

The Writing Surface: Paper

Paper, a material whose manufacturing processes are related to those of felt, had already been known in China for five centuries before the advent of Islam. In a civilisation where the customary form of the 'book' was the scroll, it was a widespread writing material. The pulp was generally a mixture of fibres from mulberry bark crushed in a mortar; sheets were made using a detachable mould made of a timber frame across which stretched cords or 'wires' made from a material of vegetable origin (bamboo fibre). These laid lines, or 'wire-lines', are easily discernible on the finished product, while the chain lines that connect them together are much less conspicuous. The paper size was made of rice starch.

Additionally, in keeping with the tradition of silk scrolls, as early as the seventh century sheets of paper for use in high-quality manuscripts were already sometimes tinted blue,² yellow, red and other colours. Buddhist texts transcribed and copied on paper were widely distributed wherever that religion gained a foothold. Moreover, it seems that the Sassanians had started using paper in conjunction with other writing materials, although no book or document on paper from that time has survived to the present day. It is true that since they had regular diplomatic and commercial relations with Central Asia and China, where paper was in common use, the Sassanians must have known of its existence. It could hardly have been anything other than a costly import, however, and its use was probably confined to official circles.

It should be noted in addition that while in Arabic paper is called *qirās*³ or *waraq*,⁴ the Persian term, *kāghaz* (found in Arabic as *kāghidh* or *kāghadh*), is a Soghdian loan word.⁵ Among others, the Soghdians, through their contacts with Chinese Central Asia, propagated papermaking techniques, and it was even perhaps in Soghdiana that the earliest manuscripts on paper of the Christian scriptures were written.

Paper seems to have been used in Islamic manuscripts in a manner very similar to parchment. Several bifolia were prepared in advance and the gatherings sewn together into volume form; usually the leaves were cut from

1 The author of this chapter is F. Richard. 2 As with a Chinese scroll, MS. Paris BNF Pelliot chinois 3561, copied in 676 CE on a dark ochre-colored paper, and the fragment Pelliot chinois 4642, datable to the first half of the seventh century, where the calligraphy is inscribed on pale blue paper. 3 Gacek, *AMT*, p. 114. 4 Gacek, *AMT*, p. 149. 5 From the Persian it was transmitted through Uygur to Turkish (Ottoman *kāghiz*, modern *kağıt*).

the same sheet, although there exist composite gatherings comprising bifolia of diverse origins, as well as bifolia made up of two leaves guarded at the centre fold. Generally, all leaves in the gatherings of a given manuscript are laid in the same direction, either parallel or perpendicular to the sewing stations. There are naturally exceptions to this rule, and so it is advisable to carry out an exhaustive (some might say exhausting) examination of the whole volume, recording any visible anomalies that subsequently need to be explained. Such an investigation provides an opportunity to note changes in the paper used (often due to a repair made in the past), the composition of the quires (to be discussed in the following chapter), and other points.

In general the lapse of time between paper being produced and used was relatively brief, since its high price was a deterrent to stockpiling. This observation is important since, in the case of paper with a watermark, the paper itself may provide a clue as to a possible date of copying. Such assumptions may be corroborated or undermined by other findings. According to the specialists in watermarked papers – including Briquet – a ten- to fifteen-year gap may still intervene between manufacture and use, and perhaps this delay may have been longer still for paper used in remote parts of the Middle East.

Non-watermarked mediaeval paper⁶

The spread of paper in the Muslim world

By most accounts, it is the Muslim forces' victory in July 751 on the banks of the Talas in Central Asia (in what is now southern Kazakhstan) that marks the onset of a wholesale expansion in production and use of paper in the Islamic world. The event was indubitably of crucial importance, since Chinese craftsmen skilled in the art of papermaking were taken prisoner during the conflict, being dispatched to set up paper mills in Samarkand, a city already renowned for its many canals. There are also records of paper being manufactured at a Manichaean monastery in Samarkand. It was in the same city, it appears, that for the first time rag and not only vegetable pulp became an ingredient in paper pulp. The moulds used were in the main fitted with detachable mould-covers.

⁶ A thoroughly documented bibliography has been published in M.-T. Le Léanec-Bavavéas, *Les Papiers non filigranés médiévaux de la Perse à l'Espagne* (Paris, 1998). Readers are referred to that publication for supplementary information on the details. A more detailed account of the history of paper in the Islamic world is to be found in J.M. Bloom, *Paper before Print* (New Haven, 2001).

Apparently, improvements in techniques of beating or paddling pulp fibre were also devised: in the fourth/tenth century, al-Bīrūnī mentions the existence in Samarkand of a hydraulic power hammer similar to that used for de-husking rice.⁷ Unfortunately, no text in Arabic script copied on paper from this time has survived from these regions. The introduction of paper to Baghdad followed shortly afterwards, the existence of a paper mill being attested at the 'Abbāsīd capital in 794.⁸

This rapid rise in the use of paper was mirrored by a rapid decline in the papyrus and parchment which it supplanted, primarily owing to considerations of cost. Egypt was turning to paper by the third/ninth century, with papermills being built at a later date in Fustāt. The 'Abbāsīd administration was clearly a heavy consumer and it is difficult to say exactly whether the demand for paper in book production was preceded by its adoption by the administration (as decreed by the Caliph in 808) or whether the two major uses for paper developed in parallel. In any case, the paper trade grew apace, and the custom arose of calling the various grades of produce by the names of the cities in or near which mills were set up (*Baghdādī*, *Samarqandī*, and so on), water quality being a notable influence on that of the paper produced. Paper from Baghdad, for example, enjoyed a reputation for fineness until the ninth/fifteenth century, though the adjective *Baghdādī* also simply designated a sheet of paper of large size. By the sixth/twelfth century Damascus too possessed its own papermaking industry; the quality of its output, considered superior to that of Egypt, then seems to have entered a decline. In the fourth/tenth century, paper was also being manufactured in North Africa, at Kairouan in what is now Tunisia.

Any descriptive analysis of papermaking, however, immediately encounters a terminological stumbling-block, since it is a field where equivalence can not always be established between traditional expressions – which vary with period and place – and the terms employed by contemporary specialists. This makes it difficult to obtain a clear view of the objects under study. Similarly, although precise translation of the earliest texts concerning paper is essential, it is an area fraught with difficulties.

The spread of 'Arab' paper throughout the Mediterranean Basin was, as we have seen, almost meteoric. The earliest manuscripts on paper produced in Armenia, where rag paper is found made solely from cotton fibre, date from 960. The Byzantine Empire had also become aware of paper by the tenth century, and the imperial chancellery introduced it in 1052; by the eleventh century paper was also in use in Sicily. In these cases, the paper was either imported from regions under Islamic control or manufactured locally following similar methods. As for Spain, by the twelfth century it possessed many paper mills in

⁷ P. Mohebbi, *Techniques et ressources en Iran du 7^{me} au 19^{me} siècle* [Bibliothèque iranienne, 46] (Tehran, 1996), pp. 182-188. ⁸ J. von Karabacek, *Arab Paper*, 1887, pp. 33; originally published as: 'Das arabische Papier', in *Mitteilungen aus der Sammlung der Papyrus Erzherzog Rainer*, 2/3 (Vienna, 1887).

its Moslem provinces: there was a mill at Játiva in 1056, and at Toledo in 1085. At the time of the Ottoman conquest, a paper mill was operative in 1453 at Kağithane, near Istanbul, and at Bursa in around 1486.

Between 1166/1167 and 1360 there appeared in Spain and Morocco a highly distinctive type of paper known as 'zigzag' paper, a mould-made paper with its chain lines lying at regular intervals and of larger size than 'Eastern' papers; the middle of the sheet bears traces of a zigzag mark whose function – indicating a levy, perhaps, or a mark of origin, or else a trace of some process whose purpose has since been forgotten – is not yet known for certain. The same zigzag shape also occurs on watermarked papers of Italian provenance.⁹

The characteristics of non-watermarked paper

Identification of fibres

This area of research too remains underdeveloped. The information so far gathered from the very few analyses of the composition (fibre or rag) of paper pulp undertaken to date is not particularly helpful to our investigation. The question arises of the part if any played by hemp, linen (sometimes recycled, for instance from mummy tapes in Egypt), cotton, or other vegetable fibres.¹⁰ Further investigation may perhaps reveal features instrumental in dating or establishing provenance. Finally, a certain amount of paper is said to have been produced from a pulp of silk fabric (*harīrī* paper).

The delamination of folios is a phenomenon encountered occasionally in manuscripts: this means not the separation or unpeeling of two sheets stuck together, but a more complex process affecting the separation of the fibres, due in all probability to the presence of several layers of pulp.

Surface treatments

The traditional manner of finishing paper prevalent in the Muslim world makes it rather hard to learn much by examining its surface alone. After sizing with wheat, rice or maize starch, the sheet of paper is laid on a board to be scraped and smoothed with a tool made of glass, agate or other material designed to reduce roughness. This explains why parallel – most commonly diagonal – lines are often detectable over the entire surface. In many cases, the sheet was then hard-sized with a brush, since the paper, though it should not be totally transparent, had to be translucent as well as capable of receiving writing without soaking up the ink. In this connection, it is instructive to examine the paper produced in India still today using such traditional methods.¹¹ The sheets are

drained over bolts of fabric which may leave remnants of fibre on the pulp; they are then put to dry and whiten on pisé walls that can leave traces of their own. The dimensions of a mould are generally governed by the size that a papermaker can handle unaided.

In comparison to the Islamic West, craftsmen in Iran and the Ottoman Empire seem to have accorded exceptional importance to the preparation and outward appearance of paper. A sheet had to be translucent and was often, once scrupulously smoothed, brushed down with a primer (glair, gum-dragon or tragacanth) or coating, generally more liberally applied in the margins. In high-quality Ottoman manuscripts from the time of Mehmed II (*reg.* 1444–1446 and 1451–1481) and of Bayezid II (1481–1512) one often finds a very smooth and apparently generously finished cream paper. In other cases, it seems clear that the paper was simply painstakingly smoothed, without any coating, an option that rendered erasure or rewriting far more difficult.

Sheet formats and sizes

Sheets of paper were seldom used in their original uncut state save in the case of volumes of exceptional size (such as MS. Paris BNF arabe 2324 from the early eighth/fourteenth century, a folio volume whose bifolia measure 53 × 76 cm). As a rule, though, dimensions rarely exceed 45 × 65 cm.; this is probably because it would be difficult for a craftsman to operate a mould single-handed if were it any larger. In most folio volumes, the whole sheet measures at least 35 × 55 cm., according to the measurements of ninth/fifteenth-century Persian manuscripts made by this author.

In a folio volume the wire-lines lie perpendicular to the sewing stations; the same applies generally to octavo format, whereas in quarto volumes the laid-lines run parallel. Since bifolia were prepared in advance, occasional leaves with lines running in an apparently anomalous direction do appear. In the case of unusual volumes such as the so-called 'Baysunghur' Qur'ān the precise technique employed remains unknown; perhaps a fixed mould was used.¹² Mamluk Qur'āns, certain specimens of which can attain impressive dimensions – around a metre tall or even more – also call for examination from this point of view. Again there exist, especially in the Iranian world, oblong or 'landscape' format volumes (in Persian, *safīna*), whose utilisation recalls that of the roll. The sheet equally well could be deployed in either direction, the gatherings corresponding to the same formats. Sheets were often trimmed drastically and

¹² On the MS., see *Islamic calligraphy/Calligraphie islamique* (Geneva, 1988), pp. 104–105; D. James, *After Timur* (London, 1992), pp. 104–105; A. Soudavar, *Art of the Persian courts: selections from the Art and History Trust Collection* (New York, 1992), pp. 59–62; S. S. Blair, *A Compendium of Chronicles: Rashīd al-Dīn's illustrated history of the World* [The N. D. Khalili Collection of Islamic Art, 27] (London/Oxford, 1995), p. 112, note 19. Concerning the technique of using fixed moulds, see J. Irigoien, 'Les papiers non filigranés: état présent des recherches et perspectives d'avenir', in M. Maniaci and P. Munafò (eds.), *Ancient and medieval book materials and techniques*, vol. I, pp. 265–312.

⁹ See MS. Paris BNF arabe 2291, which has a goat's head watermark. ¹⁰ See A. Gacek, 'On the making of local paper. A thirteenth-century Yemeni recipe', *REMMM* 99–100 (2002), p. 79–93. ¹¹ See particularly N. Premchand, *Off the deckle edge* (Bombay, 1995).

so off-cuts could be put to use, as they were in Iran or India, for example, for drafting pharmaceutical prescriptions or writing various other documents (accounts, etc.), the paper being cut with a sharp blade.

The description of non-watermarked paper

Wire-lines

Paper can be classified in terms of the number of millimetres occupied by twenty wire-lines. As an example, in a manuscript copied at Andakan (Ferghana) in 1311 (MS. Paris BNF suppl. persan 69),¹³ where the broad wire-lines of the beige paper run perpendicular to the sewing stations and the chain-lines are almost invisible, twenty wire-lines extend over approximately 40 mm. The dimensions of the whole sheet must have been at least 390 × 480 mm. The volume consists of gatherings of eight leaves – or quaternions – a system that will, as we shall see, become predominant in the Iranian world and universal in India in the eleventh-twelfth/seventeenth-eighteenth centuries, and competed with the quinion (gathering of ten leaves) in the Ottoman Empire until the end of the tenth/sixteenth century. In the Maghrib and in Spain, ‘senions’ or gatherings of twelve leaves also occur. Study of wire-line spacing can provide supplementary information. If carried out meticulously enough, it may even be possible to identify the variety of reed, bamboo or grass-stalk used to construct the mould. The best paper is most often that whose wire-lines lie closest together;¹⁴ other criteria of quality include the regular consistency of the pulp and inconspicuous fibres.

The chain-lines

In general chain-lines are difficult to discern and appear occasionally as lines running perpendicular to the laid-lines (illus. 12). There are cases, however, on particular types of paper where they are sufficiently prominent for examination to be useful. A typological analysis¹⁵ of unwatermarked ‘Arab’ papers whose chain-lines can be readily observed has been attempted by Geneviève Humbert for the period from the fifth/eleventh to the ninth/fifteenth century.¹⁶ It relies on observation of the pattern made by the wire- and chain-lines when a specimen

13 *FIMMOD*, 158. The paper in this manuscript faintly resembles certain examples in Chinese manuscripts dating from before the eleventh century CE discovered at Dunhuang, a place not far away. 14 The question remains as to what exactly ‘Samarkand paper’ was. In a later period, the expression designates a certain quality of paper, whereas originally it must have denoted the much-praised paper actually manufactured in Samarkand and exported. In a fine manuscript (MS. Paris BNF arabe 5036) completed around 1440 in Samarkand, the ivory paper in which twenty wire-lines occupy from 22 to 24 mm. must have been cut from a sheet measuring at least 36 × 48 cm. Still, it is not known whether this is an example of genuine ‘Samarkand paper’. 15 G. Humbert, ‘Papiers non filigranés utilisés au Proche-Orient jusqu’en 1450: essai de typologie’, *JA* 286 (1998), pp. 1–54. 16 For Persian paper from the fifteenth century CE, see F. Richard, ‘Le papier utilisé dans les manuscrits persans du 15^e siècle de la Bibliothèque nationale de France’, in M. Zerdoun Bat–Yehouda (ed.), *Le Papier au Moyen Âge* (Turnhout, 1999), pp. 31–40.

sheet is held up against the light. The chain-lines lie at relatively regular but sometimes protracted intervals (up to 80 mm.) and may be grouped in twos or threes. Humbert’s classification notes six groups.



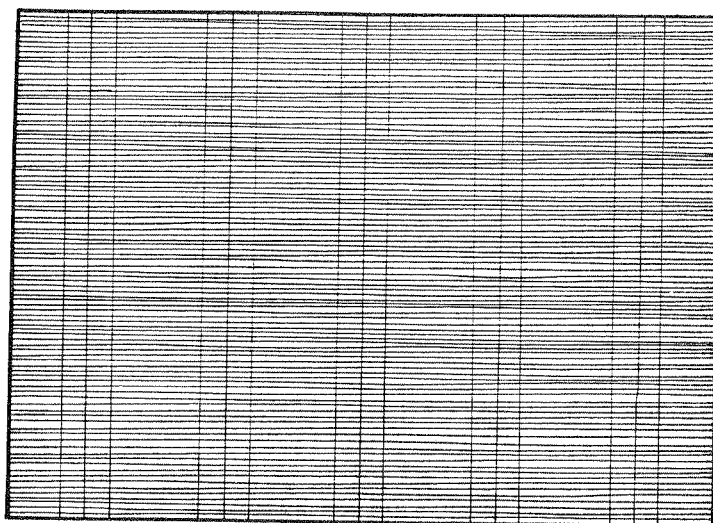
12. Non-watermarked Oriental paper with chain-lines spaced at regular intervals.

In the first category, covering paper with simple, not grouped, chain-lines (as for example in MS. Paris BNF arabe 6840, copied in 1108 at Isfahan and in part of BNF arabe 3423, copied in 1448–9), the gaps between the lines range from 12 to 25 mm. For some manuscripts produced in India in the tenth/sixteenth century, gaps of between 30 and 55 mm. are recorded; this is also the case with paper in high-quality manuscripts from eleventh/seventeenth- and twelfth/eighteenth-century Mughal India.¹⁷ In Maghribī paper, the gaps, invariably greater than 30 mm., can even attain 80; in general, however, they lie somewhere between 40 and 50 mm. A series of Persian papers of the sixth/twelfth and seventh/thirteenth centuries present simple, double or triple chain-lines that alternate more or less regularly.

Humbert’s second category presents chain-lines grouped in twos, threes or fours lying in uniform arrays over the whole sheet (illus. 13). Groups of double chain-lines are attested from at least the sixth/twelfth to the ninth/fifteenth century, particularly in Egypt, while chain-lines arranged in

17 It is difficult to be certain as to which are actually ‘*Ādilshāhī*’ papers from the Deccan, for example. The markedly different paper in MS. Paris BNF suppl. persan 140 C, copied at Firūzābād and probably, with its broad wire-lines, representative of a type of early sixteenth-century CE paper from the Sultanate of Delhi, should be noted.

threes are amply attested from the fifth/eleventh to the ninth/fifteenth centuries in Persia, Syria, Egypt, Asia Minor and even at Mecca. The place of manufacture of this type of paper remains mysterious, but it is known that its use expanded noticeably in the course of the eighth/fourteenth and more particularly in the ninth/fifteenth centuries.



13. Non-watermarked oriental paper with chain-lines in groups of three.

Without going into all the details, we may mention that other papers with chain-lines gathered in fives appeared between 1374 and 1420 at Baghdad and in southern Iran. Papers with regularly alternating groups of two and three chain-lines are less common; some are found in the seventh/thirteenth century in Syria and also in Egypt, as well as in Greek manuscripts from Cyprus. Papers in which such groups alternate irregularly have been documented from the beginning of the seventh/thirteenth to the ninth/fifteenth centuries. A large quantity appears in the Middle East and in Egypt and Syria, though such papers seem to have been rare in Persia. Beyond these general trends, it would, as things stand, be over-ambitious to try to link a type of paper categorised in this manner with the name of a mill or a location or even with an exact date. It is known besides that from the eighth/fourteenth to the ninth/fifteenth century the same types of mould were used in Syria and Egypt.

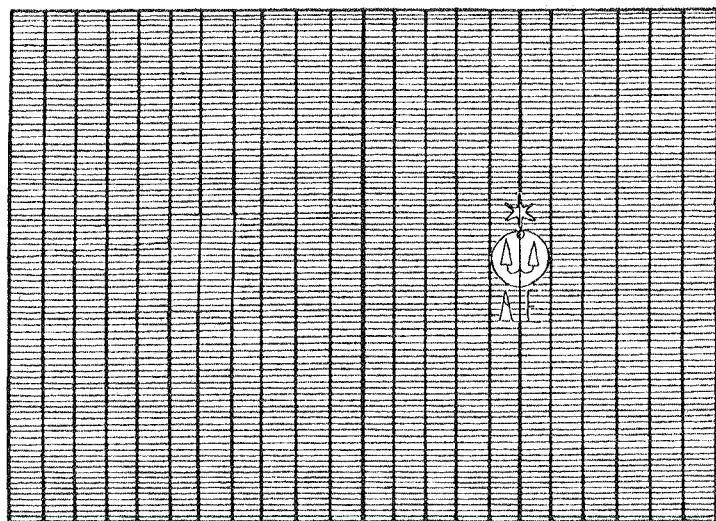
Watermarked papers

The development of production in the West

The technique developed from 1264 onwards at Fabriano in Italy ushered in a gradual revolution in the paper industry. Italy soon became a paper-exporting country and mills based on the Italian model sprung up in various European countries. Since the production costs involved were lower, such products spread quickly. The paper was characterised by the impression of a mark in the paper by a device made in metal wire and sewn to the mould (the 'watermark'; illus. 14) which allows the manufacturer to be identified. Visible on each sheet, the motifs of these new marks were often borrowed from heraldry and were sometimes accompanied by lettering. In Muslim Spain – whose mills were rendered redundant during the fourteenth century by paper exported from Italy – parchment seems to have remained comparatively inexpensive for long enough for some manuscripts to have been compiled in which bifolia of paper and parchment alternate, the latter consistently appearing at the beginning and in the centre of the book, though sometimes in other sections as well. In the Maghrib, European-made watermarked papers were used in manuscripts from the mid-eighth/fourteenth century, as shown by the example of MS. Rabat BGA D529 of 1349. Paper from Genoa is to be found in MS. Paris BNF suppl. persan 113, copied in 753/1352 at Sarāy-i Jadīd in the Crimea. In the Ottoman Empire,¹⁸ watermarked paper of the ninth/fifteenth century is encountered relatively frequently – in conjunction with the other types of Eastern paper without watermarks, which remained largely predominant – and the number of forgeries offers proof positive of their enduring success. During the tenth/sixteenth century, European paper and non-watermarked paper coexisted in roughly equal proportions throughout the Ottoman Empire, exactly in the same manner as the concurrent quire formats of the quaternion and quinion, though no congruence has been demonstrated between the use of quinions and watermarked paper or of quaternions and unwatermarked paper. After 1550, non-watermark papers with chain-lines grouped in twos or threes are no longer found, and they seem to have succumbed to competition from watermarked papers, especially Venetian papers with the anchor watermark.¹⁹

By the eleventh/seventeenth centuries, in Turkey, Syria and Egypt, as in the Maghrib, the overwhelming majority of manuscripts were being copied on watermarked papers. From the end of the tenth/sixteenth century, and until approximately 1650, the most frequently encountered paper bore Venetian

¹⁸ Locally produced watermarked paper appeared at a later stage in the Maghrib (see P. S. Van Koningsveld and Q. al-Samarrai, *Localities and dates in Arabic manuscripts: descriptive catalogue of a collection of Arabic manuscripts in the possession of E. J. Brill* (Leiden, 1978), pp. 37, no. 56 A). ¹⁹ See V. Mosin, *Anchor watermarks*.



14. European paper with watermark in the form of an anchor.

anchor watermarks; by the second half of the twelfth/eighteenth century these in turn were supplanted by paper watermarked with three crescent moons (*trelune*), concurrently with certain French or imperial paper marks. Very little European paper survives from Iran and India from before the end of the twelfth/eighteenth century, or even prior to 1815; Iran then imported Russian, English or Austro-Hungarian paper, with a pronounced partiality for the blue-tinted kind). At best, leaves of a Hispanic paper can be seen in a manuscript copied c. 1550 in Kabul for the Mughal Emperor Humāyūn (MS. Paris BNF Smith-Lesouëf 216). But the fine-quality paper produced in the Deccan and perhaps elsewhere seems to have practically dominated the market in Mughal India (in parallel with a less sophisticated product that is often of a highly flocked appearance, some of which was perhaps laid from floating moulds). French, then English, papers make an occasional appearance only at the end of the twelfth/eighteenth century. Although the Muslim West adopted imported paper from Europe rather early on (eighth/fourteenth century), non-watermarked paper continued to be produced down to the beginning of the fourteenth/twentieth century in the East. Proof, if needed, is provided by the flourishing condition of the paper industry in Central Asia (Bukhara, Samarkand and Ferghana) until the Russian Revolution. In areas where manuscripts continued to be copied, paper made from mulberry bark fibres (in Ferghana) or rag (as in the Bukhara khanate) was favoured. For its part, India has kept alive a tradition of the craft of papermaking whose low production costs ensured its survival as a priceless repository of age-old techniques.

The examination of watermarked paper

A watermark allows the place and date of production of the paper bearing it and employed in the copying the manuscript to be identified.²⁰ To effect such an identification, a similar watermark to that on the specimen has to be referenced in an authoritative corpus.²¹ If a reference can be consulted in conjunction with the item under investigation, direct comparison may be made with the original. One may, however, have to resort to making a diagram of the specimen, in which case several possible techniques exist. As freehand sketching, even on graph paper, is a haphazard affair, a more advisable course of action is to take a transfer drawing of the watermark concerned. After first checking that the institution concerned permits tracing, one places a light source behind the sheet with a ground glass plate above (to avoid damaging the specimen) on which tracing paper is laid; the watermark is then outlined with a sharp pencil. Contact photography and microfilm require more elaborate apparatus not always readily available on site; microfilm has the additional disadvantage of altering the dimensions of the original. Beta-radiography, which consists in placing the sheet of paper between a radioactive source (carbon-14) and a sensitive film, allows high-quality and faithful images to be taken,²² but unfortunately it is not as yet a viable option in every library. From the sixteenth century onwards, papermaking moulds began to incorporate a countermark (initials, a small design, or suchlike) in the half opposite the one containing the watermark, allowing the manufacturer to be precisely identified; this, too, should be searched for carefully.

In order to study watermarks in a manuscript it is best to begin by locating a legible example. A meticulous record is then made of this mark, including its shape and size; the placing of the chain-lines should also be measured, together with the space occupied by twenty wire-lines. A survey of this kind will allow comparisons with published corpuses.²³ In this connection, however, it should be stressed that it is rare indeed to find a reference watermark equivalent in all respects to one observed in a manuscript. Finally, there is little doubt that future progress in information technology will hasten the development of new and more effective tools²⁴ for watermark identification.

20 This analytical method and procedure are described in J. Irigoien, 'La datation par les filigranes du papier', in A. Gruys and J. P. Gumbert (eds.), *Les Matériaux du livre manuscrit [Codicologica, 5]* (Leiden, 1980), pp. 9-36. One example of how data derived from watermark examination can be put to advantage appears in an article by A. Brockett on two 'Sudanese' Qur'āns ('Aspects of the physical transmission of the Qur'an in nineteenth-century Sudan: script, decoration, binding and paper', *MME* 2 [1987], pp. 48-51 and pl. 18-24). 21 The reader is referred to the bibliography where the most useful corpuses of watermarks are listed. 22 A. de La Chapelle, 'La bêtaradiographie et l'étude des papiers: beaucoup plus qu'une très belle image', *Gazette du livre médiéval* 34 (Spring 1999), pp. 13-24. 23 See T. Gerardy, 'Die Techniken der Wasserzeichenuntersuchung', *Les Techniques de laboratoire dans l'étude des manuscrits* (Paris, 1974), pp. 143-156. 24 C. Rauber, P. Tschudin and T. Pun describe DOCSCAN, a system for digitizing documents, 'DOCSCAN', together with KRYPICT, a database of watermarks, in 'Système d'archivage et de recherche de filigranes', *Gazette du livre médiéval* 31 (Autumn 1997), pp. 31-40.

Special papers

Among examples of the oldest surviving paper, the existence of certain specimens of a brownish hue and others of a creamy colour would seem to imply that concerted efforts were made to produce paper with the appearance of parchment. Texts record divers processes and recipes designed to bleach the pulp and so obtain the whitest and most homogeneous coloration possible. But coloured papers were certainly not unknown in the Muslim world, be they originally imitations of sumptuous Western tinted parchment or of Chinese coloured papers. No examples from the earliest times have been recorded, however, and although it is known that the practice already existed in the fifth/eleventh century, the history of the practice poses many questions.

Tinted papers

The use of coloured paper relates to the convention of using bifolia prepared in advance to assemble the gatherings. There exist, of course, manuscripts in which a given part was copied on coloured paper: for instance, MS. Paris BNF arabe 147, from Egypt, where folios 231 to 321 are pink paper. Nonetheless, the preference was for laying one, two or three coloured paper bifolia in a gathering to embellish the copy rather than making whole sections in any one colour (illus. 39). There even survive examples of manuscripts teeming with sheets of coloured paper, often distributed unevenly through the volume, from eighth/fourteenth-century Spain across to Jalāyirid Iran; leaves tinted in yellow, salmon and ochre (illus. 35) appear alternately in a manuscript of scripture (Ms. Paris BNF persan 3) copied at Solghat in 1374 in the Jalāyirid style. A bilingual manuscript copied in 1391 at Baghdad (MS. Paris BNF arabe 3365) contains a number of pink-coloured pages; in another, copied in 1413 at Baghdad (MS. BNF suppl. persan 1531), many pages are yellow.

The ninth/fifteenth century marked a golden age for coloured and decorated papers in Iran, and it was then that a number of special techniques reached their zenith. Throughout this century in Timurid and Turkmen states, manuscripts with differently coloured pages were actively sought after, most being collections or anthologies of poetry. Paper was at that time generally dyed on both sides and thus probably made by being plunged into a vat before a finish was applied; it was then often necessary to fix the colours with an acid treatment before rinsing and drying. There even survive sheets of tinted papers that have been deliberately flecked with a different colour. Examples are found in MS. Paris BNF suppl. persan 1473, datable to ca. 1470–1480: folios 82, 141, 146, 157 and 160 exhibit pink spots²⁵ visible on the verso as well as the recto;

²⁵ Another example from the sixteenth century is MS. Paris BNF suppl. persan 800 (Qazvin, 1570–1575 CE).

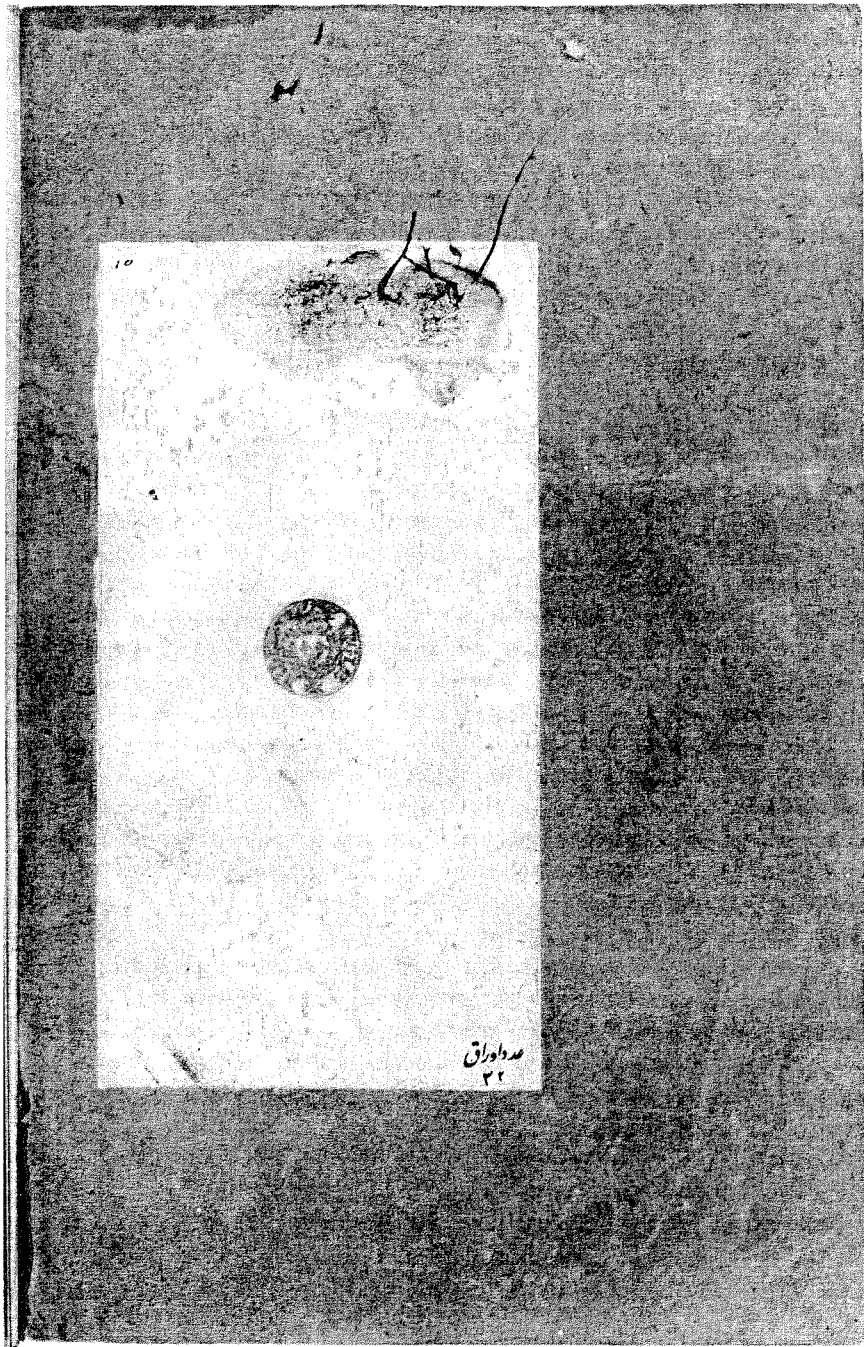
the sheet appears to have been tinted by impregnation. Sheets tinted on one side only are also to be found, though these are rarer; they received their finish prior to being floated on a mixture on the surface of a tank. Study of the recipes for obtaining the highly varied colours encountered especially in ninth/fifteenth- and tenth/sixteenth-century manuscripts (though in the early twelfth/eighteenth century, Mughal India too experienced its own vogue for coloured and decorated papers) has been based on surviving sources whose interpretation remains somewhat ticklish.²⁶ A huge range of instructions are recorded, some perhaps reflecting local practices; even the names of the products themselves are not always easily comprehensible,²⁷ though analyses of and comparisons with fabric dyestuffs would certainly be enlightening. In any case, not all the dyes were fixed in the same manner and some required doping with specific mordants, while others, such as some brown dyes, have long been held responsible for chemical reactions damaging the paper. In the ninth/fifteenth century, it seems that the use of coloured sheets became increasingly current in western Persia and in the Ottoman Empire, perhaps because the Āq Quyūnlū capital at Tabriz was an active centre in the production of coloured papers. In studying manuscripts incorporating paper of various colours, it is always instructive to observe whether all the coloured leaves are of the same type of paper or not and whether all are of the same origin. In general they are not, since some workshops surely specialised in producing technically demanding hues.

Silhouette paper, gold-speckled paper, marbled paper

Other paper-decorating techniques were also developed. ‘Silhouette’ (or ‘shadowed’) paper was produced by way of two different processes, one practised in ninth/fifteenth-century Persia and the other in the Ottoman world (illus. 45, 49) at the end of the tenth/sixteenth century and in the eleventh/seventeenth century; and gold-speckling or -sanding (illus. 48), which appeared in Persia around 1460. Marbling was one facet of the sustained effort observed in the Persian and Ottoman worlds to produce paper of varied appearance designed to fulfil a specific purpose (illus. 50), a tendency which will be treated at greater length in the chapter devoted to the ornamentation of the manuscript book.

Another highly successful device was to inlay one leaf in another leaf – often thicker and differently coloured – as in the *waṣṣālī* technique (illus. 15), wherein the arrangement of the frame masks the hairline join between the two

²⁶ See Y. Porter, *Painters, paintings and books* (New Delhi, 1994), especially pp. 41–60. The collection of practical treatises in Persian concerning the arts of the book published by Najib Māyil Harawī, *Kūāb-āwāʾī dar tamaddun-i Islāmī* (Mashhad, 1372/1993), is also worth consulting. ²⁷ See e.g. F. Richard, ‘Une recette en persan pour colorer le papier’, *REMMM* 99–100 (2002), p. 95–100.



15. Paper margined using the technique known as *waṣṣālī*. Iran, mid-10th/16th century.
Paris, BNF persan 243, f. 32v^o.

sheets. Developed apparently at Herat at the end of the ninth/fifteenth century, this type of page layout enjoyed a surge in popularity during the tenth/sixteenth century in Persia, Turkey and India, and allows for the use of an extensive palette of colours in the margins without jeopardising the legibility of the text copied on the leaf of white paper in the window. The joins, however, can be exceedingly fragile. The care devoted to paper and its appearance, as well as to its decoration, was particularly marked in the Persian and Ottoman civilisations. Clearly the influence of Chinese models cannot be dismissed in this connection.