Codicology Two:
writing materials 2: paper, quires

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Paper, a Chinese invention, conquers the world

A short chronology:

Oldest paper known in China, where it was invented, dates from before the beginning of the Christian era.

Imports of Chinese paper in the Middle East before the 8th century are known, but not documented, presumed lost.

Beginning of Islamic papermaking in Central-Asia, mid-8th century.

Slow but irresistible journey of paper in Western direction. Around year 1000 CE complete substitution of parchment and papyrus by paper in Mashriq. The Maghrib follows suit.

Around the year 1500 is the virtual end of Middle-Eastern paper industry due to heavy competition from Europe, especially Italy. Remote regions (e.g. Central-Asia) keep producing their own paper.
Paper 2

Paper was less cheap than papyrus (more work to manufacture!), but was more stable. At the same time it was less stable than parchment, but much cheaper to produce. This combination of the combined advantages of parchment and papyrus made paper the ideal substitute of either one of them.

Most Islamic and Middle Eastern manuscripts, as we know them now, are books made of paper. Papyrus and parchment became virtually obsolete after the introduction of paper.

The impact of paper on the development of written culture can hardly be overestimated. The general availability of a relatively cheap medium gave rise to scholarly multiplicity. Numerous copies of one and same text were made by many students and teachers. Many new texts were created and gained right of dissemination. The limitations of papyrus (fragility) and of parchment (dearth, scarcity) disappeared.

No wonder therefore that the 9th and 10th centuries saw an unprecedented flowering of sciences and literature in the Middle-East. Also bureaucracy profited from the wide availability of paper.
Fictitious portrait of the Chinese minister Cai Lun, said to have been the inventor of paper making.

He has some writing utensils in front of him on the table.

Chinese paper makers at work. Filling the mould with paper pulp (left), piling-up the paper leaves (right).

A Chinese papermaker at work, forming multiple layers of fiber using specially adapted moulds. Photograph (1994) from Hequing County, Yunnan Province, China.  

Different etymologies of the word for paper: *waraq* is Arabic, *qirtas* comes from Latin *carta*, *kaghidh* is a Soghdian (Central-Asia) loanword. In English ‘paper’ is derived from the ‘papyrus’.

The image shows a female paper maker from Nepal, using a simple mould over which paper pulp is poured. When the water has leaked away, the solid material is paper of blotting quality.

After drying under pressure the surface of the paper has to be covered or polished in order to prevent ink from leaking through.

A Japanese paper mould, as still in use.

Chinese, and therefore Japanese, culture is still very much characterized by a great veneration of paper, and paper making is, apart from an industry, often also a hobby and pastime.

The colophon of *Gharib al-Hadith*, by Abu ʻUbayd al-Qasim b. Sallam al-Baghdadi (d. 223/837), containing the date Dhu al-Qa‘da 252 AH (= 866 AD), and thereby possibly the oldest dated Arabic manuscript on paper preserved. The colophon (last text line) reads:

... فرغ منه في ذي القعدة من سنة اثنين وخمسين وماتين

Source: MS Leiden, Or. 298, f. 241b
A fragment of the ‘Arabian Nights’ (ألف ليلة وليلة) on paper, possibly of the 9th century, originating from Egypt.

The original manuscript measures 24 x 13 cm.

The abundant availability of paper made the foundation of schools and libraries possible. Unprecedented numbers of books were written and copied.

Here the Library of Halwan is shown in a manuscript of the *Maqamat* by al-Hariri, which was copied and illustrated in Baghdad in 1237 by Yahya al-Wasiti. Al-Wasiti’s work is the highlight of Arab painting.

The original manuscript measures 37 x 26 cm.

Source: MS Paris (BnF), Arabe 5847.
A papermaker at work:
1. Pulp is made in watermill.
2. Pulp is sieved over water.
3. Basin with watery pulp
4. Mould is filled with pulp
5. Filled mould leaks dry.
6. Sheets dry on a line.
7. Pile of sheets under pressure
8. Paper is sized and polished

Captions are in Persian, illustration from a Kashmiri manuscript (original is in colour) illustrating arts and crafts (written c. 1850-1860). Lower right corner: the well with the windlass.

Structure of Oriental paper with chain-lines spaced at regular intervals. A reconstruction, because such moulds have not survived.

Structure of Oriental paper with chain-lines in groups of three. A reconstruction, because such moulds have not survived.

Source: F. Déroche, Islamic Codicology (2006), p. 56
Example of the structure of Arab paper, irregular chain lines in pairs, waterlines of more or less the same thickness.

A Latin and Arabic manuscript on paper, dated before 1195, from Christian Toledo, Spain.

Laid paper with a structure without clearly visible chain-lines.

This Latin-Arabic Mozarabic glossary, from which this page is reproduced, is written partly on paper (inside quires) and partly on parchment (outside and heart of the quire).

It served Arabophone Christians in learning Latin.

Source: MS Leiden Or. 231, f. 56a
A European paper mill at work. The windmill (in Holland) provides the power needed for the making of the pulp (central part). At the left side, moulds are filled with pulp. At the right side sheets of paper are drying.

A windmill is used because there is hardly any running water in Holland.

Metal paper mould from a European paper mill; chain and wire lines are of metal. A watermark (anchor) is attached to the structure of the mould. At that place the paper will contain less pulp and show the watermark. Source: F. Déroche, Islamic Codicology (2006), p. 58
Detail of a metal paper mould from a Dutch paper mill; chain and wire lines are of metal. The watermark (shield, crown, post horn) is attached to the structure of the mould. At that place the paper will contain less pulp and hence show the watermark.

Source: Voorn, *Papiermolens van Noord-Holland*, plate 51
Islamic watermarks in European paper.

European papermakers soon realized that it was of no use to export paper with watermarks of typically Christian or Western symbols (crosses, crowns) to Islamic countries. They therefore started to devise ‘Islamic’ watermarks. The crescent was often used. A very common ‘Islamic’ watermark was a combination of three crescents in decreasing size. This was called by its Italian name ‘trelune’ = ‘three moons’.

‘Islamic’ watermarks in European paper.

An example of the three crescents, a very common ‘Islamic’ watermark. This watermark is usually called by its Italian name ‘tre lune’ = ‘three moons’.

Source: MS Beirut, AUB, Khuri 364, p. 317. Khuri dates the MS 867/1462, but the paper makes this impossible.
Islamic watermarks in European paper.

Several *trelune* watermarks in Italian papers used for manuscripts found in the Balkans.

Photographing watermarks can be complicated, and the photographs are never very clear. That is why the common reference works on watermarks (Briquet, Heawood, Voorn, etc.) prefer to use drawings of watermarks.

‘Islamic’ watermarks in European paper.

Abu Shubbak, ‘the man in the window’, is the nickname of this watermark in paper made by Andrea Galvani, from Pordenone, Italy.

This leaf was used in a manuscript copied in Mecca in 1886.

Source: MS. Leiden, Or. 7019, p. 456.
Watermarks and dating

The utility of watermarks in dating a manuscript is often overrated. At best a watermark can corroborate or refute a proposed dating. Sometimes it can provide an approximate date.

However, if a very popular watermark, such as the *trelune*, Abu Shubbak, or the anchor, is used, it is virtually impossible to establish a secure dating.

The reason for this is that one can never make an absolute, one-to-one, identification between a watermark in a manuscript or document and the drawing or photograph of a similar watermark in the reference works on watermarks.

The illustrations in the reference works on watermarks provide us with an overview of trends in watermark design and of the periods and the places in which these were used. From the 19th century onwards the number of papers with watermarks becomes too large for any meaningful determination or identification.
Ottoman glass balls for burnishing paper. Topkapi Saray, Istanbul.

The written surface, a summary

We have seen that papyrus and parchment, once the two most-used materials for the making of books, have been gradually replaced by paper. The Islamic and Middle-Eastern manuscript is usually a manuscript on paper.

In the course of history other materials have been used for writing down texts. The early collections of the Qur’an consisted of a multitude of materials (textile, bones, palm leaves, etc.) which could be used, as long as there was a more or less flat surface, to write upon.

The organization of the codex

We defined the codex as an amount of quires (كراسة، ملزمة) consisting of a number of folded sheets, leaves (صفحة). These leaves are sewn together into a quire, the quires are sewn together into a volume. The volume is often bound. One side of a leaf is called a page (صفحة).

The sewing and binding is usually done after the book has been copied by the copyist. The copyist must take a number of measures in order to ensure that the leaves of the manuscript remain in their proper order within the quire, and he must equally take care that the quires remain in their proper order within the book.

In our ‘normal’ printed book this is ensured by page numbering, but in the manuscript era the pages were usually not numbered. References were not given by the page or folio numbers. If we refer to certain page numbers in a manuscript, these numbers have been added at a much later date, usually by a modern owner, reader or librarian.
The maker of the manuscript

The person who makes the manuscript is the copyist, the person who copies the text. He is usually not the author of the text. Author and copyist must be clearly distinguished.

In modern times the work of the copyist has been taken over by the printer and the publisher. In a modern printed book we usually find both the author and the publisher on the title-page (and sometimes the printer is mentioned somewhere in the book as well). Each of them has a task of his own. The author conceives a text, the printer multiplies the text, the publisher finds an audience to whom he can sell the text in book form. Author, printer and publisher share the proceeds, if any. They try to earn money from the book.

In the pre-modern period is was only slightly different. An author conceives a text, he teaches it in an educational institution (and often earns a living by that). His pupils copy his book with his permission and they establish themselves as teachers for that book and they in turn often earn by teaching it, and so on. Whether or not teachers in a traditional environment should earn money from their teaching is subject of hot discussions among the scholars, however.
Notations in the codex: a quire is a gathering of units: bifolium, folio, page (sheet, leaf [or folio], page). A number of quires sewn together form a codex. A page is one side of the leaf. A leaf is one half of the sheet (or bifolium)

p. 1 = f. 1r = f. 1a  
p. 2 = f. 1v = f. 1b  
p. 3 = f. 2r = f. 2a  
p. 4 = f. 2v = f. 2b  
recto = الوجه.  
verso = الظهر.  

Source: F. Déroche 2006, p. 65
The quire, or gathering, is usually composed of a number of folded sheets. In the Mashriq the number of sheets used for one quire is often five. In Central-Asia this is often four. This quire has five sheets (bifolia) = ten leaves (folios) = twenty pages.

Source drawing: Witkam 1982
Number of sheets and leaves per quire

There is no fixed rule or law for the number of sheets in a quire. In principle the copyist can do as he likes, but he may feel bound to local traditions. Even if the number of sheets per quire in the Mashriq is often five, in Central-Asia often four, in the Maghrib often three, it is not rare that one finds other quantities, even within one and the same volume.

It can also happen that the quire does not consist of folded sheets only, but that there also half sheets (= leaves) are used. And many more irregularities can happen in the composition of the quire. There are several ways to describe these, as we will see.

It is important to look at the condition of the quires, because they are in fact the physical make-up, the architecture of the book. If regularities occur this may mean that the text is incomplete. It can also mean that the copyist has an irregular supply of paper, or that is a sloppy person.
Irregular set-up: one folded sheet + one leaf, showing 3 ff. = 6 pp.

The single leaf has a ‘stub’ so that it can be sewn into the quire.

This sometimes happens in large parchment manuscripts, when very large animal hides are not always available.

Source: Déroche 2006, p. 65.
Another irregular set-up: one folded sheet + one leaf, showing 3 ff. = 6 pp.

This single leaf has no ‘stub’ and has to be kept in the quire with a separate piece of paper or parchment. Such a separate piece is called ‘guard’.

This sometimes happens in large parchment manuscripts, when very large animal hides are not always available.  

Source: Déroche 2006, p. 65.
Single leaf of a Qur’an manuscript on parchment (40 x 32 cm), showing a ‘stub’ (at left).

Text begins with Qur’an 16:96.

Interesting detail: In the National Library in Paris is a Qur’an (Arabe 331), from which this leaf originates. The Paris manuscript was purchased in Cairo in the early 19th century, the Leiden manuscript in the 1970’s in Beirut.

A C-14 test has indicated the fragment’s age as from the middle of the 7th century CE.

Source: MS Leiden, Or. 14.545b, recto side.
Describing quires in a formula

Bibliographers have devised several systems to describe quires in the form of a formula.

For more or less ‘normal’ manuscripts on paper such a rather simple system works as follows:

For instance: a volume of 100 leaves comprising only quires of five sheets will be described with this formula: 10 V (100), meaning 10 quires of 5 sheets (the ‘five’ indicated by the Roman numeral), with highest folio number = 100 between brackets.

Another example: A volume of 7 quires consists of 6 quires of 5 sheets and of one quire of 4 sheets. Formula: 6 V (60), IV (68). If a leaf is lacking from this last quire we write: 6 V (60), IV-1 (67). If there is an extra leaf in this quire we write: 6 V (60), IV + 1 (69).

Quire of four sheets (= eight leaves) of MS Paris (BnF) Arabe 328a, ff. 7a-14b, being a Qur’an on parchment from the latter part of the 1st century AH (beginning 8th century AD).

Source: Déroche 2006, p. 73.

Gregory’s Law is followed: hair to hair (H), flesh to flesh (F). Proposed quire formula:
F7H H8F F9H H10F/F11H H12F F13H H14F

Source: Déroche 2006, p. 73.
Quire of five sheets (= ten leaves) of MS Paris (BnF) Smith-Lesouëf 193, ff. 11a-20b, being a Qur’an on parchment. This is common setup of quires in old parchment Qur’ans.

Source: Déroche 2006, p. 75.

Gregory’s Law is not followed: the outward side of all sheets is hair side, the inward side of all sheets is flesh side:

H11F  H12F  H13F  H14F  H15F/F16H  F17H  F18H  F19H  F20H

Source: Déroche 2006, p. 74.
Quire of three sheets (= 6 leaves) and four single leaves (with stubs), together constituting a quire of 10 ff.

It is MS Paris (BnF) Smith-Lesouëf 193, ff. 11a-20b, being a Qur’an on parchment.

Source: Déroche 2006, p. 78.
Quire of three sheets (= 6 leaves) as used in the Maghrib. It is MS Paris (BnF) Arabe 395, ff. 19a-24b, being a Qur’an on parchment.

Gregory’s Law is followed: hair to hair (H), flesh to flesh (F). Proposed quire formula:
H19F F20H H21F/F22H H23F F24H

Source: Déroche 2006, p. 78.
Note: The use of mixed materials (parchment and paper) is apparently an Andalusian feature. The second half of the twelfth century seems to be the period in which paper started to be used in al-Andalus.
West-African manuscripts are usually written on single leaves or on sheets, but these are not made into quires. These leaves and sheets are put onto a pile, and then kept in a satchel.

Source: MS Leiden Or. 14.052 (7)
Page numbering in a 7th- or 8th-century MS (Makarim al-Akhlāq, by al-Khara’īti), upper left corner: ٥٢ ﻣﻦ = [folio] 5 of [quire] 2. The manuscript consists of quires of five sheets.
Source: MS Leiden Or. 122, ff. 13b-14a
Page numbering in a 7th- or 8th-century MS (Makarim al-Akhlāq, by al-Khara’iti), centre upper margin: ٢ = halfway quire 2. The manuscript consists of quires of five sheets. Note that the word الجز is used here in the sense of quire. Source: MS Leiden Or. 122, ff. 14b-15a.
Title-page of *Makarim al-Akhlq*, by al-Khara’iti, a work of which is said that it is *mugazza’* (مجزأ), which means that it is divided into parts (*agza’* - أجزاء).

In this type of manuscripts, the ‘parts’ coincide with the quires. Often the title-page has a chain of *riwayat*, whereas the last leaves have *sama’at* and *qira’at* (listening and reading certificates).

Source: MS Leiden Or. 122, f. 1a.
Last pages of the first ‘part’ of *Makarim al-Akhlaq*, by al-Khara’iti, end of text followed by reading and listening certificates.

Source: MS Leiden Or. 122, ff. 8b-9a.
Systems of numbering 1

Quire-numbering in *abgad* (left: *ha’* = 8, *alif* = 1), and page numbering in the quire: ‘1 of 8’ = ‘folio 1 of quire 8’, in a MS of 554/1159 (MS Paris, BnF, Arabe 6080, f. 70a (detail))

Source: Déroche 2006, p. 92.
Systems of numbering 2

Quire-numbering in words (20th), here indicating (the first folio in) quire 20, in a MS of the *Sharh Alfiyyat Ulum al-Hadith*, by al-‘Iraqi. An autograph manuscript copied in 773/1371.

Source: MS. Beirut, AUB, Khuri 203, p. 284.
Systems of numbering 3

Quire-numbering in figures (K 4 = Kurrasa 4) in a MS of *al-Dhari’a*, a work on the numbers and figures in the Shari’a. Possibly a 19th-century copy.

Source: MS Beirut, AUB, Khuri 364, f. 31a. Khuri gives the date of copying as 867/1462, but this is impossible due the European paper. In fact the date is on the final page of the text, and does not indicate the date of copying at all.
Systems of numbering 4: Table of ghubar (in a MS of Barcelona, 562/1166, MS Paris BnF Arabe 2960) and of rumi or Coptic (in a MS of 522/1128, MS Paris BnF Arabe 2903) figures.

Example of *hindi* (right) and *ghubari* (left) numbers in *Sharh Fath al-Wahhab*, an introduction in arithmetics in which the numbers are described. Dated 878/1473, but this is impossible because of the use of European paper.

Source: MS Beirut, AUB, Khuri 650, p. 6 (detail)
Example of ghubari numbering (49) in a manuscript from Andalusia, 13th or 14th century (?). *Kitab al-Musta`ini* by Ibn Biklarish. Dating of the use of this numbering is difficult, because we do not know when these numbers have been added to the manuscript. Numbering is usually something of the owner or librarian, not of the copyist.

Source: MS Leiden Or. 15, f. 49a
A chronogram (Tarikh) in a Turkish manuscript, dated Ramadan 1205 (1791).

Manẓūma-yi Silsilanāma or Kitāb al-Silsila (p. 1) or Kitāb al-Silsila al-Ǧalwatiyya (p. 193) or Silsila-yi Ǧalwatiyya (p. 194), the spiritual pedigree of the Ǧalwatiyya Ṭariqa, by al-Shaykh Ismāʿīl Ḥaqqī [Bursalı] (p. 1), who completed the work in 1137 (1724-1725, chronogram with the significant letters written in red on p. 195.

Source: Stanford, Green Library, MS O-907805515, p. 195, detail.
System of order: Catchword (تَعْقِيبَة) in a MS of Ziyadat al-Tatimma by al-‘Udhri, dated 848/1444. This has become the most used system of keeping the leaves of a manuscript in correct order.

Source: MS Beirut, AUB, Khuri 244, pp. 1-2
Bibliographical references:


Bibliographical references (cont’d):


H. Voorn, *De papiermolens in de provincie Noord-Holland*. Haarlem (De Papierwereld) 1960


References to manuscripts in the Leiden library can be found in the on-line inventories by J.J. Witkam. These can be accessed through the URL: www.islamicmanuscripts.info and then navigate => inventories => Leiden.