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## The Cover Page

The 7 images on the Cover Page correspond to these Figures.

Top row:

Samples 1–3

Middle row:

Sample 4 = Figure 1.1

Sample 5 = Same fragment as Figure 6.1. Both its sides are illustrated here:

**V. Astrological Manuscript in Sanskrit on Paper, with Functional Stringing-Hole**

<http://manuscriptevidence.org/wpme/sanskrit-and-prakrit-manuscripts/>

Bottom row:

Sample 6 = Figure 2.2

Sample 7 = Figure 2.4

## Note

This paper was presented at the 26<sup>th</sup> Annual Conference of the World History Association, held at Northeastern University, Boston, on 22-24 June 2017. The conference program is here:

<https://www.thewha.org/files/pdf/programs/program-conf-2017-boston.pdf>

The present version of the paper has a few revisions and adds footnotes. It is presented as a Draft for Comments.

This pdf is available via <http://manuscriptevidence.org/wpme/download/14448/> .

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Please contact the author at [dwsorenson@verizon.net](mailto:dwsorenson@verizon.net).

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# Paper-Moulds and Paper Traditions: What Mould-Patterns in Near-Eastern and Indian Paper Suggest Regarding Origins of Local Papermaking

*David W. Sorenson*

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## Draft for Comments

The study of paper has been of interest to historians for well over a century, and has attracted the attention of scholars, not only for its own sake, but also for its use in other fields such as manuscript studies. The use of watermarks, for example, is well established; perhaps too well established, in one sense, in that unwary investigators can be tempted to put more weight on them than they deserve<sup>1</sup>. But at least in the West we have watermarks; outside of the West, watermarks are much less common, and until well into the nineteenth century they are found on imported paper exclusively. When we consider the really interesting material found in most of the world, we are out of luck, as watermarks are not found in such paper. Indeed, the only areas in which watermarks are at all common before 1500 are

the Ottoman Empire and the Maghreb, and that paper is (nearly) all of ordinary Italian (viz., Fabriano) origin. To the medievalist who has to deal with material in the Islamic world<sup>2</sup> that can be frustrating. Fortunately all is not completely lost, as the varieties of paper-moulds in use, identifiable by the line-patterns seen in the products of the moulds, can give us some useful information.

Although the subject has been under some scrutiny since Karabacek published his introduction in the 1880s<sup>3</sup>, this study has been going slowly since then. Nowadays, we can identify at the very least the broad outline of the standard Near Eastern paper-moulds and their laid- and chain-line patterns, or lack thereof. In Iran and India things are less clear, especially in India,

1 The standard reference is Charles M. Briquet, *Les Filigranes*, published in 1908, and republished online at [http://www.ksbm.oeaw.ac.at/\\_scripts/php/BR.php](http://www.ksbm.oeaw.ac.at/_scripts/php/BR.php) .

Still useful in many ways, it cannot be over-emphasized that this resource must be used with a great deal of caution. Lack of precise matches, with a temptation to use “close enough” without understanding the range of characteristics, as well as a tendency of some scribes to use a ream of paper for many years after it was made, are two common problems.

2 That is, for certain values of Islamic. I am using it in the most general sense, and for the period of this paper I am covering more-or-less from the Maghreb to the Indian sultanates. Not all of it was Islamic, of course.

3 Joseph von Karabacek, “Das arabische Paper (Eine historische-antiquarische Untersuchung)”, *Mitteilungen aus der Sammlung der Papyrus Erzherzog Rainer*, 2/3 (Vienna, 1887), 87–178, via <https://archive.org/details/mitteilungenusd23karauoft/page/n7/mode/2up/> .

English version: Arab Paper, translated by Don Baker and Suzy Dittmar, with Added Notes by Don Baker (Chippenham, England: Archetype Books, 2001).



Egypt, AH 357, AD 963.



Ayyubid or Seljuq, c. 11th-12th century.

Figure 1. Early Examples

partly because the line-pattern does not change all that much, partly because there has been very little study, and partly because in the case of India the period in question is limited.

As the intent of this paper is not to produce a detailed manual of paper studies, but to look at a particular problem – namely, the transmission of the craft of paper production as shown in the types of moulds used – it isn't necessary to provide more than a brief outline of the types of moulds and their sequence.

Paper, as we all are told, was invented in China, during the Han Dynasty. From there it spread throughout Eastern and Central Asia. We know that paper-making was a craft practiced in Tibet by the eighth century<sup>4</sup>, and in Sogdiana somewhat earlier, for example. In Central Asia the advantages of paper had made themselves known by the fifth century to scribes in Buddhist and related cultures, replacing the earlier palm-leaves, although keeping the format<sup>5</sup>.

The introduction of paper as a writing material in the Near East resulted from the Arab conquests of, first, Iran in the seventh century, then parts of Central Asia in the eighth. The traditional story is that an Arab army defeated a Chinese one at Samarkand in 751, capturing some Chinese papermakers among the ruins

of the T'ang army, and taking them to Baghdad to introduce their craft there<sup>6</sup>. Between the introduction of the craft and the replacement of the local product by imported Western paper the local products evolved through a variety of mould-patterns. The sequence has been known since the days of Karabacek, and still holds, albeit with a fair amount of tweaking<sup>7</sup>. We should keep in mind that outside of the main sequence the varieties are still very poorly described, and any commentary on them ranges from reasonably solid to very tentative. They can be roughly attributed to historical periods, but we should note that such attributions are for convenience; they are not hard and fast rules!

The earliest known paper style is typical of the ninth and tenth centuries. It is best described as “nondescript”, being light brown, and having no visible mould-lines or other characteristics<sup>8</sup>. It can be roughly attributed to the pre-Fatimid period in Egypt, and early 'Abbasid period elsewhere; but the vast majority of examples surviving from this period are of Egyptian provenance, that is, located (rather than necessarily produced) in Egypt<sup>9</sup>.

This style is followed by a similar variety, without wire-lines visible through the sheet, but with a major difference: impressions of laid-lines appear on the

4 An example is shown in W. Zwalf, *Buddhism, Art and Faith* (London: British Museum Publications, 1985), exhibition no. 113, dated to the early eighth century.

5 E. g. Zwalf, op. cit., no. 54 (5<sup>th</sup>–6<sup>th</sup> century).

6 Thaalibi, 11th century, cited in Jonathan M. Bloom, *Paper Before Print: The History and Impact of Paper in the Islamic World* (New Haven: Yale University Press, 2001), pp. 8–9. As Bloom says, it's a “story”.

7 Karabacek, op. cit.; updated by a variety of authors including Beit-Arié, Loveday, and this author.

Malachi Beit-Arié, *Hebrew Codicology, Historical and Comparative Typology of Hebrew Medieval Codices based on the Documentation of the Extant Dated Manuscripts Using a Quantitative Approach* (Paris 1976), updated as [http://web.nli.org.il/sites/NLI/English/collections/manuscripts/hebrewcodicology/Documents/HC%20ENGLISH%20ACCUMULATED%201-5%2019.7.17%20\(Autosaved\).pdf](http://web.nli.org.il/sites/NLI/English/collections/manuscripts/hebrewcodicology/Documents/HC%20ENGLISH%20ACCUMULATED%201-5%2019.7.17%20(Autosaved).pdf) = Preprint internet English version 0.2+ (November 2018), pp. 237–266, esp. 249–259; and other works, cited in <https://huji.academia.edu/malachibeitarie>.

Helen Loveday, *Islamic Paper: A Study of the Ancient Craft* (London: The Don Baker Memorial Fund, 2001).

8 Figure 1, first samples: 963 shipping docket and Coptic fragment.

9 That is, of what survives. This pattern of survival is not surprising, given the range of climates and conditions throughout the region. Loveday indicates that it remained in very limited production into the eighteenth century; but that production would appear to have been very local, and very limited in quantity.



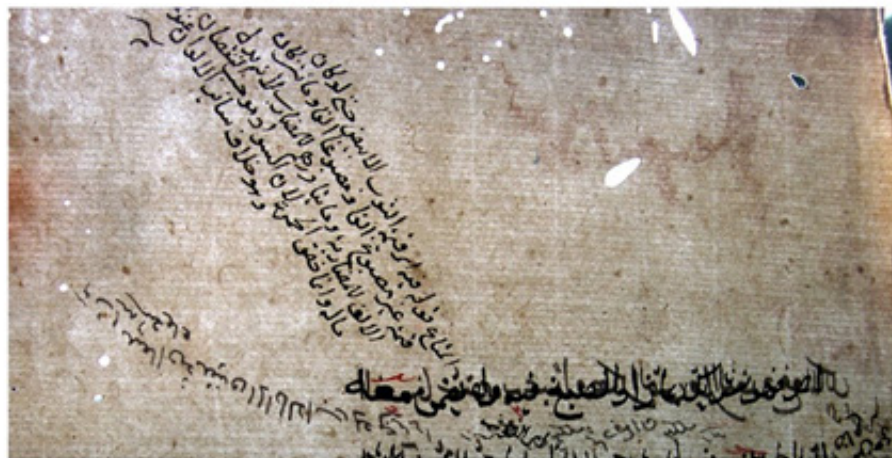
Mamluk, probably Egypt, 13th-15th century; chain-lines in pairs.



Ottoman, 15th century; chain-lines in threes.



Ottoman, c. 15th century; chain-lines in fours.



Ottoman, 15th century; single closely-spaced chain lines.

Figure 2. Mamluk and Ottoman Examples

surface<sup>10</sup>. This paper style appears to have been in production roughly between the late tenth century into the early twelfth, or roughly during the Fatimid period. This paper is not particularly common, at least in the mainstream areas; but it became the norm in the Yemen.

The third variety is more widely known. For the first time laid lines are visible through the sheet. The lines are usually fairly coarse, and the paper is still light brown rather than cream or off-white<sup>11</sup>. It appears from roughly the later eleventh century into the thirteenth century, corresponding roughly to the Ayyubid/Seljuq period. A variety with finer laid-lines became the norm in Persia down to the nineteenth century.

The fourth variety, which is much more familiar than the previous ones, shows chain-lines for the first time. The chain-lines are at this point always grouped, usually in threes, but occasionally in twos, particularly in paper from Egypt. Occasionally they are grouped in alternating twos and threes; very occasionally in fours or more<sup>12</sup>. It first appears sometime in the thirteenth century, and stays in production generally until the early sixteenth century<sup>13</sup>, being produced in limited quantities and ever decreasing quality thereafter<sup>14</sup>. Its production in Egypt and the Levant corresponds roughly to the Mamluk period.

The final “mainline” variety, or rather, collection of varieties, we find in the early Ottoman Empire<sup>15</sup>.

Most early Ottoman paper is similar to its Mamluk counterpart, with its chain-lines grouped in threes, with the main difference being that the paper is finer, with the mould-lines much easier to see<sup>16</sup>. During the fifteenth century Ottoman papermakers began to experiment with a variety of different mould types, perhaps in response to the increasing appearance of imported Fabriano paper in Ottoman markets; one major variety which makes its appearance has single chain lines close together<sup>17</sup>. The sheets are much whiter than traditional Mamluk paper, in many cases very similar to the Italian product. And, occasionally, we find varieties which defy easy analysis; they are rare, and as such are not of great importance.

Finally we must take note of the importation of the standard Italian paper, which is mainly of importance to us in that it is much easier to date than generic traditional varieties<sup>18</sup>; although Ottoman MSS can be noted with such paper from at least the early fifteenth century<sup>19</sup>, the Fabriano products more or less swept the local ones out of the local markets by 1520 or so.

The Ottoman Empire, while being politically and culturally central to Middle Eastern culture from the from 1453, if not earlier, had little impact on papermaking before its conquests. What we might call “peripheral” areas had their own traditions, which have for the most part been little studied, for reasons which will appear obvious. These are, from west to east: North Africa (i. e., the Maghreb); the Yemen; Persia; and India.

10 Figure 1, second sample (middle right): “Magic” fragment.

11 Figure 1, third sample (bottom). Turkish provenance.

12 Figure 2; first sample, 2 Cl (“Chain-line”) groups; second, 3 Cls; third, 6 Cl group.

13 The latest example I have seen datable by colophon dates to the 1530s.

14 Loveday, op. cit.

15 Not well studied so far; most studies have examined “Mamluk” paper. Loveday (op. cit.) also looks at Persian paper. Beit-Arié (op. cit.) has looked at Yemeni, albeit not in much detail.

16 Figure 3, Ottoman and Mamluk samples, with Italian paper for comparison.

17 Figure 2, fourth sample (bottom right).

18 It must be noted, given that much of the exports from Italy seem to have been made up of mixed lots, and a scribe might have bought several reams for use over a period of several decades, that dating from watermarks in Ottoman Turkish MSS is not quite an exact science!

19 Or, in some cases, earlier, in the previous century; see Bloom, op. cit.

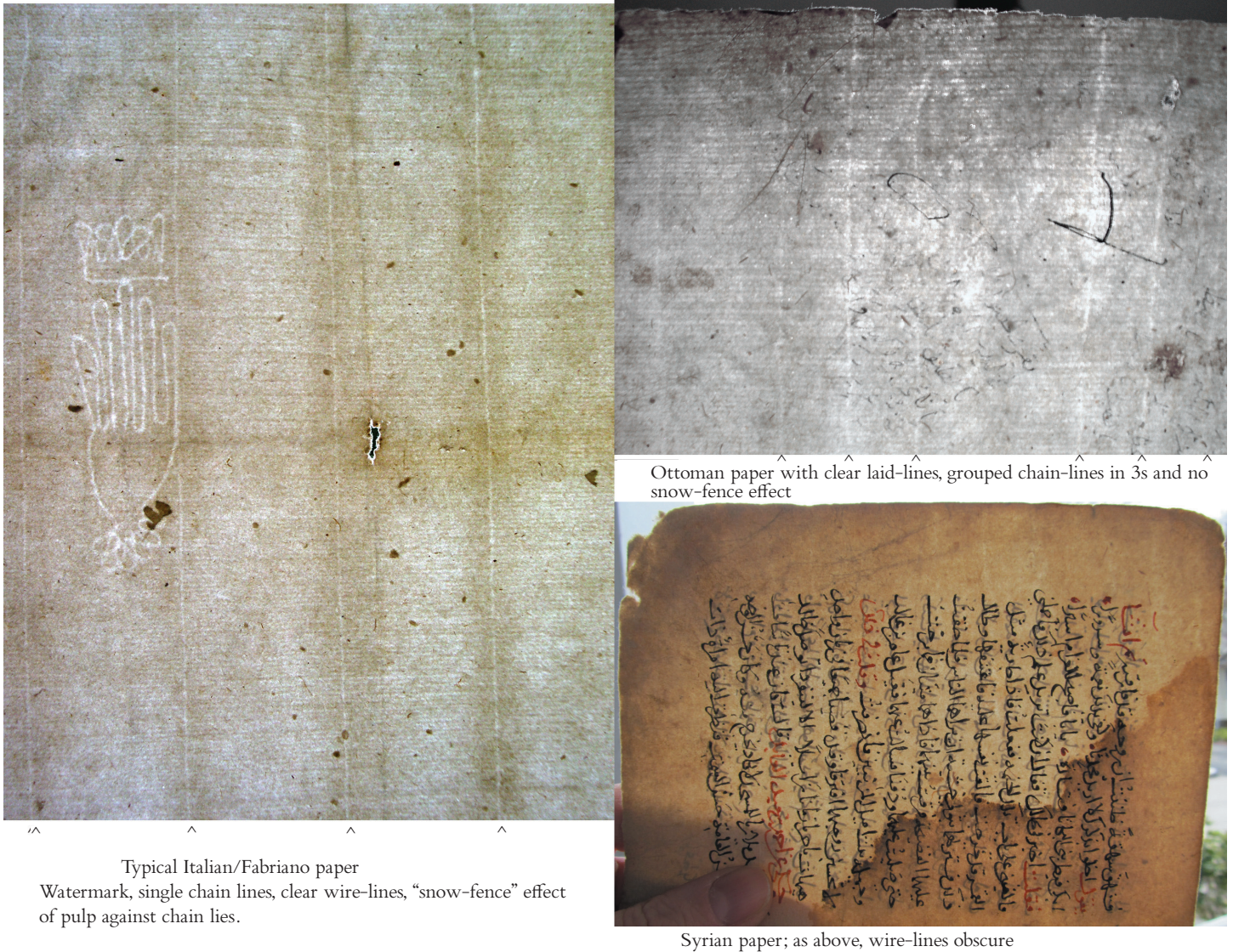


Figure 3. Italian, Ottoman, and Mamluq paper and their Mould-Patterns

North Africa, including Islamic Spain, is a peculiar case. Certain authors have tried to make a case for papermaking being introduced to Europe from al-Andalus<sup>20</sup>; but a quick look at manuscript production there indicates that paper was very much a luxury good up to 1400 or so<sup>21</sup>. The majority of surviving early Maghrebi MSS are on parchment<sup>22</sup>, and the few paper MSS are either luxury Qurans or important documents<sup>23</sup>. When paper appears in quantity it is either Mamluq style<sup>24</sup>, or shows European influence.

Next is the Yemen. While considering the production and use of paper, or any other product, there we must keep in mind that most imports, whether material or cultural, were from Egypt via boat across the Red Sea since at least Roman times. Accordingly the original

concept of papermaking, as well as any changes, would have been derived from Egyptian practice.

Yemeni paper is remarkably consistent throughout the pre-Ottoman period (up to the Ottoman conquest of 1520). It consists of "Fatimid" style paper, which is various shades of brown, without mould-lines visible through the sheet, but with impressions of laid-lines on its surface<sup>25</sup>. It usually comes in two varieties: a "fine" paper, lighter brown with a smooth surface, and a "coarser" paper, darker brown with a less smooth surface<sup>26</sup>. The paper is notable as well for being made in layers; occasionally when a leaf is soaked out of a binding-board in which it was "recycled" the leaf splits into layers. When this occurs we can see the laid-lines fairly easily<sup>27</sup>.

Given Egyptian influence, and given the style of paper, we can conclude that Fatimid influence was responsible for introducing papermaking into the Yemen in the first place. We know that the Fatimids and their partisans were active in the Yemen from the time of al-Mahdi (r. 909–934)<sup>28</sup>, whose forces briefly controlled as far as Sa'ada, the seat of the Rassid Imams. Given the apparent lack of any other sort of paper production or use in the Yemen before 1520<sup>29</sup>, and the quick replacement of the local paper by imported paper thereafter, we can conclude that papermaking was introduced by the Fatimids, or at least in their time, and remained a local industry thereafter. Its production technique remained conservative, and it was presumably cheap enough that even better-quality Mamluq paper in bulk transport by water from Egypt to Aden was too costly to compete.

Persia is a special case, largely because of its importance. It has been more than adequately covered elsewhere<sup>30</sup>; suffice it to say that Persian paper-moulds are a variety

of the third paper variety, with the moulds showing only laid-lines, without chain-lines<sup>31</sup>. The paper evolved from its more or less standard beginnings to a standardized type characterized by fine laid-lines and a much lighter and smoother surface. The earlier paper is typical of the twelfth century, and evolved from there without much, if any, outside influence<sup>32</sup>.

Finally, we come to India, which is an interesting, and very much under-studied, case. It is complicated by the presence of two quite different traditions of book production. On the one hand we find the traditional Hindu/Jain/Buddhist palm-leaf manuscript tradition, dating back as far as we can find any evidence of literacy there; on the other we have the Islamic tradition, presumably introduced by the Muslim conquerors, although given the (so far) lack of early material we must use as the initial date for this tradition the foundation of the Delhi Sultanate by the Ghoriid, Mohammed bin Sam, in 1192. The Delhi sultanate derived its paper traditions from Persia,

20 e.g. Mark Kurlansky, *Paper: Paging Through History* (New York: W. W. Norton & Company, 2017), chapter 4. He claims that paper was commonplace; surviving examples suggest otherwise.

21 As far as manuscript production is concerned this appears to be the case. Nonetheless there is evidence that a lot of paper documents were produced for legal purposes.

The problem is that there is growing evidence that legal documents in the Maghreb, unlike their Western counterparts, were intended to be very ephemeral. See Lydon, Ghislaine; A 'paper economy of faith' without faith in paper: a contribution to understanding Islamic institutional constraints (Penn Economic History Forum, April 4, 2008), p. 25. for a possible explanation.

22 Figure 4, sample 1 (top left).

23 Blair, Sheila S., *Islamic Calligraphy* (Cairo, 2006), 392–9; Figure 4, sample 2.

24 Viz., either the MS was produced within Mamluq territory, or it was written on imported Italian paper.

25 Figure 1, third example.

26 Figure 4, fourth example.

27 Figure 4, third example. This case is the main peril behind soaking Turkish binding-boards to separate the leaves; a leaf may come off easily, but turn out only to be half a leaf due to this splitting.

28 Figure 4, bottom right: Coin of al-Mahdi in Yemen.

29 Viz., a complete lack of any Mamluq paper with a Yemeni provenance, including Hebrew examples despite the all-pervasive influence of the Egyptian author Maimonides, and the use of Mamluq legal forms for documents.

30 Loveday, op. cit., and see Wright, E., *The Look of the Book* (Washington DC, 2012), pp.142–152 for an analysis of the Persian paper.

31 Figure 5, samples 1 and 2 (top row).

32 Loveday, op. cit., shows a sample of paper which is obviously European as a sixteenth-century example. This is in fact an interesting instance of the use of costly imported paper to strengthen a book, given that Islamic bindings were universally flimsy. The Boston Public Library has a superb example of a book (Nizami's *Khamisa*, AH 961) with the first few and last few quires European, and the rest of the book local. This practice is a phenomenon worthy of serious study.



Legal manuscript, North Africa, 14th century.



Fragments in Maghrebi script, from a Turkish binding-board, 14th century?



Hebrew leaf split into layers. Yemen, 15th century.



Two leaves from Yemen, 14th-15th century.

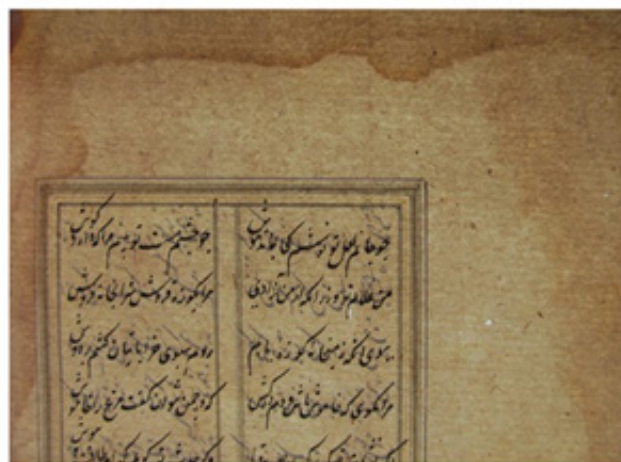


Sixth-dirhem of the Fatimid al-Malhi, struck at Aththar in Yemen.

Figure 4. North Africa and Yemen



Quran leaf. Persia, 13th century?



Leaf from Divan of Hafiz, Persia, 1474/5.



Jain astrology text, Western India, 15th century.



Western India, Sultanate period, 15th-16th century.



Figure 5. Persian, India and Nepalese paper



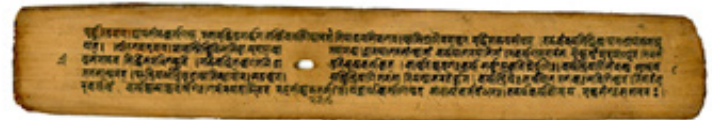
Leaf from Jain astrology text. Western India, c. 15th century.



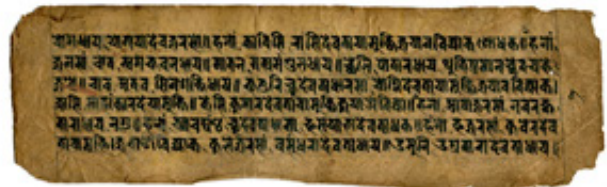
Leaf from Jain text. Western India, c. 15th century.



Leaf from Kalpasutra manuscript. Western India c. 1500.



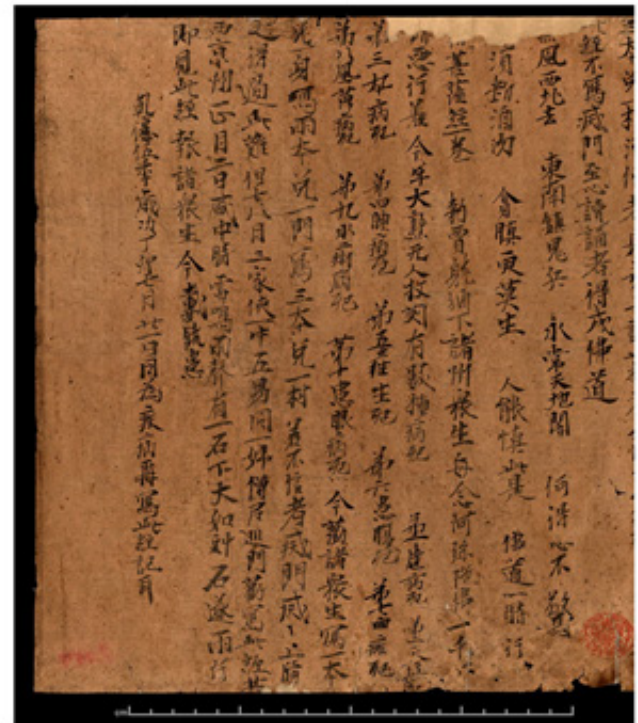
Leaf from palm-leaf manuscript. Nepal, c. 1500.



Leaf from paper manuscript. Nepal, c. 1700



Sample of thick Korean paper of Chinese type.



Chinese manuscript from Dunhuang. BM.Or.8210/S.3417.

Figure 6. Indian and Chinese paper samples

and its paper production has left us with a product which throughout the centuries is more or less a coarser version of the Persian paper of that time<sup>33</sup>. Unfortunately, we have few or no paper samples datable to before the reign of Mohammed Tughlaq (1325–1351). In the Subcontinent and its surroundings we find two separate paper traditions. One of them is the familiar, Near Eastern, type, with its Chinese-style moulds<sup>34</sup>; the other is the less familiar, Central Asian, type, with its lack of mould-lines, most likely made using cloth moulds. The latter is usually thick, and hence ideal for a palm-leaf substitute. Accordingly, it appears in Tibet in T'ang times<sup>35</sup>. It, or something similar, at some point became the norm in Southeast Asia<sup>36</sup>. But it never made it into India; it stopped in Nepal. The reason is easy to determine, even without direct evidence. In Nepal it first appears by the late twelfth century<sup>37</sup>, which was presumably already too late, as paper of Persian type had been introduced by the Muslim conquerors, who had already arrived, albeit by a slim margin. So even the earliest paper pothi MSS from India are on paper of Persian type<sup>38</sup>.

Analysis of the paper used in the “paper era” is at the moment very much in its beginnings. Several varieties are evident, some of which can be localized and roughly dated. Among these are a tan, coarse-screen type used as early as circa 1400; another, with very fine laid-lines which resemble a wove pattern, used around 1500; a brown and very brittle variety used in the seventeenth century; and the sort of generic paper distinguished by increasingly lighter colouring from the seventeenth through nineteenth centuries. And a quick glance will show that paper in Bengal, for example, is easily distinguished from that of Jaipur. But this study is still in its infancy, and it is hampered by the

rarity of localized and dated examples, especially before 1550. So we must make the most of what is available, particularly in terms of the welter of fragments which are so readily available. It will take time for a precise picture to emerge from our study, although the outlines are becoming visible.

As time is short we will not be able to go into any further detail, and in any event this is very much a “work in progress”. The exploration appears to indicate that the “paper trail” of the transmission of the craft can be followed by its “mould-prints”. Hopefully I have shown how a general approach can yield useful information regarding such things as cultural transmission of ideas and technology, which is not likely to be apparent to anyone taking a narrower, more specific, approach.

33 Figure 5, samples 3 and 4 (middle row).

34 Figure 6, samples 6–7 (bottom row).

35 Zwalf, *op. cit.*, no. 113, 8th century.

36 Figure 5, samples 5 and 6 (bottom row); Figure 6, samples 1–5 (top half).

37 Zwalf, *op. cit.*, no. 173, dated 1184.

38 As most are undated we can only estimate by how closely the given MS format approximates that of palm-leaf manuscripts. Samples illustrated here with stringing-holes.

# Coda

The End, with a bit of comic relief, from “Tundra”.

[Chad Carpenter’s Tundra: The Comic Strip, 5-2-2012, “Bookworm Fine Dining”, via <https://tundracomics.com>, specifically at <https://www.tundracomics.com/183-may-2012-daily-strips.html> .

Seated at a restaurant table, and shown munching from an opened book, the dining Bookworm is asked by the Waiterworm, wearing a bowtie and holding a grinder at the ready, “Fresh Ground Paper?”

There follows a “Note from the cartoonist: SORRY.”]