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How to identify Asian papers? A syncretic approach

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Claude Laroque

How to identify Asian papers? A syncretic approach

Introduction

Sir Francis Bacon in 1620¹ recognized printing, and thus implicitly paper, as one of the three great human inventions:

Again, let a man only consider what a difference there is between the life of men in the most civilised province of Europe, and in the wildest and most barbarous districts of New India; he will feel it be great enough to justify the saying that 'man is a god to man', not only in regard of aid and benefit, but also by a comparison of condition. And this difference comes not from soil, not from climate, not from race, but from the arts.

Again, it is well to observe the force and virtue and consequences of discoveries; and these are to be seen nowhere more conspicuously than in those three which were unknown to the ancients, and of which the origin, though recent, is obscure and inglorious; namely, printing, gunpowder, and the magnet. For these three have changed the whole face and state of things throughout the world; the first in literature, the second in warfare, the third in navigation; whence have followed innumerable changes; insomuch that no empire, no sect, no star seems to have exerted greater power and influence in human affairs than these mechanical discoveries.

Joseph Needham² pointed out that, according to Francis Bacon, the origins of the three inventions he mentioned as the major ones were 'anonymous' and 'obscure', and that he died without having known that all of them were Chinese.

What is the benefit of studying Asian papers?

Why look at paper, its origins, manufacturing, its development within societies and its historical and geographical background? The answers to these questions are many, and the first of them is undoubtedly the impact that paper has had on societies which have adopted it, throughout its development until today. From manufacturing at a microeconomic level, the development of production leads to the huge paper groups that now dominate the global market.

Originating in China, paper met huge success throughout Asia and contributed to the development of societies because it is a vehicle of thought in the service of the state (documents related to the exercise of power and the management of areas controlled by the state), economy and trade (creation of paper money, acts of commercial transactions of all types), religion (religious texts, papers used during ceremonies and festivals) and the arts (painting, calligraphy, poetry, philosophy, and so on). Thus, societies will produce various kinds of documents accompanying their political, economical, religious or artistic activities. These documents circulate via various routes, sometimes to distant destinations.

The main vector of printing development in both Asia and Europe, paper represents human industry with a lasting impact on the evolution of societies. Indeed, text printing demanded another substrate than those commonly used before the arrival of paper, whether wood or bamboo tablets, silk fabrics in China, or parchment in Europe.

¹ The *Novum organon, or a true guide to the interpretation of nature*, by G.W. Kitchin, published by Oxford University Press in 1855, is the fourth translation of *Novum Organum* which first edition was published in 1620. Book I, CXXIX: *Aphorisms concerning the interpretation of nature and the kingdom of man*, by Sir Francis Bacon.

² Joseph Needham, 'Les Chinois: des précurseurs de la science moderne', *Courrier de l'Unesco* (October 1988).



Fig. 1 Grindstone used for preparing fibre pulp, Yuanshu (Zhejiang province), China. Image copyright C. Laroque.

The dissemination of paper was spread in both directions from China: to the West along the trade routes of northern and southern China to Europe, and to the East, together with the development and spread of Buddhism coming from India to China, Korea and Japan. However, paper met some resistance when other writing carriers satisfied the user's needs, as is the case of palm leaves, which persisted in India, for example.

Papermaking, in its beginnings, was closely linked to other economic areas of rural life. Originally, the Chinese papermaker was a farmer who added to his farming activities a task allowing him additional income, a task he could undertake when the season prevented him from working in the fields. Angus Maddison³ recalls that, in China, agriculture is in the hands of peasants who are largely free to plan their own working arrangements, a situation that favours initiatives. He explains that, as the percentage of cultivable land is low, the farmer can overcome this disadvantage by increasing the productivity of land, and by using the workforce intensively. Papermaking as a secondary business is a good demonstration of an individual initiative, as well as the need to expand too-modest incomes. According to society's demands, this combination of activities will continue or will disappear, with paper production becoming a full-time job, as was the case, for example, in Japan.

However, regardless of the geographical area, papermakers have adapted to local constraints imposed by the availability of plants providing cheap and abundant fibres. They have found adequate solutions to more, or less plentiful water resources. Along with these constraints imposed by nature, they have been able to identify indigenous technologies and to appropriate them for their own professional practice. These technologies are mostly related to the agricultural world. The papermaker will use grindstones or beaters widely used in grain milling to crush raw materials for the manufacture of paper (Fig. 1), and will use current farm tools, such as pitchforks, sickles and knives to lift, cut, chop and scrape the raw or already processed materials. Indeed, the techniques are not interchangeable units but inseparable sets of sequential technical operations, and as such, developments in one milieu may have influenced their use in another. Such technical shifts are described by the French anthropologist André Leroi-Gourhan in his works on the anthropology of techniques. Such technical shifts are described by the French anthropologist André Leroi-Gourhan in his works on the anthropology of techniques.⁴

³ Angus Maddison, *L'économie chinoise. Une perspective historique*, 2nd ed., revised and updated (Paris: OCDE, 2007).

⁴ André Leroi-Gourhan, *L'homme et la matière* (Paris: Albin Michel, 1943); André Leroi-Gourhan, *Milieu et techniques* (Paris: Albin Michel, 1945).



Fig. 2 Paper drying on heated walls, Fuyang (Zhejiang province), China. Image copyright C. Laroque.



Fig. 3 Paper drying on outdoor walls, Xingjuang Ji Jas ha (Yunnan province), China. Image copyright C. Laroque.

Weather conditions have also influenced paper production processes. For example, underground tanks have been used in northern China to prevent the pulp from freezing, and in some regions or in some seasons, the drying of paper, usually performed inside the house on heated walls in humid or cold areas, has been transferred to outside walls in hot zones (Figs. 2, 3).

Like all other industries, papermaking has evolved, improving its tools and production methods, accelerating its returns, through papermakers' entrepreneurship and cleverness, and taking advantage of local resources in the various regions.

A socio-economical study of papermaking also offers interesting information. Papermaking in Asia is a family and village business, a reflection of the social organization. The example of China is in this respect representative because, if papermakers are in competition, they must also cooperate. They are caught in mutual networks providing help, as for other agricultural activities, particularly rice cultivation which requires solidarity and the sharing of water.

Papermakers are part of a knot of trade relationships across the village and the region. Papermaking belongs to a commercial network, as is the case for other goods exported to very distant destinations.

Blank paper has been especially coveted by countries which did not know how to produce it. Chinese papers are used by scholars, monks, merchants and also within local administration in neighbouring countries, or those areas under the domination of the Chinese empire until a regional production reduces their import. A good example is provided by Japan, where the oldest archival documents are written on Chinese paper.

Thus ancient documents that have survived have to be studied from different angles to better position their provenance and production date.

The history of paper is, like other industries, a case of need and demand, access to raw materials, transport of goods, cost and competition between individuals or regions. It is intimately linked to the economic, social and intellectual history of a country, a region.

Studying the techniques from what is still existing in Asia: Is the method reliable?

There are several ways in which those who want to can study the development of the industry, learn which were formerly the most used techniques, and see how they spread and evolved or were perpetrated in different societies. The

use of bibliographical sources citing explicitly or implicitly the manufacture, the trade or the use of paper is the most conventional method. While these sources often provide valuable historical information, they are often rather vague about materials and processes. What about the terminology used a few decades ago? Or what about translations from Asian languages into European languages, and their interpretations?

There is another route, the unwritten sources that can also be the bearer of knowledge. Leroi-Gourhan suggests another way in his book *L'homme et la matière* published for the first time in 1943. He says: if we are judging by the earliest evidence, paper technology dating back to the seventh–eighth centuries has changed little to the present industrialization and rural Chinese and Japanese manufacturing may serve as models.⁵

5 Leroi-Gourhan, *L'homme et la matière*.

6 Baqiao: city near Xian (Shaanxi province) where paper fragments dated from the second century BC were found in 1957 inside a tomb.

7 Père Pierre d'Incarville, *Arts, métiers et cultures de la Chine représentées dans une suite de gravures ...* (Paris, 1815); Stanislas Julien, *Industries anciennes et modernes de l'empire chinois d'après les notices traduites du chinois* (Paris, 1869); Dard Hunter, *A Papermaking Pilgrimage to Japan, Korea and China* (New York, 1936).

The text predates the discovery in 1957 of the Baqiao site⁶ and, if the author is mistaken about the date of appearance of paper, it remains very relevant. The narratives from European travellers, such as those from Father Pierre d'Incarville at the beginning of the nineteenth century, those from Stanislas Julien a little bit later or those from Dard Hunter in the mid-twentieth century, describe manufacturing techniques which are still visible currently in various parts of Asia.⁷

Do the homogeneity and consistency described by Leroi-Gourhan allow us, however, to extrapolate techniques that have been in existence for more than 2000 years? Could the researcher rely on the documentary device of using current practices to rebuild the history and evolution of papermaking?

It is clear, if considering current practices in papermaking in Asia, that developments lead to minor variations accompanied by a greater or lesser sophistication in the use of raw materials, the manufacture of the paper sheets and the type of tools which are used.

Challenge or Utopia? Towards a multidisciplinary approach to the study of paper

The study of paper is a fragmented field in which several professions are interested: the historian, the philologist, the conservator and so on, each observing the paper at a specific angle which he thinks is relevant to him.

Paper is strongly linked to the text, and the material aspects of the sheet on which it is registered are often neglected by philologists. Interest in the intellectual content of the text has unquestionably taken precedence over its materiality. Only codicological and palaeographic elements are specifically studied because they are very closely linked to the elaboration of the text. But the study of the paper itself is conspicuous by its extreme brevity!

However, if one reflects on the matter, the book, whether handwritten or printed, is an object that can be studied both in terms of its intellectual content and its material production (and therefore, its substrate.) And if we know how to examine them, the papers will provide clues to help in the identification of their origin or date.

Far from being an auxiliary science, the scientific approach to manuscripts is the foundation of any historical research via the various stages of the identification of texts and the description of the various elements of both the substrate and the writing. The technological, historical, palaeographic and analytical approaches are therefore essential for our full understanding of documents or artworks on paper.

By contributing their different but complementary approaches, historians, philologists, scientists and conservators gather information that, taken together, provides a better understanding of the documents. Unfortunately, these researchers live in separate spheres, leaving little chance for the pooling of their respective work, and often ignoring their complementarity.

The work of the palaeographer and philologist on texts is of primary importance because it brings essential elements regarding the content

of texts, their composition, the writing's styles. But the text cannot be dissociated from the support on which it is drawn.

The technological approach is also limited if it is not complemented by other information provided by history, ethnography, ethnobotany, botany and so on.

Paper is made to be used and not to be subjected to chemical analysis; the results of analysis of paper components must be situated within the general context of the study of the subject, similar to archaeological objects, which, separated from the excavation context, lose much of the information that they carried. Thus, instrumental analyses provide necessary supplementary information, but they are not sufficient in themselves to identify places and dates of production of the papers.

Relying on observation. Appropriating study models from other disciplines

As already mentioned, the researcher wishing to conduct work on identifying Asian papers must submit to a varied approach, technological, historical, palaeographic, analytical. This work along several paths will lead him to a good understanding of paper documents or works of art on paper.

Apart from the conventional methods already cited, codicological, palaeographic and historical analysis based on written sources or chemical analysis conducted on the paper component, the researcher may also follow paths trodden by others, appropriating study models used in other disciplines.

This is the case of semiotics. The founders of this discipline, Charles Sanders Peirce and Ferdinand de Saussure,⁸ provide a model for the interpretation of signs that is perfectly applicable to Asian papers. The method aims to identify and describe the signs, and then to conduct an analysis of these signs that will lead to an interpretation and hypothesis.

These signs are more or less obvious to a careful observer. Observing a sheet of paper without sophisticated analytical tools, we can gather extensive information about the paper production methods and make assumptions about the manufacturing stages, the place and date of production.

⁸ Charles Sanders Peirce, *Écrits sur le signe, textes rassemblés traduits et commentés par Deledalle G* (Paris: Le Seuil, 1978); Nicole Everaert-Desmedt, *Le processus interprétatif. Introduction à la sémiotique de Ch.S. Peirce* (Liège: Mardaga, 1990).



Fig. 4 Imprint of Indian woven paper formed on a mould with textile sieve. Image copyright C. Laroque.



Fig. 5 Imprint of Chinese laid regular paper formed on a mould with movable net. Image copyright A. Helman-Wazny.

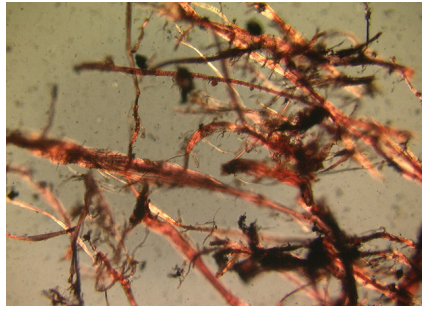


Fig. 6 Highly beaten fibres. Image copyright A. Helman-Wazny.

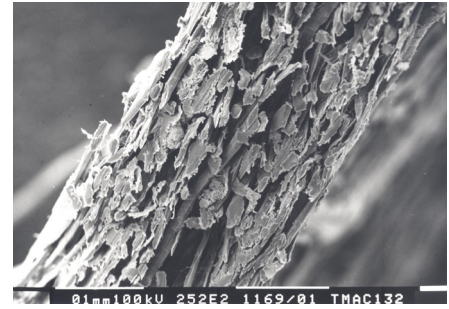


Fig. 7 Korean paper made of two papers formed with five layers of pulp each. Image copyright A.G. Rischel.



Fig. 8 Chinese laid paper with regular distribution of fibres. Image copyright A. Helman-Wazny.



Fig. 9 Chinese laid paper with irregular distribution of fibres. Image copyright A. Helman-Wazny.

Microscopic examination allows us to assess the extent to which the fibres were beaten (Fig. 6), or whether the sheet formation was made in one or several scoops, creating successive layers (Fig. 7). Furthermore, the fibre distribution provides information about the care taken in the manufacturing of the sheet (Figs. 8, 9).

Other traces are readily detectable to the naked eye, such as those left by brushing a sheet on a wooden board for its drying (Figs. 10, 11), or the treatment of its surface (Figs. 12, 13). Methods implementing more extensive techniques, such as a scanning electron microscope, provide information about particular processes or regions, for example (Figs. 14, 15).



Fig. 10 Vietnamese paper with brushstrokes on the surface. Image copyright C. Laroque.



Fig. 11 Japanese paper with wooden veins imprint on the surface. Image copyright C. Laroque.

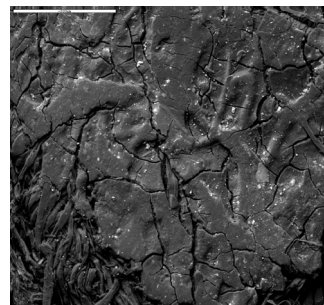


Fig. 12 Arab paper with highly sized surface. Image copyright A.G. Rischel.

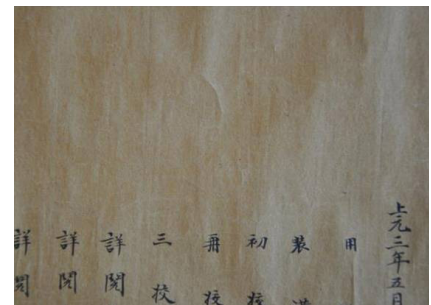


Fig. 13 Chinese paper with shiny surface. Image copyright A. Helman-Wazny.



Fig. 14 Hammering of paper or *dochim*, Gyung Gi, Korea. Image copyright C. Laroque.

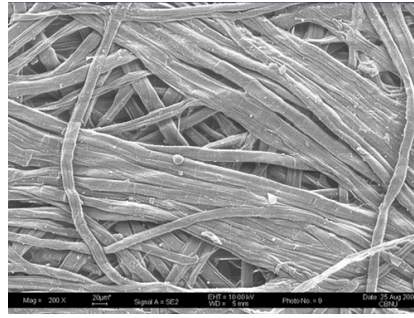


Fig. 15 Korean paper: fibres after hammering. Image copyright H. Kim.

The details can also help us to trace the manufacturing affiliation. More particularly, the type of paper mould and the sheet formation mode linked to it inform us about the origins and/or the time of the technology transfer (Figs. 4, 5).

Working from a regional or national vision

A broad approach to the study of Asian papers based on the gathering and compiling of information covering several countries allows for building bridges to cross historical and technological data and expand the vision and practices. It helps to highlight the similarities and also the differences in practices. It also allows speculation regarding affiliations, revealing the archaisms, to find processes that have almost entirely disappeared. A transnational vision is often useful to avoid the pitfalls of nationalisms.

The study of papers can help to solve the thorny problem faced by philologists: how to cross the gap between the content of a document, its language, its script and its origin. It helps to obtain information from historical and geographical settings which are now obsolete.

A multidisciplinary and international research

Research work on Asian papers began in 2010, bringing together a multidisciplinary and international team and funding running over two periods: 2010–12⁹ and 2013–15.¹⁰ This collaboration between research institutions, both in France and abroad, involving scholars from the West and East, allowed for the pooling of complementary expertise in identifying papers from Asia. The final aim of the research is to help in identifying collections from Asia and Western works of art made on Asian papers.

The research which was developed in 2010 includes:

1. The gathering of documents on current manufacturing practices in China, Korea and Japan
2. The creation of a multilingual database on Asian components of papers, available online
3. The development of analysis protocols for the characterization of the basic elements of the papers
4. The development of a descriptive method for documents and artworks on paper.

The first two points have been completed. The first phase of collecting materials was used as the documentary base for the other three points.

The database Khartasia (www.khartasia-crcc-mnhn.fr), available online since 2012, offers information about the materials used in the manufacture of

⁹ Partners from 2010 to 2012: Pantheon-Sorbonne University, Paris, France; Centre de Recherche sur la Conservation des Collections, Paris, France; Museum of Ethnology, Osaka, Japan; Kochi Prefecture Paper Technology Center, Kochi, Japan; National Research Institute of Cultural Heritage, Daejeon, Korea; Kookmin University, Seoul, Korea; Chungbuk National University, Chungbuk, Korea; Fudan University, Shanghai, China.

¹⁰ Partners from 2013 to 2015: Pantheon-Sorbonne University, Paris, France; Institut National du Patrimoine, Paris, France; Centre de Recherche sur la Conservation des Collections, Paris, France; Ecole Française d'Extrême-Orient, Paris, France; Ecole Pratique des Hautes Etudes, Paris, France; National Museum of Denmark, Copenhagen, Denmark; University of Hamburg, Germany; Fudan University, Shanghai, China.

paper, organized into fibres, dyes and a formation aids directory. It contains details of 90 plants and several hundred paper names. This database is a primary tool in the identification of Asian papers.

The database is organized around the components of the paper, the plants. Users are able to search by plant name, scientific or common, by paper constituents (fibre, dispersing agents, dyes), papers names or by 'Search' using keywords. Each plant is presented under its botanical name (Latin), the phylogenetic classification, followed by its scientific synonyms and vernacular names (in English, French, Chinese, Japanese, Korean). A descriptive section of the plant includes the intended use of the plant (fibre, dispersant, dye, sizing and insecticide . . .), the parts used (bark, stem, root, fruit . . .), the regions where it grows and where it is used for making paper.

It also provides general information on the cultivation and other uses of the plant, followed by historical information presented country by country (currently China, Korea and Japan), the preparation of raw material presented for each country, and the papers made from this plant. An illustrated fibre section includes the main elements used in the identification of the fibre.

The third research point, begun in 2013, focuses on the development of a laboratory identification protocol of basic elements of paper. Specialists from several fields work together and share their complementary skills. So Anna-Grethe Rischel and Agnieszka Helman-Wazny,¹¹ who have been working for years on microscopic analysis of Asian documents, in particular from Central Asia, are collaborating with specialists in fundamental analytical chemistry from the Center for Research on the Preservation of Collections.¹²

The reproduction of paper sheets using varying parameters, in particular the beating of fibres and carrying out accelerated ageing, will allow us to collect non-randomly characteristic elements of the paper sheets and fibres at different stages of their manufacture and degradation. This work deals with paper mulberry fibres (*Broussonetia*). The images and information collected will be used as reference models. The use of models (paper with known origin and production method) allows us to identify fibres or processes of unknown nature by comparison. The production of these reference models includes the reproduction of paper sheets according to various methods.

The descriptive guide is being developed and will be completed by

11 Anna-Grethe Rischel: Paper Conservator emeritus, National Museum of Denmark, Copenhagen, Denmark; Agnieszka Helman-Wazny: Research Associate, Asia and Africa Institute, University of Hamburg, Germany.

12 CRCC: Centre de Recherches sur la Conservation des Collections, 36 rue Geoffroy St Hilaire, 75005 Paris, France.

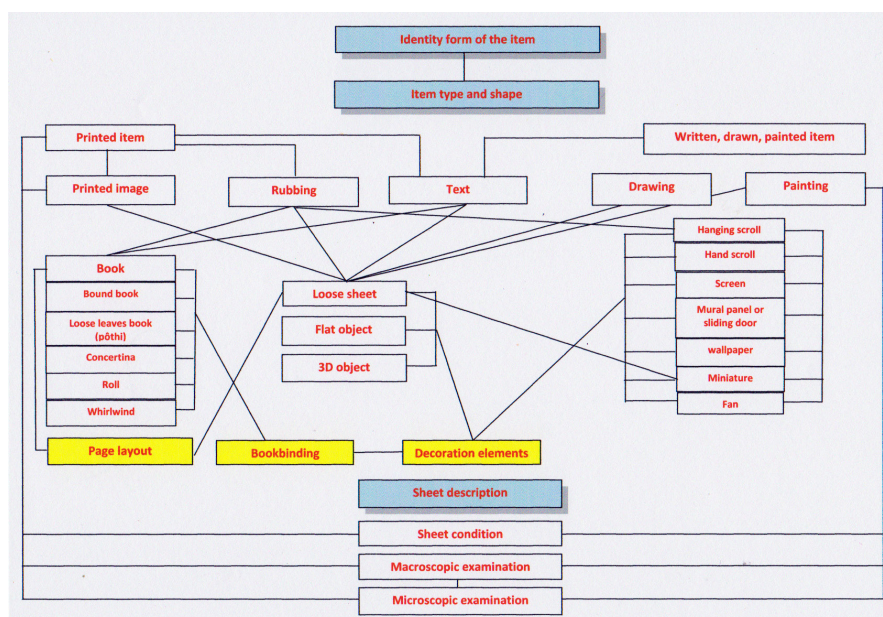


Fig. 16 Organogram showing the interrelationships in the descriptive guide.

the publication of a book and a database available to researchers. The guide brings together various topics: where the paper sheet comes from (origin, nature and shape of the item), its content and its shape (nature and composition of texts, scripts, layouts, etc.), description of the sheet (shape, manufacturing and general condition) and its components (fibres). It is based on the global observation of the object and on the macroscopic and microscopic observation of the paper sheet (Fig. 16). As has been said previously, the approach takes into account the various parameters, providing additional information when they are put together. For example, if one wishes to observe the paper from a bound manuscript, it is necessary to consider the nature of the binding, the type of writing, the text content, the appearance of the paper sheet and, only at the very end, the nature of the fibres.

Conclusion

The originality of this research lies in the convergence of expertise from both the humanities (history, history of techniques, ethnography, sociology, palaeography, codicology) and the sciences (botany, physics, chemistry). We hope that various heritage stakeholders, conservators, curators, historians, archaeologists and philologists will benefit.

The database Khartasia focuses on three countries which have produced paper over a long period: China, Japan and Korea. The descriptive guide will be useful for documents from various parts of Asia, including the Middle East. The cataloguing of texts and the collection of images and information on paper production modes also allow for an overview of an endangered industry in countries in the process of modernization.

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Abstract

Paper manufacturing processes and their chronological evolution in the West are well studied, but few technological research projects of Asian collections have taken place in the West. Since 2010, Claude Laroque has assisted in the creation of a multilingual database (www.khartasia-crcc-mnhn.fr) on the materials used in the manufacture of Asian papers: fibres, colourants and formation aids. In 2013 the author also worked in a second research area focusing on the development of a protocol for identifying the basic components of papers. Specialists from several fields worked together with their complementary expertise. The general paper

analysis protocol will be complemented by a palaeographic codicological study of documents. The use of existing descriptive protocols developed in the paper industry or by historians and philologists will complete the procedure for creating a descriptive guide of Asian documents and works of art. The originality of this research is thus based on a combination of skills from both humanities and sciences. The ultimate goal of this work is to trace the evolution of paper manufacturing methods from both chronological and geographical points of view to facilitate their dating and provenance of production.

Biography

Claude Laroque is senior lecturer at Panthéon-Sorbonne University, Master program in conservation where she is in charge of the book and paper department. During the last 15 years her main research topics have been the conservation of transparent papers (which her PhD focused on), the conservation of collections in tropical countries (she has long term involvement in a teaching program in Africa) and the technology of papermaking in Asia. The research she is currently conducting on Asian papers started in 2010. It is a joint program with partners in France, elsewhere in Europe and in Asia.

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