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Exploring and Preserving the Islamic Manuscript Heritage of Sub-Saharan Africa

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(Article begins on next page)

EXPLORING AND PRESERVING THE ISLAMIC MANUSCRIPT HERITAGE OF SUB-SAHARAN AFRICA

(SARA FANI - University of Copenhagen, *Islam in the Horn of Africa* Project)

INTRODUCTION TO THE TYPOLOGIES OF SUB-SAHARAN ISLAMIC BOOKS

In the last two decades, the Islamic manuscript heritage in Africa has undoubtedly aroused worldwide interest and attention.¹ It is worth underlining that this quite sudden concern, especially from the Western media, relies on the awareness of an increasing danger for its conservation. The political situation of several African countries, in fact, had to face periods of instability and social struggles which, in certain areas, are still ongoing. In the worst cases, the emergence of radical religious groups caused deliberate destruction of cultural heritage considered “unorthodox” and this has inevitably involved the public and private collections of books.² The texts, sometimes transmitted still today in manuscript form in the regions in question, clearly turn out to be the expression of a dimension of Islam that hardly suits to rigid radical doctrines, but rather reflects a marked religious blending of Islamic and African traditions that some refer to as *syncretism* and that Ngom and Kurfi prefer to call ‘*Ajamization*’.³

The most renowned case and most mentioned by worldwide media is certainly that of Timbuktu manuscripts, also due to the historical and commercial importance of the city, as well as to the exoticism that it evokes in the collective imagination (Jeppie and Diagne, *Meanings of Timbuktu*; Hunwick and Boye, *The Hidden Treasures*; Krätli, “West African Arabic Manuscript;” Hammer, *Bad-Ass Librarians*). The urgency to contravene this deliberate destructive wave stimulated the development of numerous conservation projects in the region, with funding of Western countries and the involvement of local communities. These projects, even if based on a contingent conservative emergency, allowed the academic community to identify an invaluable amount of texts, and to have insights into the history and the intellectual and religious life of the region, fostering an increasing scientific awareness.⁴ With the access to previously unknown collections, new perspectives of study and research related to this specific production have been inaugurated. In addition to historical, religious and literary analysis, the book collections also offer opportunities to investigate the material aspects and features displayed by Islamic manuscripts produced in sub-Saharan Africa, and to evaluate their state of conservation and their possible required interventions.

A first overall differentiation related to the books produced or circulated in sub-Saharan Africa is the one between manuscript books, which historically represent the vast majority, and printed books, which have found an increasing circulation, especially in recent years. In some regions in fact, a local typographic activity has developed, the products of which have spread alongside those imported from other Islamic countries, and next to the traditional and still alive manuscript tradition.⁵ In this cultural context, the conservation and study of printed books is not of minor interest. First, printed books can be the mean through which otherwise lost texts have been preserved. In addition to this, the case of the so-called “market editions” appears to be very important not only from a technological and philological point of view, but also from a paleographical perspective, as they reproduce the graphic features of original manuscripts (Hunwick, “Catalog of Arabic Script,” 210-211; Brigaglia, “Central Sudanic”). Finally, printed editions frequently transmit documentary information of considerable importance in additional handwritten notes. These can be related to the history of the copy itself, but also can contain historical information. Moreover, printed texts are often commented, glossed or summarized in the manuscripts’ additional *apparati* on the margins or wherever the printed text leaves free space. Such textual “derivatives” are sometimes completely original and represent in themselves important literary contributions. In other cases, they are copies or quotations of known and attested literary works, providing evidences of their local circulation and knowledge.

The Islamic manuscripts in sub-Saharan Africa can also be described according to another basic subdivision involving both their material aspect and textual content. They in fact include copies of texts produced locally, local copies of texts composed in other regions of the Islamic world, and copies produced elsewhere and imported into the various areas of the sub-Saharan African region through religious pilgrimage and commercial routes. This typological differentiation is evidently represented in the physical aspect of the manuscript books. Part of the specimens, in fact, display features which can be referred to as models attested elsewhere in the Islamic world.⁶ Nonetheless, the materials, techniques, shapes and motives of the locally produced manuscripts also express non-negligible specificities.

BRIEF CODICOLOGICAL OVERVIEW

As it is well known, the Islamic book has adopted the form of the codex, inspired by manuscript traditions already established in the regions where the new religion spread, in particular the Byzantine, Coptic, and Ethiopian areas. Examples of other forms are present and have been maintained over time, but their use is almost totally limited to texts with specific functions, for example the talismans in the form of *rotulus* which are widely attested also in the sub-Saharan region.⁷ A particular form of codex, the so-called “box binding,” which is attested in the early centuries of *Hijra* for copies of the Qur’an in oblong horizontal format, is characterized by the presence of a rigid leather wall placed in orthogonal position on the three edges of the wooden lower cover. This represents a physical boundary and protection for the text-block, preventing the intrusion of dust and impurities, and preserving the edges from mechanical damages; it also had a more symbolic function as the copies of the Qur’an requires ritual purity when they are handled. These volumes were tightly closed by means of a leather thong attached to the lower cover and tied on a peg fixed into the upper cover. The cohesion of the text-block and its union to the boards seems to have experimented different solutions, including the possibility of a block of unsewn quires or quires pasted on a strip of parchment anchored to the base of the first and last folios.⁸ The mentioned protective elements, in the guise of an envelope flap, and other features already attested in these ancient bindings determine what can be identified as the sub-Saharan model of Islamic codex.

Manuscripts in Arabic scripts produced in sub-Saharan Africa, in fact, are often characterized by a non-sewn text-block, a peculiarity which seems to be rather uncommon in Islamic manuscript produced elsewhere.⁹ In this model the presence of a fore-edge flap protruding from the back cover assumes also a restraining function as it keeps the text-block together in its constitutive elements. These can be represented either by unsewn sets of quires or by loose folios, in both cases not anchored to the two cover boards.¹⁰ The fore edge flap of this kind of books extends in an envelope flap (*lisān*, *udhn*, *marji*’ or *rābiṭa*) which has to be folded above the front cover and tightened in the right position by a leather thong wrapped around the book (Gacek, *Arabic Manuscripts. Vademecum*, 25, 103-104). A different method of binding, or better of keeping together these unsewn units, is the “reliure à sacoché” (bag binding) in which the manuscript, simply kept between two boards of cardboards or leather, is inserted in a bag or case, often after being wrapped in a piece of muslin (Viola, “Reliures islamiques,” 360).¹¹ It is evident that, in the absence of a proper sewing, the arrangement of the quires or of the loose folios of this typology of manuscripts is highly subjected to be disrupted; the most common system to indicate the order of folios is in fact the presence of catchwords in the lower margin of the verso side of each folio, while foliotation, quire numbering and mid-quire notations are not always adopted.

The *lisān* of course is not specific to sub-Saharan bindings, it is in fact recognized as the typical feature of the Islamic bindings in their standard model, i.e. with a text-block made up of gatherings sewn together.¹² This model is also widely attested in sub-Saharan Africa, both as a local production and in manuscripts coming from other regions of

the Islamic world. In this typology the *lisān* acquired also the function of a bookmark, as it is testified by those cases showing a high degree of flexibility alongside the joints with the lower cover and the envelope flap. In sub-Saharan Africa the binding of this standard model of codex – i.e. with sewn gatherings -, also occasionally displays the presence of leather laces attached to the extremity of the *lisān*. This is evidently thought to be folded over the cover and blocked by wrapping the thong around the book. The rectangular shape of the *lisān* attested in specimens from Ethiopia can be referred to this particular model of binding (in this case without the thong) and is usually found in codices lacking inner boards. Other shapes of the envelope flap (for example hexagonal or ogival) have been realized on the base of merely decorative and aesthetical criteria and are attested in different regions of sub-Saharan Africa (Viola, “Reliures islamiques,” 359-360; Regourd, “Introduction to the Codicology,” lxxv-lxxvi).

The quires are usually sewn together by means of a link stitch system with no sewing supports and the whole text-block can be anchored to the covers in different ways (Scheper, *Technique of Islamic Bookbinding*, 93-114). In addition to the built-on bindings, that is bindings constructed onto the text-block, the use of case-bindings is quite common in sub-Saharan Africa, showing a general practice of reusing and transferring the covers from one book to another, especially in the case of wrapping bindings (Regourd, “Introduction to the Codicology,” lxxvi-lxxvii, lxxx). The frequently attested weak methods of fastening the text-block to the cover confirm this common practice. In Ethiopian manuscripts, for example, it is not infrequent to anchor the block of quires to the cover by simply pasting the gauze or fabric of the spine lining to the internal part of the cover itself (ibid., lxxvii, Plate 24). In the covers where the spine is made of fabric it is possible to find hasty and weak stitches fastening the block to the spine lining (Fig. 1).

[INSERT FIGURE 1 HERE]

This model, which usually does not show proper flyleaves pasted onto the inner cover as a doublure, generally does not show any trace of endbands.³³ In the standard Islamic codex these are woven in two different phases and constitute a cohesive element among the quires, in addition to the link-stitch sewing and the spine lining (Greenfield and Hille, *Headbands*, 65-69; Szirmai, *Archaeology*, 57-59; Scheper, *Technique of Islamic Bookbinding*, 78-85, 136-144). Variations of this general pattern are attested in sub-Saharan codices (Fig. 2). This structural element is of course absent in the manuscripts whose text-block is made up of loose folios or unsewn quires.

[INSERT FIGURE 2 HERE]

The cover of sub-Saharan Islamic manuscripts is traditionally made of leather, usually from ovine species, which are abundant in the region; in addition to its availability, the advantage of using this material resided basically in its durability, mechanical resistance and flexibility, and in the possibility to dye and decorate it with different techniques.¹⁴ In more recent specimens colored fabrics, often reemployed and coming from dismissed clothes, can also be adopted and are usually limited to the spine, leaving the boards uncovered (Fig. 3). The patterns of the cover decorations generally reflect the ones displayed in the standard Islamic bookbindings, but developed peculiar styles in the details and motifs.¹⁵

[INSERT FIGURE 3 HERE]

It is opportune to underline that the unsewn manuscripts produced in some parts of sub-Saharan Africa are frequently provided with an accessory bag made of fabric, more rarely of leather. This has obviously the function of additional physical protection of the object, but also avoids the sliding of folios or quires through the open head and

tail edges.⁴⁶ Finally, if provided with thongs and a shoulder strap, these fabric envelopes make the books more easily transportable or storable, for example attached with hooks to the interior walls of the houses (Fig. 4).

[INSERT FIGURE 4 HERE]

The most common writing support used in Islamic manuscripts produced in the sub-Saharan Africa is by far paper.⁴⁷ This is not surprising considering that it had almost completely replaced parchment all over the Islamic world, at least from the fourteenth and fifteenth century.⁴⁸ Islamic manuscripts from sub-Saharan Africa display three major typologies of paper, also common in other areas of the Islamic world, corresponding to three different techniques and areas of production: 1) papers with no internal marks, 2) papers with laid and chain lines, and 3) watermarked paper (Regourd, "Introduction to the Codicology," xlviii; cf. Russo, "Connaître et conserver," 120-121). The third category is by far the most represented and it refers to paper of Western production, mainly from the North of Italy. Studying the spread of the different typologies of paper employed in sub-Saharan Africa is not merely a mean to date manuscripts, but reveal to be extremely interesting for a new consideration of technological development of paper making (Biddle, "New Strategies") and to trace the historical trade networks and exchanges between different regions of the Islamic world and between these and the West (Bloom, "Paper in Sudanic Africa;" Walz, "Paper Trade"). Italian paper started to be imported in the Islamic world in a quite early stage (fourteenth century in the Maghreb), and it almost completely supplanted the local paper after the mid-sixteenth century (Déroche, *Islamic Codicology*, 57-58). These were the centuries in which the sub-Saharan Islamic written culture started to flourish and developed its own tradition of book making, but the region had to face the already ongoing decline process of the traditional paper production in Egypt and the Maghreb and started to import from the Western world, especially from Italy (Bloom, *Paper before Print*, 211-213).⁴⁹ As mentioned above, Italian paper was distinguished from Arab and Spanish paper by the introduction of watermarks, a trademark of the paper mill imparted to the sheets during the production process. The most common in the Islamic lands starting from the sixteenth and seventeenth centuries were the anchor (originally Genoese, then copied by Venetian and Piedmontese papermakers) and the *Tre Lune* (Walz, "Paper Trade," 78-90). The acquisition and study of new manuscripts from the sub-Saharan regions allowed to focus on paper imported and used therein and to trace a commercial trend of the good. Accordingly, Western and especially Italian paper was re-exported from Egypt to Eastern African markets and Hijāz, across the desert, along the caravan routes or via the Red Sea Port. For the Western sub-Saharan regions, Tripoli, Benghazi and Tunis became the primary intermediary regions for paper supply in the nineteenth century (Walz, "Paper Trade," 95-104).

The use of Western paper in sub-Saharan Islamic manuscripts is not only important from a historical perspective, but entails some codicological considerations regarding the conservation of manuscript realized with this kind of product. The supremacy of European export market over the local production was in fact based on the development of paper production which allowed to keep cheap prices.⁵⁰ Compared to the Islamic traditional paper making, the first innovations were primarily based on a mechanized pulping method realized with hydraulic multi-mallet paper mills, on a different kind of mold (rigid, with metal laid lines, chain lines and watermarks), and on a different kind of sizing employing animal gelatin instead of starches.⁵¹ The eighteenth century witnessed a radical change in the paper making process due to the increasing request of the product and the consequent scarcity of rags and ropes. Bulking additive, like sugar cane waste, spruce, poplar, or pine were introduced in addition to bleaching agents to whiten dirty and dark rags, or to recycle used paper. The gelatin sizing was replaced by rosin-alum sizing. From the end of the eighteenth century the Industrial Revolution involved paper making introducing new machineries for refining and pulping which could produce paper pulp from cellulose obtained from plant fibers (mechanical wood pulp). At the beginning of the nineteenth century, also the paper sheet production went through an industrializing

process with the introduction of the continuous machines and the cylinder machines which allowed to produce a larger quantity of paper, with fewer people and quicker (Biddle, "New Strategies," 37-40).²² Nonetheless the paper produced with these technological innovations was of a lower quality and more subjected to degradation, especially due to its oxidation.

With regards to the inks used to write on this paper a general classification based on visual analysis can be made observing the resulting color and the related employment of the products on the manuscripts.²³ In this perspective, a basic differentiation is between inks used to write and copy texts with no particular visual emphasis (mainly black inks, but also brown) and colored inks employed to highlight particular parts of a text (such as titles, chapter headings, and entries) or to decorate it (especially the copies of the Qur'an, in correspondence of textual sections and *sūras*' headings, and in the first two folios). According to a study conducted on northern Nigerian inks (Biddle, "Inks in the Islamic Manuscripts"), five groups can be identified and can be easily extended to inks produced in other regions of sub-Saharan Africa:

- Carbon black
In its most simple form the black pigment is obtained by grinding a charred substance, usually of vegetable origin, and mixing it with water or saliva and a binder substance.
- Soot ink
The pigment is here represented by soot, a fine powder of impure carbon particles resulting from the incomplete combustion of hydrocarbons, usually oil, or oily seeds.
- Ferro-tannic inks
The principle of their production is based on the reaction between metal salts and tannins: the tannins were usually extracted from gall-nuts, a kind of swelling growth on the external tissues of plants; they can be caused by various parasites, but the one used for inks are produced by the sting of different kinds of insects of the *cynipidae* family to drop off their eggs. Substitutive source of tannins are the rind of pomegranate, the fruits of some plants, like Terminalia, myrtle, tamarisk or carob. The extraction of tannins is made by hydrolysis in different ways. The brownish solution obtained can be used to write as a simple tannic ink, but to obtain a dark black ink a metal salt, usually ferrous sulfate, has to be added. The chemical reaction between the two ingredients resulted in a more or less dark precipitate, depending on the proportion of the two ingredients.
- Dyes
They are water soluble substances mainly of organic origins; they impart their color to the writing support penetrating its fibers, through processes of inclusion or chemical reaction.
- Colloidal suspensions
They are made of finely grained pigments, often inorganic in origin, that are bound to the surface of the writing support by means of a binding medium, such as gum arabic.

The different components of these typologies of ink have been identified with chemical analysis in different collections of manuscripts of the mentioned region. *Acacia nilotica* and *senegalensis* seem to be the two main species from which gum is extracted. The various tonalities of yellow, orange, red, brown and purple pigments are of mineral origins; they are ochres - iron oxides and hydroxides - which are grinded, smoothed and decanted repeatedly according to the shade of color desired. Organic yellow dyes are also attested; they show the possible use of eggs (the white as a binder, the yolk to intensify the yellow color). The black soot ink is obtained from oily seeds or sap; the presence of manganese oxide or hydroxide additive can turn their color to a very dark purple. Blue and green inks are less common, the latter mainly obtained from plants (Jabo and Bayero, "Problems and prospects," 20). The

identification of these pigments is attested in Nigerian ethnocultural ink recipes which also highlight how the fabrication of dyes, inks and pigments developed reflecting a possible linkage with the local traditional medical treatments (Biddle, "Inks in the Islamic Manuscripts," 12-17). Specific studies on the identification of inks employed on manuscripts from other regions of Sudanic Africa are still a desideratum. Some information related to the Horn of Africa and especially to the region of Harar (Ethiopia) emerged from recent fieldworks in the framework of the project *Islam in the Horn of Africa*. According to local informants, the binder substance used for ink production is mainly locust bean gum, also known as carob gum, a flour made from the seeds of the carob tree (*Ceratonia siliqua*).²⁴ The *qalam*, the means through which the inks are stretched on the paper all around the Islamic world, is therein obtained from elephant grass (*Pennisetum purpureum*)²⁵ which is prepared and cut as the standard Islamic reed pens (Fig. 5). The inkwell was traditionally provided with a cotton ball on its open which works as a traditional *liqa*, a swab which prevented the ink from drying and from which the *qalam* could draw the right amount of ink for writing.

[INSERT FIGURE 5 HERE]

TYPOLOGICAL CLASSIFICATION OF THE COLLECTIONS AND RELATED CONSERVATIVE PROBLEMS

The problems affecting the book material can be illustrate and defined according to a typological classification of the collections which expose the book heritage to different agents and risks. The various studies and research projects related to sub-Saharan Africa identify the following typologies of collections (Kawo, "Islamic Manuscript Collections"):²⁶

1. Collections stored in recognized institutions such as libraries and museums, which can be accessed by scholars and private citizens and reserve specific spaces for the storage of the collection and, sometimes, for their consultation. They can be originated by the personal enterprise of private citizens, the transformation into public collections of private inherited corpora, or by more cultural or ideological (political, nationalist...) purposes supported by public authorities. They can also be dislocated in foreign countries when they include corpora of manuscripts collected by foreign scholars or travelers who visited sub-Saharan Africa in the past centuries for different reasons, especially during the colonial period.
2. Semi-public local collections which are mainly related to the religious and devotional activities of *zawāyā* or *ḥaḍrāt* of Sufi orders, or of isolated mosques and shrines; they can also be part of the didactical equipment of *madāris* and *kuttāb* and are generally preserved *in situ* under the responsibility of the present custodians and chief representatives of the religious institutions. They are usually accessible upon authorizations, both for study and research and for devotional and religious practices still performed.
3. Private collections which are the most challenging from the perspective of accessibility and conservation. They can originate from the personal interest of local scholars and intellectuals and then inherited by their descendants. The access to this material is discretionary and usually subordinate to a personal contact or a trustworthy introduction to the present custodians.

Based on this classification, it is worth noting that, if on the one hand a continuous book handling increases the possibility of mechanical damages, on the other hand the storing of such material for long periods in unsuitable places and without taking the proper preventative measures can easily lead to serious and sometimes permanent damages, or even to the loss of entire collections. The different typologies of collections above mentioned, in fact, expose the book heritage to different kinds of damages depending on the effective preservation of the objects and the appropriateness of their storage.

Commentato [SF1]: زاوية > zawāyā = pl. of زاوية

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- Damages caused by human agency

People's use of the manuscripts is traced to the physical aspect of the objects which often present stains of various kinds, including food, drinks (Fig. 6), tears, splits, folds, scratches, ink marks, losses and disruptions.

[INSERT FIGURE 6 HERE]

For example, the insertion of leaves,²⁷ staples, or other flat objects between the folios to keep the sign, often cause stains or chemical reactions on the paper support. The physical features of Islamic manuscripts from sub-Saharan Africa display common mechanical damages due to the peculiarities of their structure. One of the most common damage is the detachment of the text-block from its covers; also the *lisān* is often subjected to detachment from the back cover for improper handling, or for the storing in unsuitable positions. It has to be remembered that traditionally, Islamic books are intended to be stored horizontally, thus, when put in vertical position, head- and tail-edges are subjected to frictions. In sewn codices, the extremities of the spine in correspondence of tabs and endbands, is particularly exposed to damage. The flat opening of codices makes the spine assuming a convex shape, which is reflected in the protruding of the front edge in a concave one (Fig. 7).

[INSERT FIGURE 7 HERE]

This stresses the inner joints between the text-block and the boards and the sewing thread which can break or create tears on the paper, as it often happens during digitization works. Conservative interventions, when realized with improper materials (such as acidic paper, too rigid or acidic adhesives) can as well cause damages of different kinds. The traditional interventions also include the frequent fumigations with specific woods used as insect repellent which can affect the materials chemically and physically.²⁸ Moreover these interventions often do not take into account the basic principles of conservation and lead to the complete loss or disfigurement of the original codicological elements and features.²⁹

- Damages caused by biological factors

Fungal spores, from which molds originate, are always present in the air and on the objects and they can develop whenever conditions are favorable. Humidity (relative humidity above 65%), darkness and limited air circulation are the ideal conditions. Mold can weaken, stain and embrittle paper, parchment, but also leather and fabrics used for the book bindings. (Fig. 8).

[INSERT FIGURE 8 HERE]

Insects that most commonly cause damage in libraries and archives are cockroaches, silverfish, beetles and termites. They feed on organic substances such as paper, starches, gelatin-based adhesive, leather and tissues of the book binding. They prefer heat, darkness, damp, dirt and poor ventilation conditions and they generally cause irreversible damages.³⁰

Also rodents such as rats and mice can devastate collections. They destroy books to obtain paper for their burrows. Their droppings are corrosive and may leave indelible stains (Fig. 9).

[INSERT FIGURE 9 HERE]

- Damages caused by chemical factors

Chemical factors, such as acidity, alkalinity and oxidation, cause paper degradation as they activate the depolymerization of the cellulose molecules, resulting in a deterioration of the mechanical characteristic of the writing support. The origin of these damages can be identified in impurities of the paper itself, such as the use of mechanical pulp rich in lignin and hemicellulose (after 1850); the use of strong solutions (alkaline or acid) in chemical wood pulp to dissolve the lignin and hemicellulose; the use of chlorine for bleaching (end of the eighteenth century); the introduction of rosin-alum sizing; the presence of metal particles as water impurities. Modern paper is also characterized by an intrinsic instability which is partially due to the highly fragmented cellulose fibers as a result of industrial processes. Finally chemical damages can be caused by the presence of acidic inks (Fig. 10).

[INSERT FIGURE 10 HERE]

With regard to ferro-tannic inks, it is important to underline that the proportion between the two ingredients is essential for the success of the preparation: too much metal salt to obtain an immediately darker color was the main cause of the oxidative degradation of the paper support causing sometimes the perforation of the support itself.

- Physical damages, caused by environmental factors

Temperature can affect the materials employed in book production in different ways. It is the cause of the dilatation of inorganic and organic materials; it can foster the proliferation of microorganisms which generally develop in a range between 15° and 32° C; too high temperatures accelerate chemical reactions of degradation on book materials and can soften or melt materials such as wax, or resins. Variations in temperature can be very dangerous, especially in objects where materials with different coefficients of expansion are attached one to the other, as they react in different ways producing physical distortions of the objects. They are particularly dangerous because they represent one of the main causes of variation in relative humidity.

Above 65% of relative humidity it is very probable that microorganisms (bacteria, molds, fungi and yeasts) start to develop. Many insects (worms, silverfish, cockroaches, lice, etc.) find a favorable environment for their proliferation; a process of hydrolysis of the cellulose can be activated causing localized oxidation of paper. Moreover, all the materials in the book are highly hygroscopic as they tend to balance with the environment by absorbing or releasing moisture. Dimensional variations and undulations of paper are often caused by excessive moisture. On the contrary, an exaggeratedly dry environment dries paper, leather and parchment, which become brittle and fragile and can easily crack.

In addition to this, high exposure to light, and in particular to ultra violet rays, can cause embrittlement of some materials and fading or changing of their colors (inks, leather, paper). Generally speaking, the most dangerous aspects of the environmental parameters is their rapid fluctuations because the different materials in manuscripts react expanding or contracting at different rates; moreover the very same materials react differentially in their different parts, being their surfaces the most exposed to the fluctuations.

- Disasters

Natural disasters such as fire, flood, or earthquake can be sources of fatal damages on entire collections as they generate extreme environmental conditions. The time of their occurrence cannot be predicted, but their destructive effects can be minimized with proper plans of dealing with emergencies which allow quick and effective measures of heritage protection. Usually wars and terrorist attacks can be mentioned in this category even if any human deliberate and premeditated intention of destruction is hard to be prevented.

PRESERVATION STRATEGIES

The need to preserve the texts transmitted by Islamic manuscripts from sub-Saharan Africa seems to have found a long lasting solution thanks to the numerous digitization projects financed by national institutions, private foundations or generous donors (Ngom, "West African Manuscripts").³¹ Digitization is often considered the first step – and unfortunately sometimes the only one – for the conservation of book heritage and the essential one to grant access to the collections. Nonetheless, many projects inspired by this principle and including the creation of an electronic database or a digital library to grant access to material end up not fulfilling their intents and stopping after their preliminary phases (Krätli, "West African Arabic Manuscript").³² In addition to this, conservation cannot be limited to the textual and artistic aspect of manuscripts and cannot neglect the importance of the material aspect of manuscripts which can be studied only through a direct access to the objects. A new awareness and interest in the codicological or archeological perspective of manuscript studies in the last decades has given rise to projects specifically aimed at monitoring the conservative conditions of the collections and at conservation projects.³³ These projects usually involve expert conservators who train local operators in the correct practices of intervention, establishing or identifying proper laboratories and storing buildings for the collections when it is possible. But a preliminary desirable step to avoid the necessity of conservative intervention consists of preservation, or preventive conservation, i.e. all the actions or measures which positively affect the condition of objects without a direct intervention on their conditions.³⁴ Preservation is much more effective than conservation, especially in regions where expertise, proper materials and equipment, and economic means are not abundant. Some basic principles of preservation should be the core not only of conservation projects, but also of the many other projects dealing with manuscript collections from different perspectives. Making local conservators and custodians aware of the correct handling of the material and of its appropriate storage, and trying to identify solutions suitable for the different collections and environments can effectively prevent the book heritage from damages and destruction. The basic principles and indications can be accessed in many technical contributions, among which only few are focused on sub-Saharan Africa.³⁵ These deal in particular with correct handling and storage of books, but mainly refer to public collections which are stored in specific building and are managed by librarians or conservators. A more difficult challenge is to sensitize and make aware the custodians of private collections of the basic principles of a correct preservation of their heritage.³⁶ These collections are usually preserved in private homes, often huts made of wood and mud, and stored in wooden boxes or plastic bags in environments which expose the books to severe risks and damages. On the other hand, they can also represent a lively heritage still in use for didactic or devotional purposes; in this case any conservative practice should avoid to limit their present usage or to distort it. Studying the manuscripts heritage in its natural context of **fruition** is in fact crucial in any perspective of investigation, from the literary, to the religious, historical, codicological, and it should be considered and respected also in a strictly conservative approach to this material.

Commentato [SF2]: Is it not a synonym for usage? This is what I mean

ha formattato: Evidenziato

Preserving the African manuscript heritage is an extremely challenging enterprise. Local authorities started to show interest in the preservation of the manuscript heritage only in a few recent cases, often fostered by conservative urgency and inspired by the interest showed by foreign scholars. Their attempts of conservation often have to face logistic difficulties such as the lack of local professional conservators, and economic means in addition to the lack of the basic instruments of knowledge and monitoring of the collections (censuses, inventories and catalogues). These difficulties are also due to the extreme fragmentation of the manuscript heritage, which are mostly scattered in private collections in remote areas of the different countries. **The concentration and gathering of the material in dedicated institutions such as libraries and museums, by local authorities is a first step towards preservation, as it allows an easier monitoring of the manuscripts. But at the same time this strategy exposes the book heritage to different risks, mainly the possible destruction of several collections at once when not subjected to proper conservation or storage conditions.** The training of local conservators and the promotion of campaigns for a higher awareness of the importance of this material is a first and crucial further step, which would lead to its conservation on the base of international cooperation in a multidisciplinary perspective.

REFERENCES

- Adcock, Edward P. (general ed.). *Principi dell'IFLA per la cura e il trattamento dei materiali di biblioteca*, edited by Edward P. Adcock with the collaboration of Marie-Thérèse Varlamoff and Virginie Kremp. Italian edition edited by the Commissione nazionale Biblioteche e servizi nazionali. Roma: Associazione Italiana Biblioteche, 2005.
- Bausi, Alessandro (general ed.). *Comparative Oriental Manuscript Studies. An Introduction*, ed. by Alessandro Bausi with Pier Giorgio Borbone, Françoise Briquel-Chetonnet, et al. Hamburg: Tredition, 2015.
- Beit-Arié, Malachi. "The Oriental Arabic paper." *Gazette du Livre Médiéval* 28, (Printemps 1996): 9-12.
- Biddle, Michaëlle. "Inks in the Islamic Manuscripts of Northern Nigeria. Old Recipes, Modern Analysis and Medicine." *Journal of Islamic Manuscripts* 2, no. 1 (2011): 1-35
- Biddle, Michaëlle. "Recent Preservation and Conservation Activities for Northern Nigerian Manuscripts in Arabic Script." *Journal of Islamic Manuscripts* 3, no. 2 (2012): 211-229.
- Biddle, Michaëlle. "Conservation of Sub-Saharan African Manuscripts." *The Annual Review of Islam in Africa* 12, no. 2 (2014): 61-68.
- Biddle, Michaëlle. "New Strategies in Using Watermarks to Date Sub-Saharan Islamic Manuscripts." In *The Arts and Crafts of Literacy: Islamic Manuscript Cultures in Sub-Saharan Africa*, edited by Andrea Brigaglia and Mauro Nobili, 27-68. Berlin / Boston: De Gruyter, 2017.
- Bloom, Jonathan M. *Paper before Print: The History and Impact of Paper in the Islamic World*. New Haven / London: Yale University Press, 2001.
- Bloom, Jonathan M. "Paper in Sudanic Africa." In *The Meanings of Timbuktu*, edited by Shamil Jeppie and Souleymane B. Diagne, 45-57. Cape Town: Human Sciences Research Council of South Africa Press, 2008.
- Bondarev, Dmitry, et al. *Safeguarding the Manuscripts of Timbuktu*. Hamburg: Centre for the Study of Manuscript Cultures, 2017.

- Bosch, Gulnar, John Carswell, and Guy Petherbridge. *Islamic bindings & bookbinding. A catalogue of an exhibition. The Oriental Institute. The University of Chicago. May 18-August 18, 1981*. Chicago: University of Chicago Printing Department, 1981.
- Brandi, Cesare. *Teoria del restauro. Lezioni raccolte da L. Vlad Borrelli, J. Raspi Serra e G. Urbani*. Roma: Edizioni di Storia e Letteratura, 1963. (Engl. translation: Cesare Brandi. *Theory of Restoration*, ed. by Giuseppe Basile, transl. by Cynthia Rockwell. Roma: Istituto centrale per il restauro / Firenze: Nardini, 2005).
- Brigaglia, Andrea. "Central Sudanic Arabic Scripts (Part 1): The Popularization of the Kanawi Script." *Islamic Africa* 2, no. 2 (2011): 51-85.
- Déroche, François. *Islamic Codicology: An Introduction to the Study of Manuscripts in Arabic Script*, with contributions by Annie Berthier. Translated by Deke Dusinberre and David Radzinowicz. Edited by Muhammad Isa Waley. London: Al-Furqan Islamic Heritage Foundation, 2006.
- Déroche, François and Valentina Sagaria Rossi. *I manoscritti in caratteri arabi*. Roma: Viella, 2012.
- Devisse, Jean. "Trade and Trade Routes in West Africa." In *General History of Africa, Vol. III: Africa from the Seventh to the Eleventh Century*, ed. by M. El Fasi and I. Hrbek, 190-215. London: James Currey; Berkeley: University of California Press, 1992.
- Dreibholz, Ursula. "Some Aspects of Early Islamic Bookbindings from the Great Mosque of Sana'a, Yemen." In *Scribes et manuscrits du Moyen Orient*, ed. par François Déroche et Francis Richard, 15-34. Paris: Bibliothèque nationale de France, 1997.
- Federici, Carlo. "Histoire et théorie de la conservation du livre." In *Sauvegarde des bibliothèques du désert. Matériaux didactiques*, edited by Alessandro Giacomello and Alessandro Pesaro, 54-69. Nouakchott: Ministère de la Culture, de la Jeunesse et des Sports; Roma: Ministero degli Affari Esteri, 2009.
- Fierro, Maribel. "The Treaties against Innovations." *Der Islam* 69, no. 2 (1992): 204-246.
- Gacek, Adam. *The Arabic Manuscript Tradition. A Glossary of Technical Terms and Bibliography*. Leiden / Boston: Brill, 2001.
- Gacek, Adam. *The Arabic Manuscript Tradition. A Glossary of Technical Terms and Bibliography – Supplement*. Leiden / Boston: Brill, 2008.
- Gacek, Adam. *Arabic Manuscripts. A Vademecum for Readers*, Leiden / Boston: Brill, 2009.
- Gori, Alessandro. "IslHornAfr: Islam in the Horn of Africa, a Comparative Literary Approach." In *Essays in Ethiopian Manuscript Studies. Proceedings of the International Conference Manuscripts and Texts, Languages and Contexts: the Transmission of Knowledge in the Horn of Africa, Hamburg, 17-19 July 2014*. Supplement to *Aethiopia* 4, edited by Alessandro Bausi, Alessandro Gori, Denis Nosnitsin, 17-20. Wiesbaden : Harrassowitz Verlag, 2014.
- Gori, Alessandro. "Between Manuscripts and Books: Islamic Printing in Ethiopia." In *The Book in Africa: Critical Debates*, edited by Caroline Davis and David Johnson, 65-82. Basingstoke: Palgrave Macmillan, 2015.
- Greenfield, Jane, and Jenny Hille. *Headbands. How To Work Them*. New Castle, Delaware: Oak Knoll Books, 1990.
- Hammer, Joshua. *The Bad-Ass Librarians of Timbuktu and Their Race to Save the World's Most Precious Manuscripts*. New York: Simon and Schuster, 2016.
- al-Hassan, Ahmad Y. "Textiles and other Manufacturing industries." In *The Different Aspects of Islamic Culture, vol. 4: Science and Technology in Islam. Part 2: Technology and Applied Sciences*, ed. by Ahmad Y. al-Hassan, Maqbul Ahmed, A.Z. Iskandar, 135-164. Beirut: UNESCO Publishing, 2001.
- Humbert, Geneviève. "Papiers non filigranés utilisés au Proche-Orient jusqu'en 1450, essai de typologie." *Journal Asiatique* 286, no. 1 (1998): 1-54.
- Hunwick, John O. "Catalog of Arabic Script Manuscripts at Northwestern University." *Sudanic Africa* 4, Special Issue on Kano (1993): 210-212.

- Hunwick, John O. and Alida J. Boye. *The Hidden Treasures of Timbuktu*. London: Thames & Hudson, 2008.
- Irigoin, Jean. "Les papiers non filigranés: état présent des recherches et perspectives d'avenir." In *Ancient and Medieval book materials and techniques (Erice 18-25 settembre 1992)*, edited by Marilena Maniaci and Paolo Munafò, 265-312. Città del Vaticano: Biblioteca Apostolica Vaticana, 1993.
- Jabo, Sahabi Maidamma and Dahiru Ahmed Bayero. "Problems and prospects of preservation and conservation of Arabic and Ajami Manuscripts in Northern Nigeria." *Journal of the South African Society of Archivists* 47 (2014): 18-25.
- Jeppie, Shamil, and Souleymane B. Diagne (eds.). *The Meanings of Timbuktu*. Cape Town: Human Sciences Research Council of South Africa Press, 2008.
- Kawo, Hassen Muhammad. "Islamic Manuscript Collections in Ethiopia." *Islamic Africa* 6, no. 1-2 (2015): 192-200.
- Kräbli, Graziano. "West African Arabic Manuscript Heritage at a Cross-road: Dust to Digital or Digital to Dust?" *Anuari de Filologia Antiqua et Mediaevalia* 5 (2015): 41-66.
- Loveday, Helene. *Islamic paper: a study on the ancient craft*. London: Don Baker Memorial Fund, 2001.
- Lydon, Ghislaine. "A Thirst for Knowledge: Arabic Literacy, Writing Paper and Saharan Bibliophiles in the Southwestern Sahara." In *The Trans-Saharan Book Trade. Manuscript Culture, Arabic Literacy and Intellectual History in Muslim Africa*, edited by Graziano Kräbli and Ghislaine Lydon, 35-72. Leiden / Boston: Brill, 2011.
- Maniaci, Marilena. *Terminologia del libro manoscritto*. Roma: Istituto Centrale per la Patologia del Libro, 1998.
- Marçais, George, and Louis Poinssot. *Objets Kairouanais, IX^e au XIII^e siècles. Reliures, verreries, cuivres et bronzes, bijoux*, Tunis: Tournier / Paris: Vuibert, 1948.
- Maizerelle, Denis. *Vocabulaire codicologique. Répertoire méthodique des termes français relatifs aux manuscrits*. Paris: Cemi, 1985. On-line version: <http://www.palaeographia.org/vocabulaire/pages/vocab2.htm> [last access July 2019].
- Ngom, Fallou. *Muslims beyond the Arab World: The Odyssey of Ajami and the Muridiyya*. New York: Oxford University Press, 2016.
- Ngom, Fallou. "West African Manuscripts in Arabic and African Languages and Digital Preservation." In *Oxford Research Encyclopedias of African History*, 2017. <http://africanhistory.oxfordre.com/view/10.1093/acrefore/9780190277734.001.0001/acrefore-9780190277734-e-123> [last access July 2019].
- Ngom, Fallou, and Mustapha H. Kurfi (eds.). *Ajamization of Islam in Africa*. Leiden: Brill, special issue of *Islamic Africa* 8, no. 1-2, (October 2017).
- Nobili, Mauro. "Manuscript Culture of West Africa." *Manuscript Culture* 5 (2012-2015): 42-51.
- Østebø, Terje. *Localising Salafism. Religious Change among Oromo Muslims in Bale, Ethiopia*. Leiden / Boston, Brill, 2012.
- Ould Bouraya, Issa Nabiyoullahi and Eugenio Veca. *Le project "Sauvegarde des bibliothèques du désert" en Mauritanie. Les insectes ravageurs des bibliothèques en Mauritanie. Rapport intermédiaire*. Passariano: Regione autonoma Friuli Venezia Giulia, Centro di catalogazione e restauro dei beni culturali; Roma: Ministero degli affari esteri, Direzione generale per la cooperazione allo sviluppo, 2010.
- Pellicanò, Marcella and Gaia Petrella. "La prévention et l'entretien à la bibliothèque." In *Sauvegarde des bibliothèques du désert. Matériaux didactiques*, edited by Alessandro Giacomello and Alessandro Pesaro, 156-188. Nouakchott: Ministère de la Culture, de la Jeunesse et des Sports; Roma: Ministero degli Affari Esteri, 2009.
- Regourd, Anne. "Introduction to the Codicology of the Collection." In Alessandro Gori, *A Handlist of the Manuscripts in the Institute of Ethiopian Studies, Volume Two: The Arabic Materials of the Ethiopian Islamic Tradition*, with

- contributions from Anne Regourd, Jeremy Brown, and Steve Delamarter, xlvii-xci. Eugene, Or: Pickwick Publications, 2014.
- Regourd, Anne. "Manuscrits de la mer Rouge (première moitié du xxe siècle): papiers Abū Šubbāk du Yémen et d'Éthiopie." In *The Trade in Papers Marked with Non-Latin Characters / Le commerce des papiers à marques à caractères non-latins. Documents and History / Documents et histoire*, edited by Anne Regourd, 81-140. Leiden / Boston: Brill, 2018.
- Ross, Eric. "A Historical Geography of the Trans-Saharan Trade." In *The Trans-Saharan Book Trade. Manuscript Culture, Arabic Literacy and Intellectual History in Muslim Africa*, edited by Graziano Krätli and Ghislaine Lydon, 1-34. Leiden / Boston: Brill, 2011.
- Russo, Maria Luisa. "Connaître et conserver le manuscrit islamique." In *Sauvegarde des bibliothèques du désert. Matériaux didactiques*, edited by Alessandro Giacomello and Alessandro Pesaro, 112-155. Nouakchott: Ministère de la Culture, de la Jeunesse et des Sports; Roma: Ministero degli Affari Esteri, 2009.
- Sarin, Sophie. "In the shadow of Timbuktu: the manuscripts of Djenné." In *From Dust to Digital. Ten Years of the Endangered Archives Programme*, edited by Maya Kominko, 173-188. Cambridge, UK: Open Book Publishers, 2015.
- Scheper, Karin. *The Technique of Islamic Bookbinding: Methods, Materials and Regional Varieties*. Leiden / Boston: Brill, 2015.
- Savage-Smith, Emilie. *A New Catalogue of Arabic Manuscripts in the Bodleian Library, University of Oxford, vol. I: Medicine*. Oxford: Oxford University Press, 2011.
- Szirmai, Ján Alexander. *The Archaeology of Medieval Bookbinding*. Aldershot: Ashgate, 1999.
- Viola, Natalia. "Reliures islamiques: spécificités soudanaises." *Histoire et civilisation du livre* 5 (2009), 357-374.
- Walz, Terence. "The Paper Trade of Egypt and the Sudan in the Eighteenth and Nineteenth Centuries and its Re-export to the Bilad as-Sudan." In *The Trans-Saharan Book Trade. Manuscript Culture, Arabic Literacy and Intellectual History in Muslim Africa*, edited by Graziano Krätli and Ghislaine Lydon, 73-107. Leiden / Boston: Brill, 2011.
- Zaccarelli, Giulio. "Notions de conservation préventive." In *Sauvegarde des bibliothèques du désert. Matériaux didactiques*, edited by Alessandro Giacomello and Alessandro Pesaro, 72-110. Nouakchott: Ministère de la Culture, de la Jeunesse et des Sports; Roma: Ministero degli Affari Esteri, 2009.

Endnotes

¹ I refer in particular to sub-Saharan Africa, or Sudanic Africa (from the Arabic *Bilād al-Sūdān*, 'the Land of the Blacks,' as Arabs called it) with the inclusion of the Horn of Africa whose Islamic manuscript heritage has been only recently included in large scale research projects (Gori, "IslHornAf"). In the codicological perspective, according to the new material acquired from the Horn of Africa, it is in fact possible to trace a certain continuity with West African manuscripts. The adjective "Islamic" is not strictly related to the content of the texts, but to the religious and cultural context of their production and transmission. The identified manuscript collections in Africa have been mapped by the Al-Furqan Islamic Heritage Foundation (https://www.al-furqan.com/world_library/, last access July 2019).

² I use here the word "radical" as an umbrella term for different declinations of Islam (as Salafism, Jihadism, Wahhabism, etc.), which share some basic principles: among these is the intent to restore the Islam of the origin, referring to the Qur'ān and the Sunna of the Prophet as its only legitimate sources. The most important tenet of these movements is their interpretation of the belief in the Oneness of God (*tawhīd*) which entails in their doctrine the refutation of any innovation (*bida'*) diverging from the traditional behaviors and leading to polytheism (*shirk*), such as the veneration of Muslim saints, the pilgrimage to their shrines, and other religious practices related to Sufism. For a brief discussion on this subject with reference to one region of the Horn of Africa, see Østebø, *Localising Salafism*, 23-28 and related bibliography; on the juridical sources related to the concept of *bida'*, see Fierro, "Treaties against Innovations."

³ For more on the 'Ajamization of Islam, see Ngom, *Muslims beyond*, 19-20; and Ngom and Kurfi, *'Ajamization of Islam*.

⁴ For an overview of the studies and projects on West African manuscripts, see Nobili, "Manuscript Culture;" Krätli, "West African Arabic Manuscript;" Ngom, "West African Manuscripts."

⁵ For the case of Ethiopia, see Gori, "Between Manuscripts and Books."

⁶ For the general codicological aspects of Islamic manuscripts, see Déroche, *Islamic Codicology* (and its extended Italian edition Déroche, and Sagaria Rossi, *Manoscritti in caratteri arabi*) and Gacek, *Arabic Manuscripts. Vademecum*; see also id., *Arabic Manuscript Tradition* and id., *Arabic Manuscript Tradition. Suppl.* for terminology and specific bibliographies.

⁷ The development of bookbinding models in the different cultural and geographical environment is traced in Szirmai 1999; cf. also Bausi. *COMSt*, 69-265 (specific sections).

⁸ They correspond to Déroche's I type, "box-book" (Déroche, *Islamic Codicology*, 261-262). The dispute over the existence of this model has been going on for years, but it finally found an archaeological confirmation in the discovery of dismissed book bindings in the Mosques of Kairouan, in 1940s, and Sana'a, in 1970s (Marçais and Poinsot, *Objets Kairouanais*, 13-15, Dreihholz, "Some Aspects," 26).

⁹ It is worth noting that the definition of *codex* of this typology of book can raise some objections. Denis Muzerelle in his *Vocabulaire Codicologique*, for example, define the *codex* as "Livre formé de feuilles pliées en deux et assemblées en un ou plusieurs cahiers cousus par un fil le long de la pliure," entailing the necessity of a physical connection among its constitutive elements (Muzerelle, *Vocabulaire codicologique*, s.v.; the same definition appears in Maniaci, *Terminologia*, 75). In Bausi. *COMSt*, 86 the description of the binding structure is similar but the word *codex* is not mentioned. François Déroche in his milestone contribution on Islamic codicology, defines the *codices* as "manuscript books comprising a series of gatherings, or quires, of sheets" with no mention of a physical connection among them; at the same time, he refers the "single-sheet manuscripts" as a non-codex, mentioning them in the paragraph entitled "not all books are codices" (Déroche, *Islamic Codicology*, 11, 14-15). The distinction seems thus to be based on the presence of bifolios (as a quire can be made up of only one bifolio), instead of on the presence of a physical connection among them.

¹⁰ Examples of unsewn gatherings usually made by four or five bifolios are documented also in other regions of the Islamic world. They sometimes show the presence of connective strips of leather, fabric or paper pasted on the spine of the text-block. Karin Scheper, in her study on bookbinding structures, underlines the difference between these two models: "unsewn manuscripts in wrapper bindings are not to be confused with African manuscripts consisting of single leaves" (Scheper, *Technique of Islamic Bookbinding*, 281). Nonetheless, there is clear evidence of sub-Saharan manuscripts consisting of sets of unsewn quires. In the same way, very ancient specimens of single-sheet manuscripts are attested in regions other than sub-Saharan Africa, such as Istanbul and Şan'a' (Déroche, *Islamic Codicology*, 14-15), but with no evidence of their original bindings.

¹¹ This is in fact what Natalia Viola describes as "group b" defining it as "reliures simples." She does not explicitly mention the fact that they are unsewn manuscripts, but this is evident from the related image (Viola, "Reiures islamiques," 373, fig. 2).

¹² This model corresponds to Déroche's Type II (Déroche, *Islamic Codicology*, 260-261). It corresponds to Categories 1 and 2 in Anne Regourd's classification of Ethiopian bindings, which differentiate according to the presence of boards (Regourd, "Introduction to the Codicology," lxx-lxxiii).

¹³ Cases of "false" headbands (i.e. non-structural headbands, and not sewn on the quires spines) in manuscripts produced during the twentieth century are also attested (ibid., lxxx).

¹⁴ Leather is also mentioned by historians of economy as one of the commodities transported along the trans-Saharan trade routes starting from the eighth century. By the twelfth century West African tanned leather started to be exported to northern Africa, in particular Morocco and Libya, and then to be sold to European traders. It is because of its passage through Moroccan ports of trade that in European countries this good is named in different languages with a direct reference to the Moroccan regions. The city of Sokoto and Kano specialized in the production of the best quality tanned-leather on the basis of the manufacturing procedures and from the middle of the fifteenth century they started to export to Cairo. The demand for tanned leather grew considerably in the nineteenth century because of the growth in the book trade worldwide. From the 1870s onwards, the locally produced manuscripts began to be substituted by printed books imported from outside, while leather continued to be exported (Devisse, "Trade and Trade Routes;" Ghislaine, "Thirst for Knowledge," 62-63; Ross, "Historical Geography," 20). For the development of leather manufacture and industry in the Islamic lands, see Bosch, Carswell, Petherbridge, *Islamic bindings*, 58-65; al-Hassan, "Textiles and other Manufacturing," 159-164.

¹⁵ A description related to Ethiopian bindings' decorations can be found in Regourd, "Introduction to the Codicology," lxxx-lxxxviii.

¹⁶ Cf. Viola, "Reiures islamiques," 363, where the books showing wrapper bindings with a thong are not related to additional pouches.

¹⁷ This is generally true also in area where other manuscript traditions have adopted different supports, such as the Ethiopian one where Christian manuscripts are mostly copied on parchment (Regourd, "Introduction to the Codicology," xlvi, mentioning some exceptions in the related footnote; Bausi. *COMSt*, 155-156). Two cases of manuscripts in Arabic script on parchment are

documented in the Bodleian Library (Bruce 45; Bruce 50) and appear to be from Gondar, thus a historically Christian region (Savage-Smith, *New Catalogue*, cat. entries nn. 22, 34, 82, 83, 106, 107, 121, 123, 153 and 19, 20, 23, 41, 121, 132, 133, 134, 171c).

¹⁸ A selected bibliography on the subject is in Gacek *Arabic Manuscript Tradition*, 198-203; specific studies are Irigoin, "Les papiers non filigranés;" Beit-Arié, "Oriental Arabic paper;" Humbert, "Papiers non filigranés;" Loveday, *Islamic paper*; Bloom, *Paper before Print*.

¹⁹ According to documentary sources, locally made paper continued to be produced in Egypt until 1650 A.D., but Italian and French papers were already used in the same proportion in the period of 1530-1640. These two countries alternated their supremacy in the paper market until the end of the eighteenth century (1640-1680 Italy; 1680-1780 France), then mainly Italian paper from 1780 onward (Walz, "Paper Trade," 76-77).

²⁰ A detailed description of Western paper making is in Biddle, "New Strategies," 32-35.

²¹ This was the sizing of the paper that was imported to Africa, but there is clear evidence of paper in rough and unrefined state that was intended to be glazed in Egypt before reaching its final destination in sub-Saharan Africa (Walz, "Paper Trade," 93, 96). Also the additional process of polishing was not a standard in the paper exported to Sudanic Africa (Biddle, "New Strategies," 35).

²² The dating of manuscripts according to the identification of a paper mill's watermark and countermark is often impossible or inconsistent if not supported by other considerations on paper production based on the position of these elements on the mold, the distance between the chain lines, the thickness of the laid lines, the thickness of the sheet, the pulp distribution on the sheet, the fiber used and their possible orientation, or grain (Biddle, "New Strategies," 37). An interesting case study in this perspective is related to the Italian paper makers Galvani (*ibid.*, 44-64; see also Walz, "Paper Trade," 88-89, 96 and, for the Horn of Africa and Yemen, Regourd, "Introduction to the Codicology," xviii-lxviii; Regourd, "Manuscrits de la mer Rouge").

²³ For a description of the chemical and physical instrumental analysis on inks, see Déroche, and Sagaria Rossi, *Manoscritti in caratteri arabi*, 17-21.

²⁴ This gum is used in the food industry as a thickening agent, stabilizer, gelling agent, or as a substitute for gluten; it is soluble in water and does not form a gel on its own, but function by increasing viscosity. It is said to have antibacterial effects, thus to prevent paper degradation (Personal communication by Abdullahi Sharif, Harar, Ethiopia, May 2018).

²⁵ ~~Schumacher, 1827~~ complete please [He is the one who gave the name to the plant:

https://en.wikipedia.org/wiki/Heinrich_Christian_Friedrich_Schumacher,_we_can_avoid_the_note]

²⁶ Examples of the different kinds of collection in Ethiopia are given in Kawo, "Islamic Manuscript Collections." For an enlarged overview on the collections in the Horn of Africa and their descriptions see the reports of the project field mission at: <http://islahnafr.eu/publ.html> (last access July 2019). For a description of other African manuscript collections see Nobili, "Manuscript Culture," 42-43 and the classification of those collections made by Al-Furqan Islamic Heritage Foundation (https://www.al-furqan.com/world_library/, last access July 2019).

²⁷ In manuscripts from the Horn of Africa, the most frequent are chat leaves, *Chata edulis*.

²⁸ In Eastern Ethiopia the use of *wagar* (African olive, *Olea europaea* sp. *africana*) is commonly attested.

²⁹ Federici, "Histoire et théorie;" Bausi. *COMSt*, 541-544; 564-565.

³⁰ A specific study about infestation has been carried out on Mauritanian libraries (Uold Bouraya and Veca, *Project*).

³¹ For the region of the Horn of Africa, new material has been acquired by the project *Islam in the Horn of Africa* and a literary data-base will be soon available on-line, see <http://www.islahnafr.eu/index.html>. For a detailed report of field work see Sarin, "Shadow of Timbuktu."

³² Standards and guidelines for the digitization have been proposed by different institutions, such as the Federal Agencies Digital Guidelines Initiative, USA (<http://www.digitizationguidelines.gov/guidelines/digitize-technical.html>, last access July 2019) or the International Federation of Library Associations (<https://www.ifla.org/publications/node/8968>, last access July 2019).

³³ Among the others see Pellicanò and Petrella, "Prévention et l'entretien;" Biddle, "Recent Preservation;" *id.*, "Conservation of Sub-Saharan;" Bondarev *et al.*, *Safeguarding the Manuscripts*.

³⁴ For a terminological excursus and the principles of conservation see Bausi. *COMSt*, 539-543. For a theoretical approach to the modern theory of restoration, see the fundamental Brandi, *Teoria del restauro*.

³⁵ See for example Adcock, *IFLA*, and for Sub-Saharan collections Zaccarelli, "Notions de conservation;" Pellicanò and Petrella, "Prévention et l'entretien;" Biddle, "Conservation of Sub-Saharan."

³⁶ An example is given by the *Vademecum for the Preservation of Book Materials*, elaborated in the framework of the project *Islam in the Horn of Africa* (see: <http://islahnafr.eu/publ.html>).

CAPTIONS:

- Fig. 1: Ms WRK0003, from the collection of Warukko, Oromia (Ethiopia); the fastening between the textblock and the cover is realized with an additional thread anchored to the textblock sewing. ©*IslHornAfr* project, ERC.
- Fig. 2: a) & b) Ms SDQ0004, from the collection of Säddäqa, Oromia (Ethiopia); the endbands are realized without a core and the secondary sewing is anchored on the textblock; c) Ms LMG0007, from the collection of Limmū Ghannat, Oromia (Ethiopia); the endband is sewn in one phase, with a monochrome thread, on the spine lining; d) Ms SSE0002, from the collection of Suuse, Oromia (Ethiopia); the secondary monochrome sewing without a core is (slid?) on the spine. ©*IslHornAfr* project, ERC.
- Fig. 3: Ms DJBL0045, from the collection of Ayfaraḥ b. Sharif b. Ḥamza, in Balbala, Djibouti City (Djibouti); the textblock is made by loose folios, while the cover is made by two uncovered boards and a piece of colored fabric in correspondence of the spine. ©*IslHornAfr* project, ERC.
- Fig. 4: Ms SHM2018-001, from the collection of Sharif Museum, Harar (Ethiopia); a fabric envelop bag with shoulder strap. ©*IslHornAfr* project, ERC.
- Fig. 5: a set of used reed pens (qalam) and small glass bottles used for inks. Limmū-Ennarea, Oromia (Ethiopia). ©*IslHornAfr* project, ERC.
- Fig. 6: People eating and drinking next to a pile of manuscripts in Säddäqa, Oromia (Ethiopia). ©*IslHornAfr* project, ERC.
- Fig. 7: Ms SDQ0005, from the collection of Säddäqa, Oromia (Ethiopia); the spine of the codex assumed a convex shape, which is reflected in the protruding of the front edge in a concave one. ©*IslHornAfr* project, ERC.
- Fig. 8: Ms from the collection of Limmū-Ennarea, Oromia (Ethiopia); a wooden box containing manuscripts and printed book affected by molds and insects. ©*IslHornAfr* project, ERC.
- Fig. 9: a) Remains of manuscripts and printed books affected by rodents and insects, from the collection of Tije, Oromia (Ethiopia). b) Ms MAJ026, from the collection of Muḥammad Abba Jamaal, Jimata, Oromia (Ethiopia); effects of rodents' infestation. ©*IslHornAfr* project, ERC.
- Fig. 10: Ms SHM2006-166, from the collection Sharif Museum, Harar (Ethiopia); the effects of an acid green ink on the paper support; the support has been repaired with photocopy paper in correspondence of the green frame. ©*IslHornAfr* project, ERC.

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