During the last 25 years or so, a growing awareness of the importance of the Islamic handwritten heritage led to new research on the production of books in Muslim societies before the introduction of the printing press. Codicology, that is 'the study or knowledge of codices' developed in the sphere of Islamic manuscripts. At the same time, the need to train specialists working in this field is increasingly felt and the al-Furqan Islamic Heritage Foundation which had already started some programmes in this direction decided to publish the present handbook as an answer to this new situation.

With more than 150 illustrations and drawings, indexes and an extensive bibliography, this book is primarily meant to provide a practical guidance for the beginners in codicology. They will find here a clear introduction to the techniques used by the craftsmen who for centuries were involved in manuscript production, from paper making to book binding. On the other hand, the scope of the documentation itself - more than 700 manuscripts are referred to - turns the present volume into a true reference book for those who are already familiar with the world of manuscripts and are looking for comparative material.
François Déroche completed his secondary school in Nancy and was admitted to the Ecole Normale Supérieure in Paris where he was educated from 1973 to 1978. He studied there Semitic languages and archaeology, but also classics and passed an agrégation in this field. He completed a doctorate on the inscriptions of Dedan, the modern al-‘Ula, an oasis in North-Western Arabia (1987).

In 1979, he was appointed member of the scientific staff of the Bibliothèque nationale and worked there until 1983 at the preparation of the catalogue of Arabic manuscripts; two volumes on the Qur’ān manuscripts were subsequently published. He carried on his studies on Arabic manuscripts in Istanbul, first as a scientific member of the staff of the French Research Institute (1983-86), then with a scholarship of the Max van Berchem Foundation (Geneva) for a program on the early manuscripts of the Qur’ān (1986-88). He was elected in 1990 professor (directeur d'études) at the École Pratique des Hautes Études, in the department of history and philology, where he teaches the history and codicology of the Arabic handwritten book.

In addition to the catalogue of the Qur’ānic manuscripts of the Bibliothèque nationale (1983-85), he has published The Abbassid tradition, Qur’āns of the 9th to 10th centuries (1989). Buchkunst zur Ehre Allâhs. Der Prachtkoran im Museum für islamische Kunst, in collaboration with A. von Gladiss (1999), and Le livre manuscrit arabe. Préludes à une histoire (2004). He also published with S. Noja Noseda the facsimile of two early Qur’ānic fragments, BNF Arabe 328 (a) and BL Or. 2165. He has edited the proceedings of three conferences on manuscripts and codicology, wrote many papers on both topics for various journals and is in charge of the FIMMOD, a publication devoted to the description of dated Middle Eastern manuscripts prior to 1500 AD.

François Déroche was elected in 2001 corresponding member of the Académie des Inscriptions et belles-lettres in Paris. He is president of the International Congress of Turkish Art and of the SEMPAM, a learned society of studies on the Maghrib in Classical and Mediaeval times; he is a member of the scientific council of the Max van Berchem Foundation (Geneva) and of the al-Furqān Council for the Preservation of the Islamic Written Heritage (London).
Islamic Codicology
an Introduction to the Study
of Manuscripts in Arabic Script

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with contributions by
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Preface

The second conference organised by al-Furqan Islamic Heritage Foundation in December 1993 highlighted the need to provide better training to those interested in the study of Islamic manuscripts, and eventually in the publication of catalogues. It was agreed to make the provision of such training one of the priorities of the Foundation. This effort was to complement the projects of surveying and cataloguing Islamic manuscript collections worldwide, which were already in the implementation stage. Two decisions were taken: the first was to organize training courses in codicology and cataloguing; and the other to prepare and publish a handbook which would give ready access to the knowledge needed by those who wish to work in this field of research.

Training courses were started as early as 1994 and allowed many young scholars to acquire skills and know-how in Islamic manuscripts. The handbook was still no more than a plan, although the publication of the papers of the 1993 conference provided a clearer idea of what it should ultimately include. These papers were published in English as The Codicology of Islamic manuscripts, London, 1995. While the Arabic version, Dirāšt al-makhlīqa al-islāmīyyah bayna i stibārāl al-maddah wa-l-bāshar, was published in London, 1997.

Professor François Deroche, a leading authority on Codicology who presented a scholarly paper at the conference, mentioned that he was writing a handbook on the same subject. This information was received with enthusiasm, as no better scholar could have been entrusted with such task. The French edition of this book, Manuel de codicologie des manuscrits en écriture arabe, was published in 2000. With Professor François Deroche's kind agreement al-Furqan Foundation undertook the translation and publication of this book in Arabic and English. Publishing such a book was all the more urgent because, over the years, the need to preserve the collections of manuscripts became a major preoccupation for the Foundation. The traditional skills necessary for both the production and conservation of the manuscripts declined rapidly during the last century. New dangers appeared to threaten the handwritten heritage of Islam. Hence, the present handbook is seen as a valuable contribution to the training of those who are in charge of the restoration and preservation of Islamic manuscripts.

In order to meet all these goals, the handbook departs from the style of the volumes previously published by the Foundation, as it was deemed necessary to illustrate the various components of the codex.
The Foundation is pleased to present this contribution, hoping that it will serve its general strategy of manuscript preservation and provide those who are interested in manuscripts with a better understanding of the peculiarities of the Islamic tradition in this field.

Ahmed Zaki Yamani
Chairman, al-Furqān Islamic Heritage Foundation
London, November 2005

Foreword

The present handbook is in no sense a history of the handwritten book in the Islamic world. It aims only at providing the reader with the basic facts and methods needed in order to understand the physical characteristics of a manuscript. Even in this respect, it does not claim to be exhaustive: as far as the handwritten tradition in Arabic script is concerned, our knowledge of the materials and techniques which have been used through the centuries is still largely elementary. Many collections still await full descriptive cataloguing and an immense number of important manuscripts have yet to be published. It is my hope that this book will stimulate a wider interest in this field of research and that readers will in turn contribute their observations, comments and criticisms to the development of the codicology of manuscripts in Arabic script.

The English version is not a mere translation of the French original. It has also benefited from comments offered by colleagues after reading the original, and in certain instances I added information either to complete the text or correct a deficiency. In this respect, I want to thank both the translators, Deke Dusinberre and David Radzinowicz, who spared no efforts to find the mas juste and the scientific editor, Dr. Muhammad Isa Waley, who made extensive stylistic revisions to the draft translation.

The generous commitment of the al-Furqān Islamic Heritage Foundation has been instrumental in publishing the English translation of a work which was itself prepared with the support of the Max van Berchem Foundation (Geneva). I would like to thank the members of the staff of the Foundation whose dedication and patience contributed to the realization of this project and also to pay tribute to the memory of the Foundation’s former director, the late Prof. Yusuf Ibis, who supervised the beginning of the work. It is my pleasure to thank here colleagues, especially Adam Gacek and Gérard Trupei, whose helpful comments have contributed towards an improved translation.

François Déroche
Correspondant de l’Institut
Transliteration of Arabic characters

In parentheses the transliterations as they may appear in the bibliography

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Introduction

Manuscript: the first appearance of this term as a noun in the late sixteenth century – in English as well as in French – indicates that its existence is due in part to the invention of printing. It was only when books were no longer all copied by hand, as the traditional mode of making them was giving way to this irresistible rival, that a new word entered the language: manuscript, a book "manually inscribed", written by hand. And it is books that are the subject of this volume. Of course, in many other contexts, ranging from administrative documents to literary composition, the hand continued to favour the pen and was not to abandon it until long after the sixteenth century. This, however, applies not to books but to documents, whose study falls within the domains of papyrology, diplomatics, and so on. Similarly beyond the scope of this study are inscriptions, even though some of them record texts that also appear in manuscripts or were executed with implements similar to those used by scribes. It is the book, copied by hand for centuries – and more precisely a specific form of book, the \textit{codex} – that is the focus of the field of codicology.

What is codicology? It is a recent term that has its origin in scholarship.\footnote{The \textit{Shorter Oxford English Dictionary} dates the term to the mid-twentieth century; for the history of its French counterpart, \textit{codicologie}, see Lemaire, \textit{Introduction}, p. 1 (notes 1 and 2).} A definition that sticks close to the etymological roots would be 'the study or knowledge of codices' (from the Latin \textit{codex} and the Greek \textit{λόγος}). This answer, however, is too brief and needs to be expanded upon. The field that has adopted the name of 'codicology' can arguably claim a certain legitimacy from the way in which the West traditionally referred to books. Unlike Arabic, which places the emphasis on the aspect of writing (in words such as \textit{kitāb} and \textit{makhbūṭ}), English, following French and Latin, etymologically refers above all to materials: "book", 'codex', and 'volume' derive respectively from words meaning 'beech tree', 'wooden tablet', and 'roll of papyrus'. Codicology, then, refers primarily to the study of the material aspects of codices: that is, manuscript books comprising a series of gatherings, or quires, of sheets. This remains the basic structure of the book to this day, even though the printing press has replaced the hand of the copyist.

Note

Bibliographical references in the notes have been simplified when a work appears in the Guide to Further Reading at the end of the volume. There are two possible cases:
1) publications frequently cited are given in an abbreviated form listed in the first section of the bibliography;
2) other references that appear in the bibliography are given solely by title, without place or date of publication. Exhibition catalogues are identified by the name of the city in which the exhibition took place, in small capitals, followed by the date.
Not all books are codices

Before going further into the subject, it is worth remembering that books can also be made in other ways. The *volumen*, or scroll, long enjoyed a dominant position in the Mediterranean world.\(^2\) Nor did the triumph of the codex banish every other form of book. True enough, manuscripts in the form of *volumina* did not play a major role, numerically speaking, in the Arab and Islamic world.\(^3\) By the time Islam appeared, the Mediterranean world and surrounding regions had replaced scrolls by codices. *Volumina* did survive in vestigial form, thanks to the liturgical use made of them by Jewish communities – in the form of Torah scrolls – which Muhammad and his followers certainly knew of.\(^4\) But when the text of the Revelation came to be compiled into a book, it was the dominant form of the book – the codex – that was employed.

**Volumen and rotulus**

It appears that Muslim scribes never used the *volumen*, a form characterised by the layout of text in lines perpendicular to the axis of the scroll, arranged in a series of columns read one after another (see illus. 1). The only Islamic manuscripts in the shape of rolls that have so far come to light are in the form of a *rotulus* (illus. 2). In this latter case, the text runs parallel to the axis; calligraphic variations on this form are not unknown, most of them being copies of the Qur’an, but such exceptions are few and wholly untypical. To conclude this brief discussion of scrolls, a form that is peculiar to Indonesia deserves to be mentioned. It consists of long, narrow strips of palm stitched end to end, along which runs a single line of text; a wooden or metal frame holds its two rolls together side by side (MS. Jakarta Perpustakaan Nasional, Vt. 43).\(^6\)

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2 There exists an extensive literature on the history of the manuscript book, especially for the period covering the emergence of the codex. See, for example, C. H. Roberts and T. C. Skeat, *The Birth of the Codex*; A. Blumhard (ed.), *Les débuts du codex* [Bibliologgia 9] (Turnhout, 1989).\(^3\) They have continued, however, to be employed for almanacs until recent times, and for talismans down to the present day. In addition, the epistle of 'Abd al-Malik ibn Ishaq al-Kindi claims that the early Muslims left the text of the Qur’an in the form of leaves and rolls like the scrolls of the Jews, until the Caliph 'Uthman changed this practice. See P. Caramona, *Mohammed et la fin du monde: étude critique sur l’histoire du livre* (Paris, 1953), p. 121; G. Troudeau, *le ‘Kinder*’, *ESFV*, pp. 123-124.\(^4\) In referring to the Turb, the Qur’an employs the specific term *tambou* (Qur’an III. 3, 48, 50, 65, 93; V. 43, 44, 46, 66, 68, 108; VII. 157; IX. 101; X. 29; LXXII. 6; LXII. 3), which implies that it was known to the Prophet’s listeners. \(5\) S. Ory, ‘Un nouveau type de manuscrit: inventaire des corans en rouleaux de provenance damasqine, conservés à Istanbul’, *REV* 33 (1965), pp. 87-149.\(^6\) Grateful acknowledgement is due to J. J. Waliot for drawing our attention to this manuscript.
Single-sheet manuscripts

Manuscripts in the single-sheet format—that is, wherein each leaf corresponds to an individual sheet—were produced mainly during the early Islamic period. The few surviving examples are copied on parchment, which makes it easy to understand how they were made. Not a single specimen, unfortunately, has come down to us in its original binding, so that it is impossible to know how the sheets were originally held together. A typical example is MS. BNF arabe 324, which can be dated to the latter half of the second/eighth century. Initial examination shows that the flesh side of the parchment most often serves as the recto. Two series of leaves—folios 18 to 27 and 30 to 37—contain continuous texts, one of ten leaves, the other of eight. In accordance with the usual practice (to be discussed later), the flesh side of the parchment is used for the recto, except for folio 23, which is reversed. It might be thought that these are vestiges of gatherings of sixteen or twenty leaves; but another explanation seems preferable in the light of a study of the 122 leaves of a Qur’anic text found in two Istanbul manuscripts (TIEM 51 and 52), whose hand is similar to that of the Paris fragments and which present a continuous series of flesh sides as the rectos. Both examples are single-sheet manuscripts, and since each of their leaves represents an entire skin there is no fold, so that the text block is not made up of gatherings. The leaves all face the same direction; that is to say, all the rectos employ the flesh sides of the parchment, while all the versos are hair sides. The state of these manuscripts, which have clearly undergone repeated restoration, makes it impossible to determine how the leaves were originally held together. The question as to whether they were stitched flat or mounted on a stub remains unanswered. The San’ā’ manuscript (Dār al-Maktabāt 20–33) may also have been made of single sheets, though it is not clear whether the leaves all face the same way as of this writing, there is no precise information on this point. Was this approach ever adopted for manuscripts written on paper? We cannot exclude the possibility that Qur’āns of very large size, such as the so-called Baysunghur Qur’an, each folio of which today measures 177 x 100 cm, may have been made of single sheets.

The expansion of Islam soon brought Arab conquerors into contact with other civilisations in which book manufacture had followed a different path. The repercussions of the encounter with the Chinese at the battle of Talas (CE 751) are well-known: as the story goes, the capture of papermakers slowly led scribes throughout the Islamic world to adopt paper for copying manuscripts. By contrast, there was no such adoption of the form of books typically used in China. Nor did relations with the Indian subcontinent have much impact on Arab and Islamic books: for example, the use of palm-leaf slats called olla (illus. 3) continued to be confined to the indigenous manuscript tradition, since Muslims employed strips of palm leaves only in very special instances, as mentioned above.

9 Hence there is no "fold", as normally there would be: see below. 10 This is in fact part of a manuscript now dispersed among various collections. For the Paris leaves, see E. Tisserand, Specimen codicum orientalium, p. xxxii, pl. 42; R. Barché, Introduction aux Coran, 2nd ed. (Paris, 1959), pp. 96, 99, 100; G. Bethaër, and O. Precht, "Die Geschichte des Koran", in GAG III (Leipzig, 1938), pp. 274; Droste, Cat. El, pp. 75–77. Other leaves are held in other collections: Cairo, Dār al-Kutub (see Moutot, Ar. P., pl. 1–12); A. N. Sheibani, "Kuficheskii Koran Khediviiskii Biblioteki v Kaire", Zapiski Vostockogo Otdeleniya Imperatorskogo Russkogo Arshbedelgiskogo Obshchestva 14 (1902), pp. 120–125; and Gottha, Forschungsbibliothek MS. Orient. A. 462 (see J. H. Möller, Palographische Beiträge aus den herzoglichen Sammlungen in Gottha [Erfurt, 1844], l. pl. XIV; H. von Bothmer, Gottha 1997, pp. 95–107). 11 For a discussion of "troubled", see chapter "Writing surface: Papyrus and parchment". 12 Other manuscripts may perhaps also belong to this group, in addition to MSS. Istanbul TIEM 51 and 52 and Paris BNF arabe 324 (see note 10 for bibliography): a Qur’an in the Sayyid Ali Hoseyn mosque in Cairo and the so-called Qur’ān of Ubayda preserved in Tashkent. It is difficult to tell from photographs whether the same arrangement was used in the Sayyid Ali Hoseyn manuscript (which allegedly measures 60 x 70 cm, according to P. Neuma, Renaissance, et Coran mis antiques", Etudes, Sanaayi Supplement [Mexico City, 25 July 1993]); cf. S. al-Munajjid, Divād fī 'āthār al-'Anne munah hilāqtiyī illā nubayy al-fayr al-umamī, pp. 53–54. For the Tashkent manuscript, see A. N. Sheibani, "Kuficheskii Koran Imperatorskoi Sankt-Peterburgskoi Publichnoi Biblioteki", Zapiski Vostockogo Otdeleniya Imperatorskogo Russkogo Arshbedelgiskogo Obshchestva, 6 (1899), pp. 75–81; S. al-Munajjid, op. cit., pp. 50–53; E. Horace, "The Qur’an and its World: VI. Emergence of the Canon: the struggle for uniformity", Manuscripta Osnabrič, 43 (1998), p. 47, note 11 (bibliography of publications in Russian); compare the folios sold at Christie’s in London on 20 and 22 October 1993 (lots 225 and 225 A) and on 19 and 21 October 1993 (lots 29 and 30). The dimensions of these manuscripts seem to indicate parchment made from the skin of a goat, according to the figures given by Reed (Avicenna skin, parchments and leathers, p. 130).

The goals of codicology

To attain its aims, codicology has to undertake two principal tasks. It must first attempt to analyse, as precisely as possible, all the techniques used in making a manuscript. In this task, laboratory methods can solve problems which visual examination alone cannot hope to, for example in determining the composition of the colours used or identifying the fibres in a paper. Even without the aid of laboratory measuring instruments, however, codicologists can gather a significant amount of data by relying on two staunch allies – their patience and their curiosity. It is hoped that they will also find this handbook useful, designed as it is to provide readers with clues to enable them to recognise the methods employed by the craftsmen who made the books under discussion.

Such analysis, however, cannot be an end in itself. It should be accompanied by an effort to date the various techniques and even to pinpoint them geographically. All work in this field therefore faces the crucial need to constitute coherent sets of documents that shed light on one another. Some of these documents are dated; and now and then they contain evidence as to their origin; and such manuscripts therefore play an essential role in establishing the comparisons required for codicology to progress. More than anything else, it is the single object taken alone – in the eyes of the person examining it, at least – that is fraught with the risk of error and misinterpretation. And there are many manuscripts for which we have no parallels, at least in the present state of research. These manuscripts are not necessarily sonic – unique examples of a text – but are often copies of well-known works, starting with the Qur’ān, which display particularities that are hard to explain given the absence of parallels. For example, the comments made by Jacques Berque concerning a Qur’ān (MS. Tunis Bibliothèque nationale 14.246) are debatable because Berque analysed this copy in isolation, whereas in fact it belongs to a larger group. Of the hundreds of thousands of extant manuscripts in Arabic script, the vast majority have not been adequately studied; many, indeed, remain simply unknown. In order to grasp the limitations of our present knowledge, one need only consider the changes in our understanding of the early centuries of Islam brought about by the discovery of the Qur’ān manuscripts of San’ā’.

Redoubled efforts are therefore required if we are to fully grasp the Arab and Islamic heritage in all its diversity. For the moment, our vision of it is far too incomplete; indeed, it is a limitation of the present handbook that it inevitably reflects the immature state of scholarship in this field, and therefore can represent no more than an initial step.

Codicology and palaeography

Among the various processes involved in producing a manuscript, writing takes pride of place. Specialists in Western manuscripts traditionally accord special importance to the study of writing, or palaeography, which emerged and developed extensively as a science before codicology appeared, thereby establishing an independent discipline. In the Arab and Islamic field, however, a number of factors impeded the serious study of book scripts, delaying the commencement of rigorous analysis of their forms and evolution. It would thus seem reasonable to include the study of these scripts within the discipline of codicology, which in no way means that we consider manuscript hands to be entirely unrelated to those used for Arabic inscriptions or papyri.

Toward a history of books in Arabic script

The other direction in which codicology must progress remains, for the moment, a distant ideal: the data that specialists are patiently assembling should provide material for a future reconstruction of the history of manuscript books written in Arabic script, faithfully reflecting the intellectual, social, economic, and even technical conditions under which they were produced. Scholars have sometimes directed their research toward more specific goals; Rudolf Sellheim, in Materialien zur arabischen Literaturgeschichte, favours examination of the numerous notes that appear on manuscripts and also accords a larger role to the study of the history of the text, thereby tending to place codicological research more at the service of the history of literature. This latter can in turn shed light on codicology, for example by pointing to the existence of ‘families’ of manuscripts - in other words, groups of copies that derive from a single prototype, often of distant origin.

Codicology and cataloguing

Although the role of codicology makes it an ancillary field of history, its role cannot be reduced to one of merely gleaning elements that may provide a better grasp of the history of a given period. As we learn more about the methods used to produce manuscripts during various periods, our attempts to determine the date and geographic origin of a copy containing no written evidence of either will steadily improve in accuracy. It is readily apparent, however, that the service which codicology can render to all whose work is based on manuscripts depends above all on painstakingly gathering accurate data and meticulously analysing its implications. It is to be hoped that this development will be significantly advanced by progress in cataloguing, and more particularly in describing manuscripts. This handbook itself is indebted to the remarkable work done in the past twenty-five years by the authors of modern catalogues, to whom an acknowledgement and thanks are due.

These modest yet indispensable tasks entail the use of terminology as precise as possible. Thanks to Denis Muzerelle, French codicologists have at their disposal a taxonomy that has been drawn on extensively in arriving at the technical terms employed here. It is hard to overstate the need for terminological accuracy, even when naming the basic parts of a codex. When a manuscript written in Arabic script is laid down flat, the spine will be to the right when the reader begins to read; it is also called the ‘back’, and is where the stitches holding the quires are found. The three other sides are ‘edges’: opposite the back, on the left, is the ‘fore-edge’; the top edge, furthest from the reader, is known as the ‘head’, and the nearer edge is called the ‘tail’.

Methodology

On the proper use of originals and reproductions

Any examination of the outside and inside of a book should be undertaken with the greatest care. Working on an original makes it possible to draw up a list of notable features and to measure the size of the volume, the thickness of paper, and the written area. One can also detect the places where special apparatus (magnifying glasses, scanners, lamps, beam generators, beta-radiography, image-analysis software) is required to study features that are otherwise invisible; for example, to identify materials used (inks, papers, pigments) either with the unaided eye, or with a binocular magnifier, or through physical and chemical analysis of micro-samples. Again, with the original at hand, one may even be able to date the document by smell, given that a freshly tanned skin gives off a characteristic odour.

21 Aspects of the issue of the respective roles of the two disciplines are discussed in Lemaire, Introduction, p. 3, notes 4 and 6. 22 Sellheim, Materialien 1 and 2. The term used by German specialists, Handschriftenhandschrift, is older and has a broader meaning than codicologie in French, which may explain the different tendency. In France, a similar standpoint was adopted with the founding of the Institut de Recherches et d'Histoire des Textes, where codicological studies place great emphasis on the history of texts.

23 See the concluding chapter on 'Codicology and the history of collections'. 24 Denis Muzerelle, Vocabulaire codicologique: repertorie méthodique des termes français relatifs aux manuscrits [Rabnière, 1] (Paris, 1985). 25 This section was written by Antoine Berthier.
Even from a first-rate reproduction it is not possible to ascertain the exact colour of the writing surface (be it papyrus, paper, or parchment), to measure its density, to determine its transparency by holding it up to light, or to assess its grain. Nor is it possible with a reproduction to assess the thickness of the page in order to detect patches added or removed, to note scraped areas, to measure the size of the volume, to count the gatherings or to ascertain how they are sewn. It is difficult to study inks and ruling, to determine where the pen has been raised from the paper or to identify passages that have been altered or erased. It must therefore be said that the complete codicological description of a manuscript needs to be based on an examination of the original. Reproductions, however, (photographs, slides, microfilm and microfiche, facsimiles, digitised images) allow for types of handling not feasible with an original, and studying a reproduction can provide useful images that are necessary at a certain point in the analysis. Handling of the original can be reduced and simplified by determining in advance, thanks to the study of a reproduction, what to look for and where.

There are two types of reproduction: firstly, existing reproductions (books and facsimiles, institutional photographic archives, digital and other types of databases); and secondly the researcher's own reproductions, whose purpose is targeted and precise: sketches, tracings (allowing for visual data to be superimposed), photocopies of books or manuscripts from a microfilm, enlargements and scanned images.

Laboratory techniques for studying manuscripts

Manuscript specialists have long made use of chemical and physical techniques to contribute to their work in either restoring to view writing that has been erased, faded, or worn; attempting to identify the animal from which a given parchment was made (or to date that parchment); analysing the composition of a paper; or identifying the pigments and colours used by copyists and illuminators. The methods employed are now evolving very swiftly, and increasing in accuracy and in ease of use, though of course limitations remain.

It is not possible to provide more than a brief overview of available techniques in these few pages. For further information, readers are advised to consult the proceedings of four conferences, which provide basic information. Although these proceedings provide a convenient survey of current possibilities, they do not dispense with the need to keep abreast of recent publications and to refer to competent physical chemists for updates. In this as in many other fields, tools and techniques are evolving very rapidly.

Decipherment of faded and vanished text

Since the nineteenth century, scholars have been using chemical reagents in efforts to recover writing that has been scraped away or erased. Cardinal Angelo Mai in particular strove to decipher palimpsests in this way, although unfortunately the results were disappointing. The script was often restored only for a relatively short time, and the parchment was irrevocably damaged by the various products employed, making any further attempts at recovering the text impossible. Such methods were consequently abandoned. It is nevertheless worth noting that certain chemists now advocate new methods, which are claimed to be harmless.

At the time of writing, ultraviolet rays are the simplest and most commonly used means of reading deleted or erased texts. Reading can be done directly by using a Wool’s lamp, although this method has the drawback of tiring the eyes even if protective glasses are worn. It is preferable to begin by taking a photograph of the passage to be deciphered. This not only spares the reader’s eyesight but considerably reduces the document’s exposure time to ultraviolet rays which, as is well known, are not without deleterious effect. Ultraviolet fluorescence photographs also offer the advantage of being available for examination at greater length; furthermore, they can be subjected to various methods of contrast enhancement, thereby combining the advantages of several methods.

A more recent technique, ultraviolet reflectography, improves results where the text to be deciphered is written in metallo-gallic ink. In the case of carbon-based inks – the type of ink most frequently used in the East – infrared reflectography gives good results with a Vidicon camera hooked up to a monitor and fitted with an appropriate filter.

Infrared light has another advantage, well known to forensic laboratories: it enables one to read texts eradicated or masked by a layer of paint. In favourable circumstances, then, it becomes possible to read instructions to the artist written on the parchment underneath an illumination, even though the text has been covered over with paint.

In the 1970s, new methods made it possible to restore erased texts with the aid of contrast enhancement. They entailed optical examination based on photometric analysis of images or on digital analysis. Both techniques are all the more promising in that they can be applied not to originals but to photos taken in ultraviolet or infrared light, thereby optimising images already obtained. Unfortunately, advances in this sphere, and especially the development of new and much more powerful (and expensive) tools, have not yet greatly benefited codicological studies.

The shrewd application of a variety of techniques can sometimes yield excellent results. Miracles should not be expected, however. If a text has been thoroughly scraped or washed away, so that no trace of ink remains, it is pointless to expect to be able to decipher anything at all. This applies notably to owners' marks, which were often thoroughly removed, depriving researchers of precious information on the history of a manuscript.

Finally, inscriptions were sometimes made on parchment with a stylus. Such notes are usually hard to make out. Photographs taken in oblique light can make them easier to read.

Identifying pigments and colouring materials

Besides those already mentioned, there are other ways in which laboratory techniques can assist the codicologist. Over the past forty years, physicochemical analysis of pigments and other colors used in manuscripts has made great strides, not only in terms of the quality and accuracy of results obtained but also in terms of greater ease of analysis. A major factor in this has been the miniaturisation of certain pieces of equipment that can now be carried easily to the place where the manuscript is kept. It can be very risky to transfer a manuscript to a scientific laboratory, and it may therefore be wiser to remove microscopic samples when the apparatus to be used is not portable.

Several types of microanalysis yield quite valuable results even when only tiny samples are available, their minuteness being limited above all by the difficulty of handling them. Among the methods available, it is worth distinguishing between, on the one hand, elementary analysis techniques (the most common of which is currently electronic microscopy combined with energy-dispersion x-ray spectroscopy, or EDXS) and, on the other, various methods of structural or compound analysis (such as infrared absorption spectrometry, UV-visible fluorescence spectrometry, mass spectrometry, and Raman spectrometry). In recent years, such tools have been adapted for the study of minute samples, giving birth to new microspectrometric techniques (infrared and Raman microspectrometry). On the other hand, techniques of nuclear analysis (by neutron or proton activation) — which are highly sensitive methods of elementary analysis — can be used to reveal minute traces of elements within a sample, thus supplying precious information on the source of a material. No one method, however, can alone answer all the questions that arise, and it often happens that the same microscopic sample is subjected to several successive tests. It is therefore important that the sample not be destroyed or significantly altered during the process of analysis.

It is not surprising that the examination of a microscopic sample, even when it proves feasible, can be time-consuming and sometimes costly. These drawbacks can make it hard to justify increasing the number of measurements in order to aid potential comparisons. Equipment that can be easily transported to the site where the manuscript is kept and that provides colour measurements through reflective spectrometry has recently been developed by Bernard Guineau at the Institut sur les Archéomatériaux (CNRS) in Orléans, France. Because the time required for measurement by this technique is very brief, multiple measurements can be taken, especially since their cost is not prohibitive.

Thanks to the great number of measurements that can be made of a single painting, the palette used by an artist can be determined. Comparison of results obtained from different works ascribed to the same artist provides a crucial means of evaluation which can confirm or contradict conclusions based on stylistic analysis alone. It is also interesting to check whether the results of scientific examination corroborate the formulae for colours recorded in medieval texts.

Dating

In recent years, laboratories have attempted to date old parchments by using Carbon-14 techniques. A promising method in theory, it is only really useful if a sufficient number of items are available for comparison in a given region. Furthermore, the size of the sample that needs to be removed for analysis is often too large to allow its use, even though the quantities required for analysis have been reduced to less than one square centimetre, in certain cases. Finally, such tests require the use of apparatus that is scarce and therefore very costly.

Whatever technique is used, a single measurement taken in isolation is of little significance; and multiple measurements only provide usable information if, prior to analysis, a precise modus operandi has been established through close collaboration between the physical chemist and the palaeographer or codicologist. Laboratory technicians need to know what is expected of them in order to be able to suggest the most appropriate techniques and to explain, when necessary, the limitations of current methods.

Codicology and its focus of study

Just as the very name of the discipline of codicology makes its object of study – codices – obvious, so any qualifying adjectives reveal how tricky it can be to define a specific field of application. To dodge that difficulty by calling this book 'An Introduction to Codicology' would rightly be considered misleading.

The Writing Surface: Papyrus and Parchment

In the course of history mankind has used many materials—mineral, plant and animal—to write on. The following two chapters will be concerned only with those writing surfaces (papyrus, parchment and paper) employed in the Islamic world in manufacturing handwritten books in codex form. ¹ These materials were also utilized for other aspects of book production, such as binding; those other uses will be discussed at greater length in the relevant chapters.

Papyrus

In the Arab and Islamic field, papyrus more readily brings to mind types of documents that do not belong to the sphere of codicology proper: letters, contracts, administrative documents, etc. In fact, though, only scattered remnants of manuscripts written on papyrus in Arabic script have survived the intervening centuries, and our knowledge of the role played by this material in the history of books in Arabic script (illus. 5.) remains scanty. Papyrus preserves traces of its vegetable origin since the fibres of the plant remain visible at the end of the manufacturing process, their two sides being distinguished respectively by whether the fibres run horizontally or vertically.

Origin

The word 'papyrus' denotes both a plant and the writing material made from it. *Cyperus papyrus* L.,—to use its botanical name—grows wild in its original habitat, Egypt. During the first centuries of the Islamic period, it was also found in Palestine, Mesopotamia and Sicily.² In Arabic, it is designated by terms such as

¹ Other materials have also been used to make manuscripts in codex form, if only sporadically. One case is represented by a Qur'ān extract copied on wood, published by N. Abbott ('An Arabic-Persian wooden Qur'ānic manuscript from the royal library of Shah Husain Safawī', *Ars Islamica* 5 [1938], pp. 89-94). ² Grohmann, AP², pp. 67-69. Pliny the Elder already noted (Natural History, XIII, 11, 73) that papyrus grew not only in Egypt, but also in Mesopotamia and in Syria. See also the references in note 4.