, Calcutta.<sup>9</sup> The date appears to be authentic based on sound paleographic evidence and the text. Trier<sup>10</sup> has subjected it to material analysis and derived many important conclusions. The paper is made of the fibres of a high altitude species of the family *Thymelaceae*. The technology of paper making was similar to that used in Tibet, Burma and Thailand : fibres of the species of *Thymelaceae* were retted and disintegrated using wood ash as the alkaline reagent, the paper pulp was lifted on a cloth mould, left in the sun to dry, later starch was used as a sizing agent. Trier's study of the fibres also revealed that the high altitude species of *Thymelaceae* appears to have been used until the 15th century. After the exhaustion of this species, low altitude species seem to have been increasingly used.

In Assam, Bihar and Bengal paper manuscripts are found from the 12th century onwards. The earliest reference to the use of *tulāpāt* type of paper (made of 'ginned' or 'felted' cotton) occurs in 1469 A.D. although this material appears to have entered Assam earlier, in the 13th century from the Shan states.<sup>10</sup> However, a description of the making of *tulāpāt* given by Neogi and quoted by Das Gupta<sup>10</sup> does not refer to the raw material as 'ginned' or 'felted' cotton but to the barks of trees : the *mahai*, the *yamon* and the *nuni* tree. The technique resembles Nepal papermaking in the pulping of the raw material but

is incomplete as it gives no indication of a lifting technique. A fibre analysis of this paper can resolve this difference in view.

### THE JAIN PAPER MANUSCRIPTS OF WESTERN INDIA

The Jain paper manuscripts in Western India occur from the 12th century onwards. Again, here the dating has been based on paleographic evidence and from the size of the folio. The idea used is that the closer a manuscript is to the size of the palm leaf manuscript the older it is. The shape of the palm leaf was retained for paper manuscripts until the 15th century after which the width of the manuscripts increased with the greater use of paper.<sup>11</sup> Although there are scarcely any palm leaf manuscripts from the 15th century in Western India, this shape was retained until the 18th century.

The use of paper has been definitely recorded in the Jain monasteries in the 15th and 16th centuries.<sup>11</sup> The words for paper *kāgada* and *kādgā* are also mentioned. The paper of the Western India in no way resembles paper from Nepal and Eastern India. It resembles paper of the middle eastern type and in all probability was made from a secondary source of raw material such as textiles. An analysis of a single leaf of a Jain manuscript belonging to the 15th century by Trier<sup>9</sup> reveals that it is made of undyed hemp or ramie and is not starch sized. It has the imprint of a grass mould. Much research remains to be done in this field.

### REFERENCES AND ILLUSTRATIONS ON PAPER MAKING IN MUSLIM LITERATURE

With the Arab conquest of Sindh in the 8th century and the Turkish invasions of the north, paper appears to have been imported from the Middle East.<sup>12</sup> The use of *Khurāsānī* paper from Iran was known in Western India. *Shami* or *Damaishqi* paper appears to have been used in Delhi in the 13th century.<sup>13</sup> The Persian or Arabic word for paper *kāgaz* in different forms appears to have been adopted.<sup>14</sup> Papermaking seems to have established itself in India in the reign of Mohamed bin Tughlak (1325-51) who also introduced paper money.<sup>12</sup> It is interesting that by the 14th century paper made in India was exported back to Khorasan.<sup>12</sup> There is a definite account in Kashmir of paper technology being transferred from Samarkhand in the reign of Zain-ul-Abidin (1417-67 A.D.) and set up at Nowshera in Kashmir.<sup>12</sup> The process of manufacture used is similar to the Persian one using water power. The water wheel which is still in existence<sup>15</sup> can be seen in an illustration from the 19th century (figure 5)

There are several references to the use of paper, imports of paper, varieties of paper from Muslim sources, but no complete account of the technology has been described; though it can be deduced from several illustrations. For

example from the *Haishiya* or a decorated border from a folio of the *Jahangir album* (1610-18) (Figure 1), kept at the State Museum in Berlin, which depicts

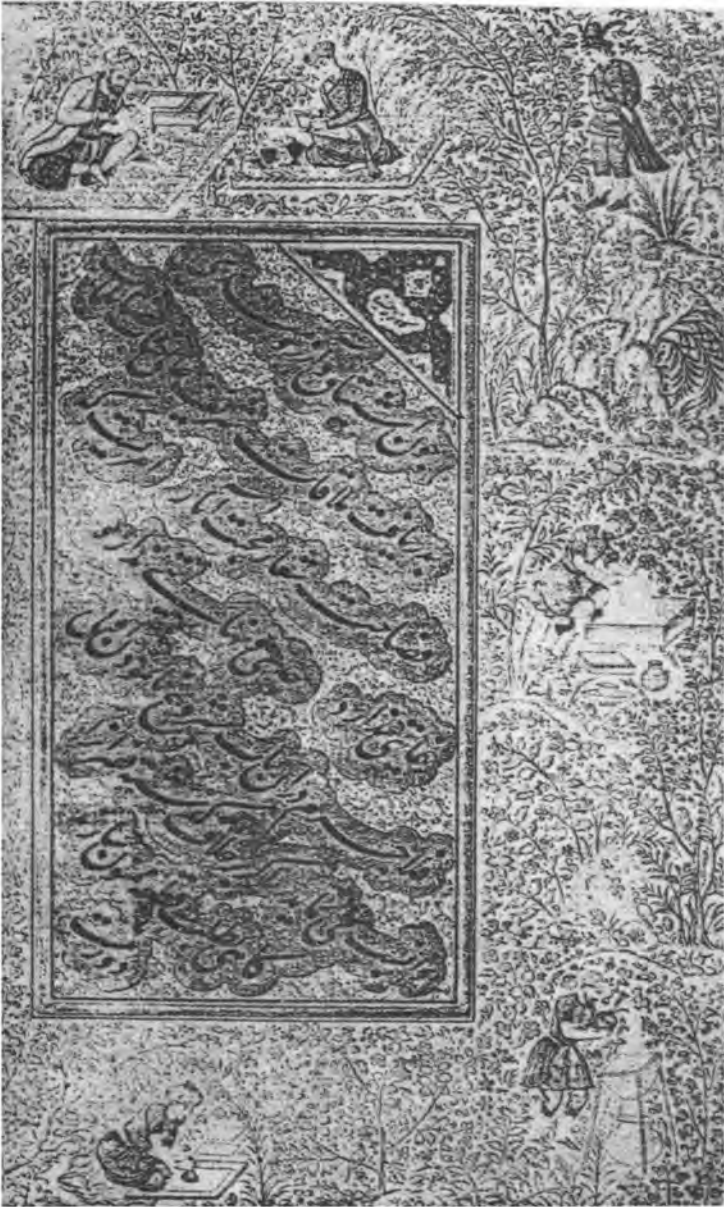


Figure 1.

paper being polished (Figure 2), preparation of the size (Figure 3) and tub



Figure 2.



Figure 3.



Figure 4.

sizing of the paper (Figure 4).<sup>16</sup> Another illustration on an ivory playing card which is known to have existed during the time of Akbar is also a depiction of papermaking.<sup>17</sup> Unfortunately, this pack has not been traced. There is an



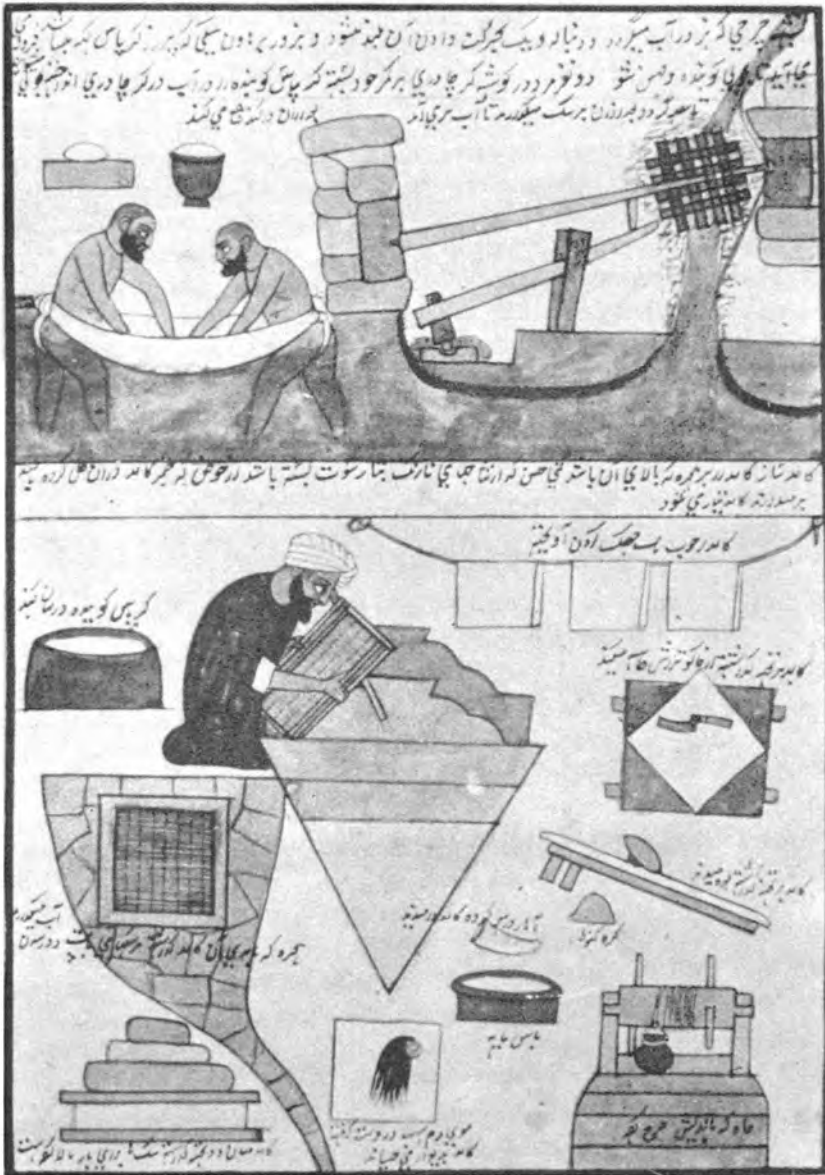


Figure 5.

excellent 19th century *gouache* from Kashmir (1850-60) (Figure 5). The illustration depicts the use of the Persian wheel for pulping, the process of washing the pulp in a sheet tied to the waist of two men, the pulp being lifted on

a woven mat with a frame, the lifted pulp being weighed down by stones, paper being hung up to dry on a rope, starch in a pot, and tools for trimming and polishing. The original, a page from a book containing illustrations of various traders in Kashmir, is in the India Office Library and Records, London.

From a study of Muslim sources one is certain that paper produced (in variable qualities) was named after (a) the material used (examples *bansha* of bamboo)<sup>16</sup> *mahājāl* of fishermens nets, *nimhariri* of cotton and silk,<sup>12</sup> *sanni* of flax);<sup>11</sup> (b) the place of manufacture (example *Patani* from Patan,<sup>13</sup> *Kashmiri* from kashmir);<sup>12</sup> or (c) the patron under whom it was produced (example *Nizām Shāhi*,<sup>18</sup> and *Murād Shāhi*<sup>12</sup>). It would be of interest to investigate through fibre analysis whether the varieties mentioned in (a) were actually produced using the raw material suggested by the name or by a mixture of different raw materials.

### ACCOUNTS OF TRAVELLERS OF THE 15TH - 17TH CENTURY

There are three known accounts of the use of paper by travellers who visited India between the 15th and the 17th centuries :

Nicoli Conti who visited India in the early part of the 15th century observed that paper was used extensively in Cambay but 'leaves of trees' were used elsewhere as writing materials.<sup>19</sup>

Tavernier in 1648 comments "throughout all the east tobacco in powder and all drugs and other wares which can be so treated are wrapped in white paper ; this tends to the profit of the seller, who weighs the paper and the goods together. It is for this reason that so much paper is used in Asia and it is the principal article of trade of the people of the provinces who send theirs even to Persia."<sup>20</sup>

The third is an account of the use of paper in Gujarat by Ovington who stayed in Surat in 1689 to officiate as chaplain of the English Factory at Surat.<sup>21</sup> He describes long scrolls of paper ten feet in length and a foot wide that 'by its slickness and smoothness appears shining' for common use and 'to the emperors or persons of consequence', paper 'gilt on the surface as ours is on the edges with some small flowers interspersed here and there for ornaments.'

These three accounts indicate that paper seems in popular use in India not only as a writing material but also for wrapping common wares and also seems to have been a well known article of export from India.

### BRITISH SOURCES : HAND MADE PAPER IN INDIA

The earliest known account of producing hand made paper as it existed in India is that given by Ironside<sup>22</sup> which gives a complete description of the

process and the instruments used. Similar descriptions are also found in other sources<sup>23 24</sup> and the following summarises the methods : The raw material which was usually old ropes, fishing nets, sacking or textiles of hemp, jute or sunn hemp, is cleaned, chopped and then pounded by means of a pounder or a levered foot pedal. The pulped material is then washed in a river by suspending it in a cloth attached to the waist of two men. The washed pulp is treated with lime and an alkali, usually an alkaline earth. The treated pulp is pounded again. The pounded pulp material is left on platforms of stone or cement to dry and bleach in the sun. The pulp is made into cakes. A quantity of the pulp to make several sheets is put into a vat which is sunk into the ground and then 'lifted' by means of a mould which is made of a detachable reed or grass mat in a wooden frame. The lifted pulp is separated or couched on a textile. When a sufficient pile of pulp and textile has been made the water is squeezed out by placing heavy weights on it or by placing wooden plank and having two men 'see saw' the moisture out. The cloths are separated with the

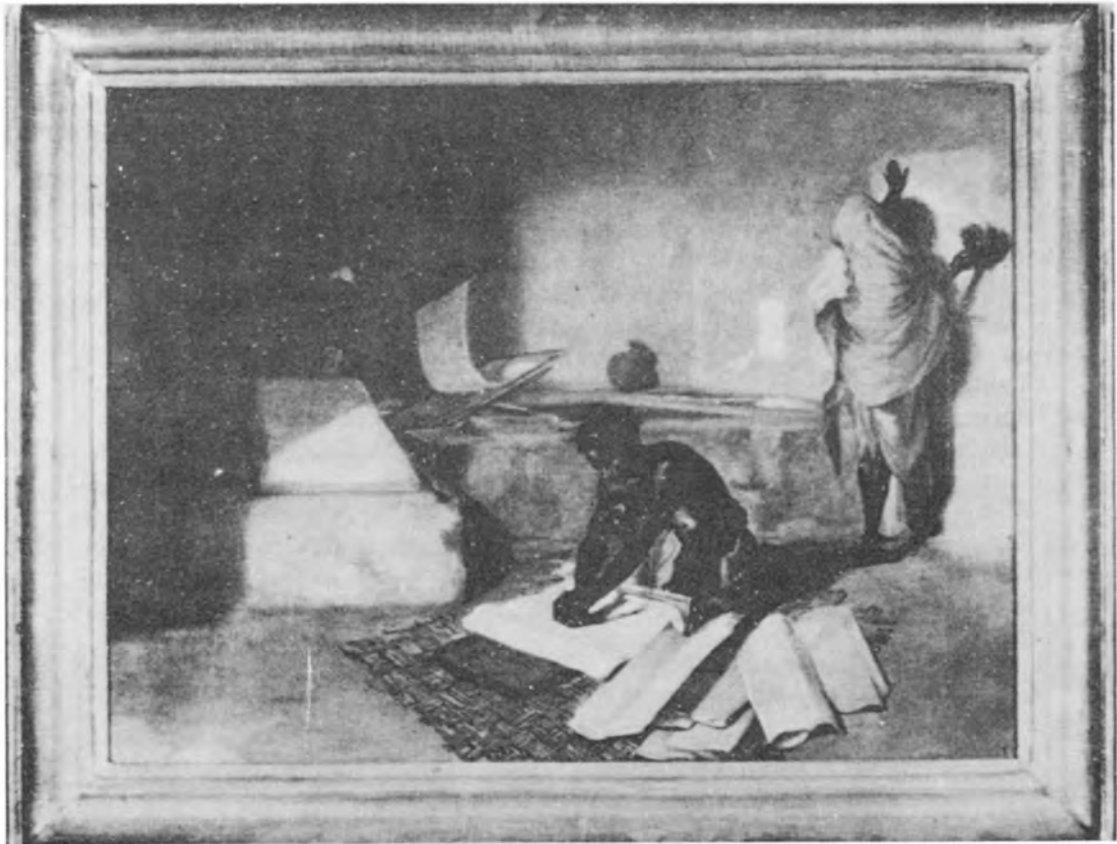


Figure 6.

pulp and brushed on to a lime washed wall or the pulp is simply separated from the cloth. The paper is then sized with starch or dipped in a mucilage or a gum of some sort. The paper is then polished on a curved wooden board by means of a stone or a burnisher. The polished paper is trimmed with a knife.

The descriptions given in the various accounts differ in the number of times the pulp is pounded, and the different qualities of paper produced appear to depend on the degree to which the pulp is pounded or the degree of bleaching by alkali or the sun.

An oil painting on canvas of a paper manufactory at Patna by Arthur William Devis (1763-1822), an artist engaged by the East India Company to paint 'manufactories', depicts paper being separated from the mould, pasted on a wall with a brush and polished on a wooden board (Figure 6).<sup>25</sup> The original was displayed at Spink and Son Limited, London.

### THE UTILISATION OF PLANT FIBRES FOR PAPER MAKING

The information relating to the possible species of plants which yield fibres for papermaking are found in the surveys of Royle,<sup>26</sup> Liotard<sup>27</sup> and those of Cross, Bevan and King.<sup>28</sup> The final compilation of this information is found in *The Dictionary of Economic Products* by Watt.<sup>29</sup> These surveys resulted in the manufacture of specimens of paper or paper pulp using the surveyed fibres in the jails in India, also at the Bally Paper Mill in Calcutta, the Ford Paper Works and the Haverstoke Mills in U.K. These specimens were exhibited at the Colonial exhibitions between the period 1857-86. The usefulness of these surveys and collections lies in the fact that the species of raw material has been identified and the specimens have been made from known species of fibres. These could be used as standard reference material if paper manuscripts were to be analysed. Specimens from the Colonial Museum in New Zealand were given to Dard Hunter and are now at the Dard Hunter Museum in Wisconsin.<sup>15</sup> Collections from the U.K. were finally housed at the Museum of Economic Botany at Kew. The other collections of Indian paper in London are :

- 1) 60 specimens of paper at the British Museum of different fibres manufactured in 1772 yet to be traced.<sup>30</sup>
- 2) 80 specimens of paper collected by the Schlagintweit brothers in 1854-58 when they came to complete the magnetic survey of India. This collection was transferred to the India Museum. The collection is now at the India Office Library (Technical Objects from High Asia 1854).<sup>31</sup>
- 3) The large sheet of Nepal paper exhibited in 1851 at the Great Exhibition transferred to the India Museum is yet to be traced.<sup>31</sup>

- 4) 3 specimens of paper manufactured by Mr Framji Byramji sent to the Victoria and Albert Museum in 1874 are also to be traced.<sup>27</sup>

The results of these surveys showed that most of the fibres could not be utilised for large scale manufacture on a sound economic basis.

Jails started manufacturing paper from about 1840 onwards.<sup>27 32 33</sup> The raw materials used for paper manufactured in jails were those suggested by these economic surveys. Prisoners were given the task of pounding, treading and polishing as a part of their hard labour and women and old prisoners were given the task of starching and cutting. There was hardly any new technological innovations in the jails apart from the introduction of steam boilers and the manufactories were fitted with pounders, treading vats, and polishing implements.

Hand made paper seems to have been much superior to jail manufactured paper which unfortunately the government was ordered to use. Emerson<sup>33</sup> quotes Lockwood Kipling who in 1882 said, 'The competition of the jails none of which with all their resources have greatly improved on the best Sialkot stuff has had an injurious effect on the manufacture ... District officers have frequently had occasion to complain of the quality of the article they were compelled to buy alleging that they could be better and more cheaply served in the open market.'

#### THE DECLINE OF HANDMADE PAPER AND THE MANUFACTURE OF PAPER FROM WASTE PAPER

Towards the later part of the 19th century hand made paper making began to decline. This was due to the large export of jute and textiles from India and the increased preference for imported paper. Below are the figures quoted by Watt<sup>29</sup> :

	Export of rags and papermaterials	Import of paper and paste board
	Rs. Value	Rs. Value
1884-85	3,70,533	4,892,121
1885-86	3,98,269	4,338,000
1886-87	3,45,697	3,926,215
1887-88	4,72,916	5,463,663
1888-89	5,64,871	4,889,923

By 1908, from the descriptions of Kirk,<sup>32</sup> Mookerjee<sup>34</sup> and Emerson,<sup>33</sup> a few families of papermakers manufactured paper from the waste clippings of the mills and produced paper which was polished and used for account books.

The making of paper by hand using waste paper seems to have continued until 1939 when Dard Hunter<sup>15</sup> the paper historian visited India. Paper was made in treading vats in sunken pottery jars in Nekapura, Delhi, Agra, Wardha and Dacca. Hunter also described the technology at the Mahatma Gandhi School of Papermaking and indicated the need for improved techniques. In 1940 in order to assist the All India Village Industries Association the British government in India introduced machinery for hand made paper manufacture from Great Britain which completely altered the nature of the industry.<sup>35</sup>

### THE EARLY DEVELOPMENT OF MILLS IN INDIA

The early development of the mills was related to the development of printing in India. The Portugese set up the first printing press in 1556 in Goa but there appear to be no accounts of any paper mill or paper manufactured for the press. The earliest paper 'mill' known to have existed was at the Danish colony at Tranquebar run by the first Protestant mission in India.<sup>36</sup> Paper appears to have been a costly item and it was thought desirable that the mission should supply its own paper. Wrapping paper was known to have been manufactured by a Chinese papermaker but the paper proved useless for printing as it was unsized and adhered to the type. The mill was set up in 1716. The description of the machinery used is incomplete but what is certain is that the power supplied, for it was by oxen which were changed every ninety minutes. The printing press appears to have supplied the press paper of local manufacture until about 1722 when it was sold due to lack of raw materials. There seems to have been an acute shortage of paper and in 1725 paper had to be made from waste paper. For the remainder of the century the shortage of paper was a constantly recurring complaint.

It is possible that other 'mills' of printing concerns had existed in Bombay from 1779 and in Madras in 1761.<sup>37</sup> Liotard<sup>27</sup> mentions paper being manufactured by the Foster Press in Chinglepet district but no date of its manufacture or information on its technology is yet known.

In eastern India two mills seem to have come into existence : the Calcutta Paper Mill at Calcutta founded in approximately 1789-90 and run by Mr. Brown<sup>37</sup> and the Bankeypore Paper mill run by East India Company<sup>38</sup> at Patna. The first one produced paper 'far superior to that at Patna and of various sizes'. Nothing however is known about the technology of the paper produced. A more complete account of the paper manufactured at Serampore exists.<sup>38</sup> The Baptist missionary press began printing in 1800. The mission were initially compelled to use Patna paper described as 'dingy, porous, rough substance'

which attracted bookworks and white ants or arsenicated paper 'a hideous yellow colour', examples of which are in excellent state of preservation at the Serampore College. In 1811 native labourers were employed to produce hand made paper using relays of 40 men to pound sunn hemp fibre with a levered foot pedal. The press depended largely on imported paper for printing. In 1812 a major portion of their stock of English paper was burnt in a fire. It was then considered on the advice of William Jones, a coal mining engineer, to install a steam engine for the mill. In 1820 a steam engine was installed, manufactured by Thwaites Hick and Ranelles Company of Bolton. This was the earliest steam engine used in making of paper known hitherto in India. The machinery was later transferred to the Royal Paper Mills in 1867.

The following table lists chronologically the mills set up after the Serampore mission press :

Date	Name of Mill	Place	Details
1862	Girgaum Paper Mill	Bombay	Run by Framji Byramji <sup>27</sup>
1867	Royal Paper Mill	Bally, Calcutta <sup>39</sup>	
Approx. 1874	Upper India Paper Mills Co.	Lucknow	Run by Munshi Lal Newal Kishore <sup>27</sup>
1878	Upper India Couper Mills Co.	Lucknow	Established by an army officer named Couper <sup>40</sup>
1878	No name mentioned	Ahmedabad	Steam paper mill run by a Bohra <sup>27</sup>
1878	No name mentioned	Surat	Steam paper mill run by a Muslim <sup>27</sup>
1882-94	Scindia Paper Mill	Gwalior	Established by the Scindia Royal family <sup>39</sup>
1882-94	Titaghur Paper Mill	Titaghur Calcutta	Established by Heilgher and Co. <sup>39</sup>

Very little is known from the literature about the technology used in these early mills and there is tremendous scope for investigation to assess the nature of the technology that was brought into the country. What is certain is that prior to 1875 the raw material used by these concerns were waste paper, jute cuttings, rags and local fibres. After 1875 following the report of Routeledge<sup>29</sup> raw materials such as bamboo and grasses were used. The reasons for the use of grasses and bamboo was the abundance of the material over large areas and sustained yield in the case of bamboo as it could be easily propagated by cuttings. In 1908 the Forest Research Institute (F.R.I.) was founded in Dehra Dun. The reason for the establishment of the F.R.I. and the attempts to utilise indigenous woods, bamboo and grasses for large scale manufacture was due to

the result of the First World War, which gave the economic incentive for the British to utilise Indian fibres for large scale manufacture. In 1910 the Allahabad Exhibition exhibited the pulps of 40 specimens of woods, grasses and bamboos prepared by the pulp and paper section of the F.R.I.<sup>41</sup> Prior to 1925 the grass *bhabar* or *Ischaemum angustifolium* and *munj* or *saccharum sara* were used. Grasses were boiled under pressure with caustic soda and then washed and bleached with chloride of lime.<sup>42</sup> After 1925 bamboo was utilised as a result of the exhaustion of grass as a raw material.<sup>43</sup>

The summary of the various processes in the manufacture of paper from bamboo is given in the Bulletin of the Imperial Institute.<sup>44</sup>

The raw material is chipped or crushed between rollers. The problem in the digestion of bamboo lies in the removal of the starchy carbohydrates which require a large amount of alkali. These are then converted into dark brown products which makes the pulp difficult to bleach. Three chemical processes are used—the sulphite, soda and sulphate. In the sulphite process an aqueous solution of bisulphite of calcium or magnesium is prepared by passing sulphurous acid gas. The bamboo pulp prepared from this material has a yellow colour due to the free sulphurous acid which chars the fibres. Two modifications of the same process utilise magnesium or sodium bi-sulphite which is soluble. In the case of one of the modified processes the sulphur dioxide is allowed to escape during digestion ; whereas the other contains a base with the sulphurous acid so that sulphur dioxide is not volatilised. In the soda process caustic soda is added with increasing strength or increasing temperature and pressure after removing the carbohydrates by boiling, as digesting bamboo with caustic soda yields dark coloured products that are difficult to bleach. The two stage soda pulping made it possible to use bamboo on a commercial scale.

In the sulphate process sodium sulphate and caustic soda is used. The digestion liquor can be recovered by evaporation, boiled with lime and used again with the addition of sodium sulphate to make up the loss in strength. The pulp is loaded with china clay, and is sized with alum and rosin.

In 1931 new machinery and equipment was introduced for the manufacture of paper from bamboo.<sup>45</sup> Papers made from bamboo were 'protected' or were taxfree in the periods 1925 and 1932 under the British Government.<sup>45</sup> Paper appears to have been exported to neighbouring countries in the periods 1937-1939.<sup>43</sup>

From 1940-47 a paper famine existed in India and paper had to be mainly used from imported stock or made from waste paper.<sup>46 49</sup>

The paper produced in India during 1870-1910 was probably of poor quality as with the early establishment of the mills the technology of paper, especially that concerning bleaching and rosin precipitation, would have imitated the technology used in the United Kingdom. During the periods of the two world wars, as a result of the paper famine and restrictions in the import of raw



materials and chemicals, attempts were made to utilise indigenous materials which resulted in paper of mediocre quality. The technology of paper manufacture from bamboo and grasses was not perfected until 1920 and this resulted in an improvement in the economic use of chemicals in treating the pulp. Even so the fibres of bamboo and grass, which had to be utilised as a result of the paper famine, yielded paper of kraft quality. The dire shortage of raw material and the uneven distribution are the most frequent complaints found in the issues of Indian Print and Paper. The Indian printers were obliged to use any paper that was available for printing. Because of the problem of shortages indigenous materials had to be used to manufacture paper which resulted in very poor quality production. The disastrous use of cheap mechanical wood and of imported old bales of newspaper for newsprint manufacture resulted in the quality of newspapers produced during this period to be so inferior that they are literally crumbling to dust.

### CONCLUSIONS

Although this article attempts a review of the history of paper in India looking at references in history and also at the material evidence from earliest times upto the establishment of the early paper mills, one notices that there are many lacunae in our knowledge in this important field. This can be filled to some extent by documentation. It seems important to undertake systematic investigations in material analysis, a field which has hardly been undertaken in this country.

### LEGENDS TO FIGURES

- Fig. 1. A decorated mount or *Haishiya* depicts various stages of paper making. The original, a folio from the Jahangir album (1603-18) is in the State Library in Berlin. The size of the original is 40×22 cms. Reproduced in Kunhel and Goetz, 1926.<sup>16</sup>
- Fig. 2. Enlarged detail from fig. 1. It shows paper being polished. The size of the original is approximately 3×2 cms.
- Fig. 3. Enlarged detail from fig. 1. It shows a man preparing a size/or glue for paper. The size of the original is approximately 3×2 cms.
- Fig. 4. Enlarged detail from fig. 1. It shows paper being tubsized with glue or gelatin. The size of the original is approximately 3×2 cms.
- Fig. 5. The various papermaking processes are described in the text of a *gouache* from Kashmir. The original, a page from a book containing illustrations of various traders in Kashmir (1850-60), is in the India Office Library and Records, London. The size of the original is 34.3×24.8 cms.
- Fig. 6. A paper manufactory at Patna by Arthur William Devis (1763-1822). The original, an oil on canvas, was displayed at Spink and Son Limited, London. The size of the original is 59×43.2 cms. Reproduced in *Octagon*, 17(2), 8, 1980.

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