

Skin Against Paper: Identification of Historical Interleaving Materials in Indo-Iranian Manuscripts

ABSTRACT

When we handle manuscripts or books, we often find various sort of materials placed between the pages to prevent the illustrations from pigment or ink offsetting and charring. These are not always poor quality or modern materials, but are sometimes part of the original conception of the objects. Some Iranian illuminated or illustrated 19th century manuscripts were supplied with a particular kind of interleaf made of thin sheets of skin. The Museum of Islamic Art in Doha, Qatar, houses three manuscripts containing these specific sheets and one copy of a Qur'an whose folia are penned on similar material. Catalogues often mention these sheets to be of gazelle or deer skins, but recent analysis conducted through the 'Books and Beasts' project at York University in the UK, has identified the species of the animal and corrected this assertion. The new and non-invasive technique developed by the team consists of collecting the eraser waste generated while dry cleaning a parchment surface with a plastic eraser, and analysing the collagen molecules from the scrubs through protein mass spectrometry with the MALDI TOF instrumentation. Several samples from the above manuscripts reveal that sheep skins were used and, due to the thickness of the skins, it is most likely that that these were the result of skin splitting.

While the study of this material may appear insignificant at first sight, it provides unexpected insight into book materiality at the turn of the 19th century in Iran. At that time, the Qajar rulers (1785–1925) promoted the adoption and expansion of innovative European technologies, and the renewal of artistic developments alongside cultural and diplomatic exchanges. Hence, this essay attempts to shed light on how interleaves eventually appeared to be used in manuscripts and why sheep skin was the material used, while exposing the various usages of thin skins in Central Asia and in Europe. Some links are also established with the practice of interleaving in western cultures from medieval times, where silk curtains were often

inserted into lavish religious codices, until the industrial era when the illustrations of printed volumes, as well as photographs and drawings collected into albums and scrapbooks, were protected with thin, and translucent papers.

INTRODUCTION

This essay illustrates one aspect of on-going research surrounding the historical interleaving materials encountered in Islamic manuscripts. When we, conservators, scholars or curators, examine western or eastern manuscripts, we often find various sorts of materials inserted between the folios. These are meant, on one side, to protect the illuminations and the illustrations from abrasions and erasures and, on the other side, to keep the facing pages free from pigment offsetting and charring. When the quality of those materials is poor, however, we are often tempted to remove them as they generally damage more than they protect. In most cases, they are modern, non-archival materials such as glassine, acidic paper or plastic sheets placed by supposedly attentive readers.

The use of interleaving materials within Islamic manuscripts as part of the original conception of the book is rather a recent practice, dating from the 19th century. Through various examples found in the collections of the Museum of Islamic Art in Qatar, three main groups of usage were determined which correspond with three geographical areas: the Indo-Iranian regions with the use of very thin skin sheets, the Maghreb with dyed paper, and the Ottoman Empire with coloured and gilded translucent sheets. While the latter two are still undergoing research, this paper intends to present the outcomes of the most recent research among these three groups: the interleaving sheets made of skins that have been found in some manuscripts from Iran to north India. Through the examination and scientific analysis of four manuscripts, including both religious and secular, it is possible to correct misconceptions by identifying the real nature of the material used for writing support and interleaving throughout the course of the 19th century. Indeed, in some modern publications, catalogues and museum website entries there appears to

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be much confusion, as the support is either mentioned as deer or gazelle skin or even snake skin. This needs to be clarified in order to better contribute to the understanding of Islamic manuscript materiality, since little research has been undertaken regarding manuscript production in its latest developments, particularly during the Qajar dynasty in Iran (1784–1925).

EXAMPLES OF SKIN INTERLEAVES IN IRANIAN MANUSCRIPTS

The first relevant example of skin use can be found in a copy of the *Divan* (a compendium of poems) of Hafez¹, dated 1812, and copied during the Qajar era (acc.no.MIA.2014.190). The illustrated and illuminated pages at the beginning of the volume are faced with sheets of very thin skin (Fig. 1). The skins remain semi translucent and very flexible, allowing the full page illustration to be visible. In this copy, it seems that the interleaves are contemporary with the text block since there are no visible traces of restoration or rebinding.

Another Qur'an copied in Bagdad during the 13th century (acc.no.MS.376.MIAQ) was restored and redecorated in a north Indian workshop in the 19th century. The manuscript was re-bound with a magnificent Indian binding. The two final end leaves show two watermarks, a crowned bear holding an axe and the monogram ЯМБСЯ, referencing the Russian provenance of the paper. It was produced in Yaroslavl city in the Volga region and the monogram stands for "Yaroslavl'skaja Manufaktura Vnukov Savvy Yakovleva" (Yaroslavl Factory of the Grandsons of Savva Yakovlev). Russian papers were widely imported to Iran between the late 18th to 20th centuries, for the purpose of book production or refurbishment. Many loose animal skins were inserted between the pages, some of which feature the shape of the animal wherein the leg and back are partially visible (Fig. 2). It is also interesting

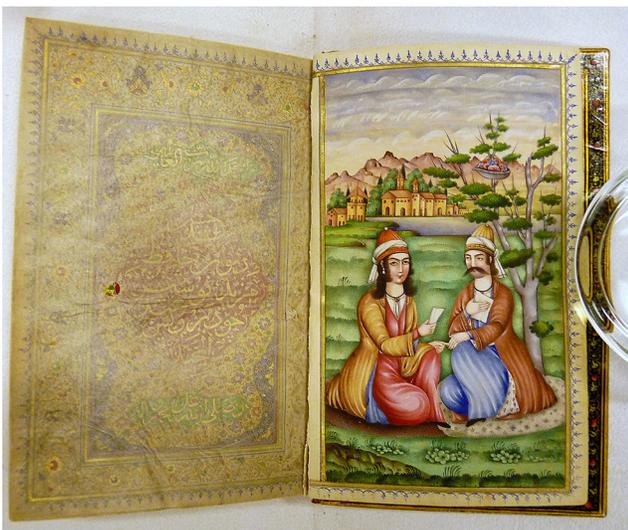


Fig. 1. Copy of the *Divan* of Hafez, acc.no. MIA.2014.190, 151 x 97 mm, the interleaf protects the full illustrated page.



Fig. 2. Copy of the Qur'an, acc.no.MS.376. MIAQ, 285 x 178 mm, the text block contains many loose interleaves whose some parts of the animal shape are still visible.



Fig. 3. Copy of the Qur'an, acc.no.MS.376. MIAQ, some tears of the pages were mended with patches of skin on which the text had been re written.

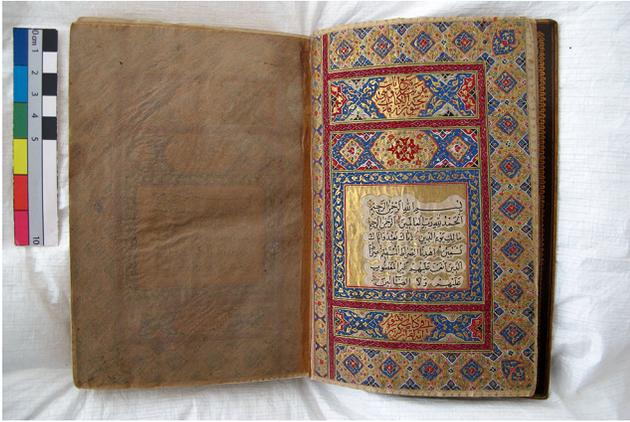


Fig. 4. Copy of the Qur'an, acc.no.MS.366. MIAQ, 155 x 105 mm, the interleaf that protects the full illuminated page has discolored probably due to the oxidization of oil or varnish applied en surface to enhance the support transparency.

to point out that strips of similar membrane were pasted to repair the tears of the folios (Fig. 3). One can wonder about the efficiency of this material since some of the interleaves do not even cover the text area. Their rough and crumpled surfaces can even cause damage to the original support and pigments. This leads us to think that they might consist of recycled materials. Nevertheless, the presence of hairs on the surface and the arrangement of follicles in some areas indicate that the de-hairing process was incomplete.

In a luxury Iranian Qur'an (acc.no.MS.366.MIAQ) dated 1784, lavishly illuminated pages are protected by a similar material. Unlike both copies presented above, however, the membranes have discolored while ageing (Fig. 4), due perhaps to an application of oil or varnish as a means to enhance the support transparency. Over time the varnish has oxidized and the skin has turned yellow. A simple observation through microscope or transmitted light offers insight into the material's process of production (Fig. 5). The strokes and marks have certainly been caused by a blade, while the skin was mechanically split to produce a couple of thin sheets. The round holes may be the result of insect bites which became larger when the skin was scraped and stretched, or accidents due to the hand of the craftsman. These were mended with small patches of the same material which indicates that the repairs are contemporary with the use of the skin. The manuscript, earlier than the previous ones, was most probably restored in Iran during the 19th century: the original binding was replaced by the extant Qajar style lacquered binding. Hence it can be assumed that the interleaves were added during the restoration, these being pasted along the gutter of the illuminated folia and not sewn into the text block.

These examples are not isolated cases. In the Heidelberg University library, a *Shahnamah* copy from Kashmir, dated 1819, shows about 90 full-page illustrations that are covered with similar interleaves (Fig. 6). This volume, therefore,



Fig. 5. Copy of the Qur'an, acc.no.MS.366. MIAQ, with transmitted light, the interleaf shows characteristic marks probably caused by the action of a blade; the holes were mended with a similar type of skin.

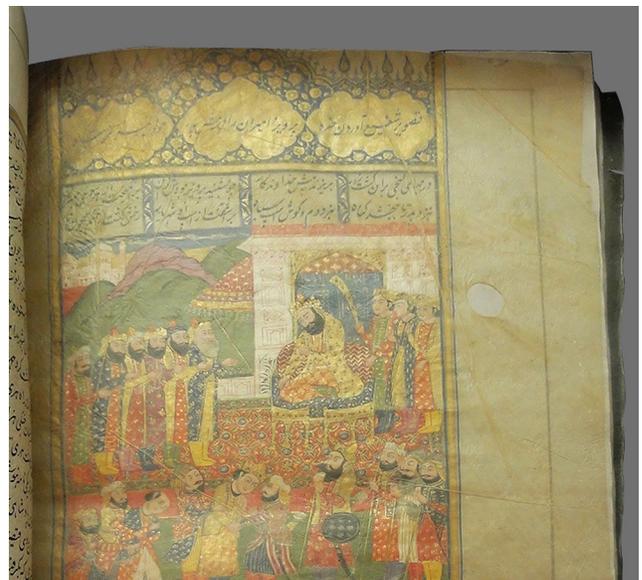


Fig. 6. Copy of the *Shahnamah* of Firdausi from Kashmir, c.1819, acc. no. Cod.Trübner 8, 440 x 265 mm, the large illustrated folios are covered with skin interleaves. Credit: Universitätsbibliothek Heidelberg, Germany.

exemplifies the adoption of this practice for a particularly large volume copied in north India².

USAGES OF THIN SKIN MATERIALS IN THE INDO IRANIAN CONTEXT

There are four main uses of very thin skins in the Indo-Iranian artistic sphere throughout the 18th and 19th centuries. The goldbeaters' skins were traditionally used for the manufacturing of gold leaves. These were made from the outer membrane of cow intestines which were stripped off and stretched to produce very thin and transparent materials with great tensile strength, resistant to tearing under heavy beating. The thickness usually ranged from 0.05 to 0.10 millimetres. These sheets were then placed between squares of gold leaves in a booklet which, once closed, was hammered out to shape the gold leaves.

The Qajar dynasty saw the emergence of miniature Qur'ans written on a very thin skin support, whose height reached no more than 10 centimetres and the width measured up to 6 centimetres. These precious manuscripts, penned with minute script, were not really meant to be read and opened but, rather, to be used as personal devotional objects while being kept in purses or metal cases against the body. Many museum or auction catalogues state the support as being from either deer or gazelle skins, sometimes goldbeaters' skins, snake skins, or simply thin membrane or parchment. In some copies, the support is so fine and transparent that the copyist could only pen the words on one side of each folio³ (Bayani, Contadini, Stanley 1999). However, in the Doha miniature Qur'an the pages are written on both sides (acc. no. MIA.2014.415). The support features an arrangement of hair follicles in clusters that are clearly visible to the naked eye, indicating that it is indeed made of skin and not guts (Fig. 7).

Further objects made from thin skins include talismanic charts. These are dated to the 18th and 19th centuries and were produced in Ottoman and Qajar ateliers. It seems that skin was favoured by the Iranian workmen whereas paper and textile was preferred in Turkey. Three charts found in the Nasser D. Khalili Collection catalogue mention "parchment, perhaps gazelle skin" as a material description (Maddison and Savage-Smith 1997)⁴. They were decorated with various writing and symbols such as Qur'anic verses, the 99 names of God, and magic squares and numbers to ward off diseases, the evil eye, the devil and misfortune. The size of these charts was quite large, the biggest measuring roughly 80 centimetres high by 70 centimetres wide. The items were used as amulets, folded several times to reach a small rectangular packet to be placed into a container, household objects such as boxes or mirror cases or held on the person. The thin skin was probably more flexible, lighter and less prone to tearing with repetitive folding than paper.

The *charbah*, very thin and transparent supports were used as tracing. The outline of a composition was pricked

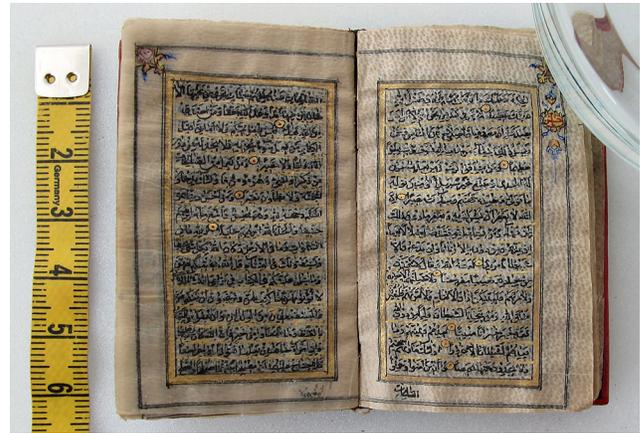


Fig. 7. Copy of a miniature Qur'an, acc.no.MIA.2014.415, the writing support is made of sheep skin whose hair follicles are clearly visible in the right hand folio.

and reported onto paper for a finished painting by pouncing (Chowdry 2008). Some *charbah* are still found today in collections and are precious testimonies to understanding the techniques of miniatures paintings. The various annotations often found on these supports and the alterations in the composition, from the original sketch to the final version, also provide great insight into the artistic development of an object. As for the Portrait of Sheikh Hasan Chishti from the Victoria & Albert Museum⁵ and the portrait of Buhlol Dana Ghazn from the Harvard Art Museum⁶, both dated to the 18th century, gold beater's skin and deer skin respectively, are mentioned in the catalogue entries. It seems that the nominations are confusing and reflect a lack of knowledge for this material due to the fact that no scientific analysis has been conducted on these materials.

Nowadays deer and gazelle skins are said to be still used by calligraphers and copyists in Pakistan and North India. When I visited the Iranian Cultural Centre in New Delhi in 2008, the artists ensured me that the contemporary works and calligraphy are executed on deer skins (Fig. 8). Modern book binders still claim to employ this material in addition to snake skin as interleaves or writing support, as seen in a Lahore modern book bindery (Soteriou 2002). These materials are called, in Urdu, *hiran* (deer) *kechelli* or *nag* (snake) *kechelli*. These expressions are difficult to translate since *kechelli* can be interpreted differently depending on the spelling and the context. Some may translate as "Follower of the deer/snake", whereas others may think of "clothing/skin of the deer/snake", *chelli* meaning blouse. The recipe, however, is briefly described in Alexandra Soteriou's essay (Soteriou 2006), having been kept in secret for centuries and only taught by word of mouth. The skin is removed while the dead body is still warm, and is then stretched and scraped on a frame. The recipe further explains the application of a mixture made from various ingredients including antibacterial, conservative and softening properties



Fig. 8. Iranian Cultural Centre in New Delhi in 2008, artists today still produce calligraphy on a long scroll, supposedly made of deer skin.

such as red tree sap, gum Arabic, chloroform, salt and aromatic ammonia. However, no mention is made of possible lime treatment of the skin for de-hairing and fat removal. According to Soteriou, deer skin is supposedly still manufactured today in Billimaran, a section of Chandni Chowk, the Muslim bazaar in old Delhi.

SCIENTIFIC IDENTIFICATION OF THE SKIN MATERIALS FROM THE MIA MANUSCRIPTS

Confronted by this mass of information, it sounded interesting to scientifically identify the real nature of this material while attempting to analyse its components. The Books and Beasts Project based at the University of York and its founding members, Professor Matthew Collins and Doctor Sarah Fiddiment, have developed a method to identify the species of the animal used to make parchments. This novel, non-invasive technique consists of collecting the eraser waste generated while dry cleaning a parchment surface with a plastic eraser (Staedler Mars®) and analysing the collagen molecules from the scrubs through protein mass spectrometry with the MALDI (Matrix-Assisted Laser Desorption/Ionisation) TOF (time-of-flight mass spectrometry) instrumentation. The results given

by the identification of more than 900 samples contribute to the understanding of book materiality, and provide historians with valuable information about European geographic distribution of livestock and animal preference for codices and archival records. In July 2014, several eraser samples of each manuscript described above were sent to York and the outcome of the tests revealed that all of the interleaves were made from sheep skins. Regarding the extreme thinness of the support, the materials were certainly obtained from the splitting of the skins. A split skin is a skin which has been delaminated manually with a blade to produce two supports. The use of sheep hides makes sense, as this animal was easily available and cheap, and its skin can delaminate easily due to the presence of abundant fat cells and its natural spongy quality. The skins were probably prepared like parchment: after soaking in a solution (enzymatic bath made of fermented organic materials or alkaline chemical bath such as lime), the epidermis was removed, keeping only the dermis as main support. The fat cells present between the reticular and the papillary layers of the dermis contain abundant fat cells which swell in the solution. Once the cells are swollen and weakened, both layers can be easily split. These are then stretched onto frames.

The data was compiled in a table in order to compare the features of the analysed sheep skin sheets (Fig. 9). The thicknesses ranged from 0.03 to 0.05mm which is fairly thin, whereas non-split sheep parchments range from 0.07 to 2 mm. For comparison, the right column displays the paper thickness of the manuscript pages which vary from 0.09 to 0.12 mm.

While today gazelles are an endangered and protected species in Pakistan and India, they were very widespread in the past when many different species of cervids were encountered in the vast territories from Iran to India. Many miniature paintings depict the animal being hunted by rulers, kings or mythical heroes. Technically, any kind of skin can be processed as long as it is free from hair, flesh and fat with specific chemical treatment such as washing, stretching and thinning produce a thin membrane. If deer hides could have been used at some point for particular use, they might also have been a selling point for art dealers, as deer sounds more exotic and precious than any domestic species.

Alongside protein spectrometry, x-ray fluorescence spectroscopy (XRF) was also conducted directly on the membranes by using a handheld XRF Olympus Innov-X Delta Premium with a 4W, 40kV Rh anode X-ray tube. This non-destructive technique allows for identifying non-organic components such as potential chemical compounds involved in the skin manufacturing. In each manuscript, two different interleaves were analysed, so each graph shows two spectra superimposed (Figs. 10–13). In all of the interleaves Sulphur, Chlorine, Potassium and Calcium were found in different quantities. From the nineteenth century onwards, chlorine was used in parchment manufacturing as disinfectant agent.

Manuscript Acc. No.	Date	Type of manuscript	Type of interleaf	Interleaf thickness in millimeters	Paper folio thickness in millimeters	Species identified with protein mass spectrometry
MS.376	13th c.	Qur'an refurbished in the 19th c.	Loose	0.04–0.05	0.09 borders	Sheep
MIA.2014.190	1812	Poems, no traces of restoration	Pasted along the gutters	0.03–0.05	0.08–0.10	Sheep
MS.366	1784	Qur'an, restored in the late 19th c.	Pasted along the gutters	0.03–0.04	0.09–0.12	Sheep
MIA.2014.415	1875	Miniature Qur'an, no traces of restoration	Writing support	0.4–0.05		Sheep

Fig. 9. Description of interleaf features.

The presence of calcium highlights a possible lime treatment of the skin. Potassium might have been used in the process as well. The presence of sulphur is certainly representative of the atmospheric sulphur dioxide pollution which forms sulphuric acid so relevant to parchment degradation.

THE USES OF THIN SKINS IN EUROPE

It seems that the knowledge of how to split skins existed as far back as the Talmudic period in the Near-East, in order to optimize the skins by obtaining two writing supports from a single skin. Beforehand, the hides were probably swollen in fermented enzymatic baths to ease the mechanical splitting with long knives (Chahine 2013). Then the flesh and the hair sides were stretched on a frame.

In Medieval Europe, thin parchments were also produced for manuscripts. They were either made from young or stillborn animals, or by mechanical fleshing or splitting. To produce coverings for windows or 'paper' for reports, the hides from young animals were coated with gum Arabic, honey and egg white, in addition to linseed oil or animal glue, and were left to dry under tension. This process would induce the modification of the parchment's reflexion index, thus creating the transparency (Chahine 2013). It then seems that the technique was forgotten during the following centuries until the revival of skin objects during the 17th and 18th centuries. During this period, the demand was diverse but nevertheless quite restricted to specific usages, from the manufacturing of accessories such as pillows, gloves and fans for summer made of sheep or kid skins, to domestic goods such as labels, book covers, bottle caps, and lamp shades.

During the industrial era, transparent papers produced with chemical treatment such as immersion in acid baths, or pulp overbeating and surface super calendaring, replaced skin supports.

Little research has been carried out on the development of industrialization throughout 19th century Iran, particularly on the adoption of western artistic technologies. Few accounts discuss the domestic leather and paper industries. The tanning industry was a vital and fruitful economy throughout the whole period for footwear, clothing, horse tack and everyday goods, the main production centers being Hamadan, Mashhad, Isfahan and Tehran. Products were widely exported to neighboring countries, and commercial exchanges with Russia were frequent and lucrative (Floor 2003). No study, however, relates the state of leather and parchment production to book binding and artistic activities. Throughout the Qajar period, book production significantly decreased in favor of other forms of art that are described below. Moreover, lacquered covers in vogue at that time supplanted the traditional boards laid of decorative leather. In this context, it is quite intriguing to see the emergence of skin as it had never been in demand for books in prior centuries. This material enabled new possibilities such as the production of tiny manuscripts. The skin being much thinner than paper, it allowed for more pages and less bulk in comparison with a copy written on paper. It seems quite natural therefore, that this material was also used as interleaves for the same reasons.

THE INTERLEAVING PRACTICES FROM WEST TO EAST

Very little has been written on the practice of interleaving in western books. Nevertheless, during the medieval period, the rich ornamentation of deluxe religious codices was protected by silk curtains stitched onto the pages. The first uses of these silk curtains dates to the 11th century, but it remains debatable whether they were in fact later alterations. It would seem, however, reasonable to assume that silk was favored since it was smooth and flexible, and therefore easy to fold over. Although silk was not a transparent material, it was used

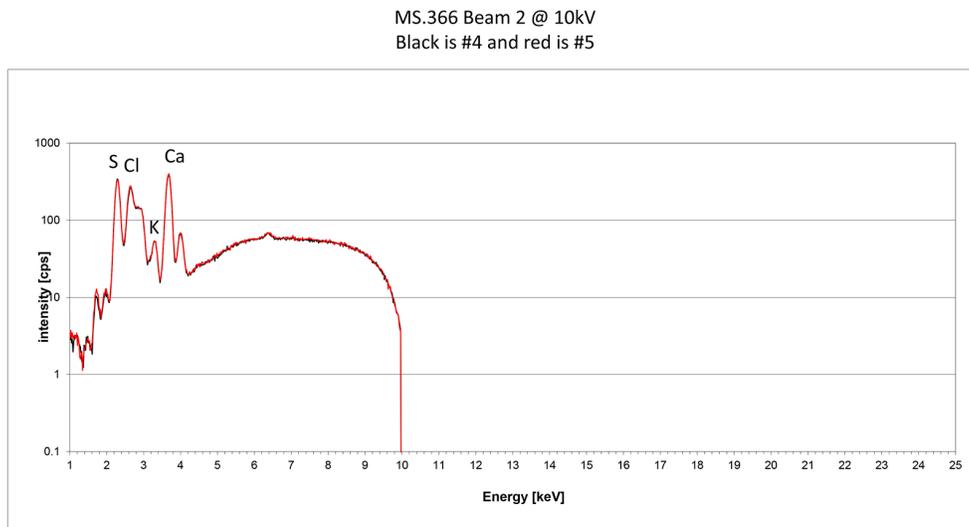


Fig. 10. XRF spectra of MS.366.MIAQ, copy of the Qur'an, under 10 kV beam.

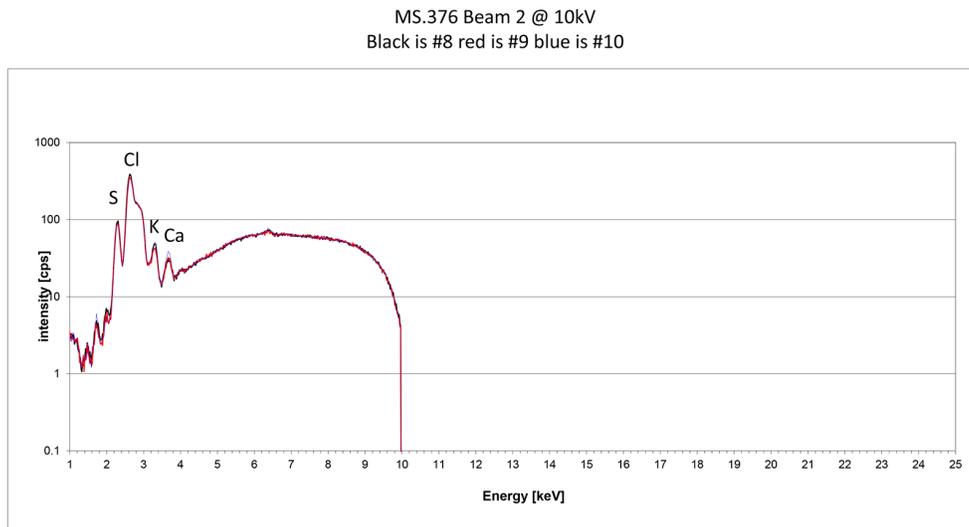


Fig. 11. XRF spectra of MS.376.MIAQ, copy of the Qur'an, under 10 kV beam.

intentionally as a protective barrier between the viewer and powerful or disturbing images. Furthermore, such interleaves served the didactic purpose of physically engaging the reader with the book by asking him or her to manually flip over these protective sheets (Sciacca 2007). Today, with repetitive handling and the fragility of the silk, these curtains are crumpled and deteriorated and no longer seem to provide the efficient protection as was first assumed. The use of silk or linen curtains did, however, continue throughout the 16th and 17th centuries for secular volumes such as the Guild Book of the Barber Surgeons of York, housed in the British Library where portrait busts of English sovereigns from Henry VII to Elizabeth I stood, also protected with green pieces of silk⁷.

Paper interleaves first appeared in manuscripts or printed books from the end of the 17th century onwards (Lafitte 2007). At that time, printers and book publishers were aware of the damages caused by ink discharge. Therefore, guard sheets or loose pages were sewn into the bindings or inserted between the folios. These were made of extremely thin laid paper. These leaves were obviously not transparent but they were thin enough to not cause any bulk to the text block and to perceive the illustrations underneath. Over the course of the 19th and 20th centuries, interleaving was mainly used for deluxe editions of printed volumes which were usually supplied with various types of machine-made paper. Glassine paper became a cheap alternative since it was smooth, thin,

MIA.2014.190 Beam 2 @ 10kV
Black is #2 and red is #3

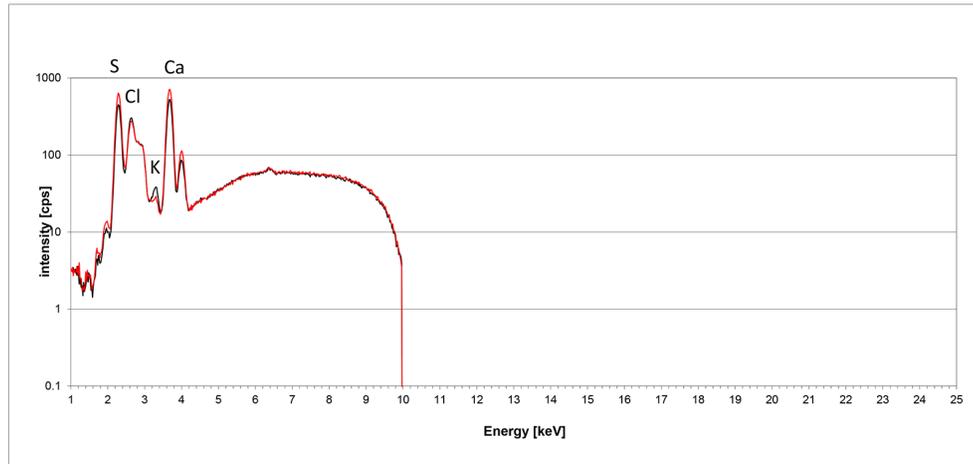


Fig. 12. XRF spectra of MIA.2014.190, Copy of the Divan of Hafez, under 10 kV beam.

MIA.2014.415 Beam 2 @ 10kV
Black is #6 and red is #7

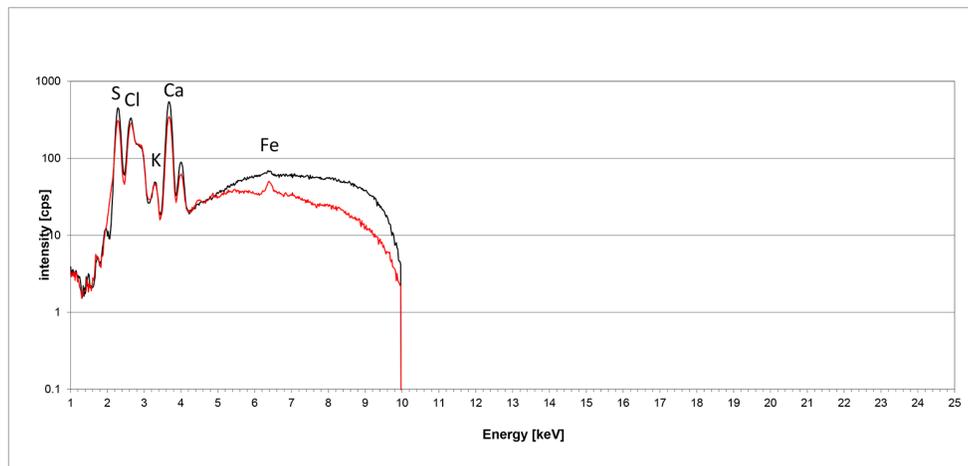


Fig. 13. XRF spectra of MIA.2014.415, Copy of the Qur'an, under 10 kV beam.

resistant and translucent. It was produced by super calendaring, where the paper was compressed through a series of alternating steel and fibre-covered rolls so that the paper fibres would flatten while still facing in the same direction.

From western books to Qajar manuscripts, how did the practice of interleaving emerge in the history of Iranian book materiality? Throughout the 19th century, the Qajar emperors, eager to modernize the country and ascend in the international scene, promoted the adoption and expansion of innovative European technologies in the fields of industry, sciences and art. Many refined western objects reflecting the creative effervescence of the 19th century were offered to the shah via diplomatic and military envoys, and inspired the

renewal of Iranian production. Iranian artists and craftsmen were sent to France, Italy, England or Russia to be trained and to learn new techniques. Official court art met new developments in forms, techniques and aesthetics. New media such as large-scale oil painting, photography, and lithography introduced simultaneously in the 1820s and 1840s were used by the rulers to promote their international image. Nassir al Din-Shah (1848–1996) was so passionate about photography that he used himself as a subject to immortalize the members of the royal family. Under his reign, several professional or amateur photographers such as the Italian Luigi Pesce or the French Jules Richard were encouraged to record public events, historical monuments and sites from expeditions, and a broad

spectrum of Iranian society. They also assembled photography albums to be offered as gifts for the shah. In 1858 the Royal Photography atelier was established in the Golestan Palace (Tamasbpour 2013). It is then recorded that Nassir al Din Shah owned 1,039 albums and today 1,000 of them remain stored at the Golestan Palace (Scheiwiller 2013). Of those, 34 albums were sent from Europe as diplomatic presents (Diba 2013). It is not easy to identify the features and patterns of those albums and to determine whether they were made and purchased in Europe or *in situ*. While the history of photography in Iran is today well documented, very little is known about the supplies and the production processes. Scrap books were also introduced in Iran and the art of compiling and collecting drawings, paintings and photographs began to develop in high society. In Europe, the 1860s marked the beginning of the mass production of various types of photographic albums: *carte de visite*, then cabinet cards and snapshots. Albums and portfolios bought from the art suppliers or stationers were also used to compile drawings and lithographs which were pasted directly onto the pages. Overall, there existed a wide variety of albums in terms of layout and design, reflecting the skills and liberty of production at that time. Provenance is difficult to trace since there are no stamps or suppliers' labels (Fitzpatrick 2013). To prevent media transfer, the albums were sometimes interleaved, as seen in this volume which compiles scenes from everyday life painted with gouache by different Iranian artists (Fig. 14). Usually these paper sheets were pasted along the gutter rather than sewn, as the material was too thin to be pierced with a needle and the album arrangements did not necessarily accommodate the stitching of interleaves. However, regarding artistic and commercial exchanges, it is not impossible that interleaved photographic albums and deluxe printed volumes reached the Iranian market. If such were the case, they may have raised awareness among book binders and



Fig. 14. Album, acc.no.MS.772. MIAQ, compiling *scenes de genre* of the Iranian classes. The gouache paintings made by Iranian artists were faced with thin woven paper that have acted as a buffer against pigment chemical degradation as seen on the left hand side.

amateurs regarding the preservation of manuscripts, in turn promoting similar practice. The use of skin, however, remains uniquely Iranian originality and is not found in Europe.

CONCLUSION

By the 19th century, calligraphers, painters and bookbinders were well aware of pigment and ink deteriorations and their impact on paper. This knowledge was transmitted through centuries of artistic practice, technical expertise and feedback. Several research projects have highlighted that some buffer substances were added to the painting preparation to counteract the harmful action of iron gall inks or copper green pigment corrosion (Barkeshli 1999). However, no physical barrier was inserted into the text block until the second half of the 19th century when European albums and printed volumes started emerging in high Iranian society. Today, this practice is difficult to trace since many albums have lost their interleaves. Chemically and mechanically deteriorated, these interleaves were simply torn out and discarded, as they no longer provided the efficient protection for which they were intended. While sheep split skins have been highlighted, it remains unclear whether these were made in Iran or imported from Europe. Mass spectrometry only allows for the identification of the species and not the breed of the animal, which can only be determined with DNA analysis. The use of interleaves nevertheless exemplifies a growing interest in the preservation of cultural items. Each piece of physical protection should be very carefully recorded and it is our duty as conservators, curators and scholars to make sure that these materials are kept and properly conserved in order to contribute to the dissemination of knowledge about this practice.

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NOTES

1. Hafez is an Iranian poet and a mystic philosopher born in 1310 and dead in 1337.
2. The whole manuscript is available in the digital version on <http://digi.ub.uni-heidelberg.de/diglit/codtruebner8>.
3. The Nasser D. Khalili Collection owns 30 folios from Kashmir, Cat.78, QUR 500, written on one side of the support.
4. The acquisition numbers are MSS.756, MSS.734, MSS.735.
5. Accession no.IM.2-1944, see online <http://collections.vam.ac.uk/item/O454963/sheikh-hasan-chishti-tracing-unknown/> (accessed 05/19/2015).
6. Accession no.1919.253; see online www.harvardartmuseums.org/collections/object/216765?position=0 (accessed 05/19/2015).
7. See Egerton 2572, online www.bl.uk/catalogues/illuminatedmanuscripts/record.asp?MSID=7581&CollID=28&NStart=2572 (accessed 05/19/2015).

REFERENCES

- Barkeshli M. 1999. The use of saffron in Persian miniatures paintings and its preventive role for the destructive effect of verdigris. *ICOM Committee for conservation Journal*. 12th Triennial Meeting, Lyon. France.
- Bayani M., A. Contadini, and T. Stanley. 1999. The Decorated Word, Qur'ans of the 17th to the 19th Centuries, part one. London: The Nasser D. Khalili Collection of Islamic Art, The Nour Foundation, in association with Azimuth Editions and Oxford University Press.
- Chahine C. 2013. Cuir and parchemin ou la Métamorphose de la peau, Paris : CNRS editions.
- Chowdry A. 2008. The studio practices of painters in Mughal ateliers. Symposium on the care and conservation of Middle-Eastern manuscripts, University of Melbourne.
- Diba, L. 2013. Qajar photography and its relationship to Iranian Art: A Reassessment, *History of Photography*, 37 (1):85–98.
- Fitzpatrick, O. 2013. Design, Style and Commercial Photographic Albums. In *The Photograph and the Collection: create/preserve/analyze/present*, ed. by G. Farnell, Edinburgh: Museums Ect.
- Floor W. 2003. Traditional crafts in Qajar Iran (1800–1925). Costa Mesa, California: Mazda Publishers, Inc.
- Lafitte, M.P. 2007. Quelques exemples de serpentines anciennes dans les manuscrits à peintures. In *Quand la peinture était dans les livres*, Ed.by M. Hofmann, E. König, C. Zöhl, Turnhout, Belgium: Brepols Publishers.
- Maddison F. and Savage-Smith E. 1997. Science, Tools and Magic. London: The Nasser D. Khalili Collection of Islamic art, The Nour Foundation, in association with Azimuth Editions and Oxford University Press: 110–112.
- Scheiwiller S.G. 2013. Photographing the Other Half of the Nation: Gendered Politics of the Royal Photograph Albums of Nineteenth-Century Iran. In *The Photograph and the Album*, ed. Jonathan Carson et al. Edinburgh: Museums Etc: 30–74.
- Soteriou, A. 2002. Indian Paper-making: mapping the DNA. *Hand paper making Journal*, 27 (2).
- Soteriou, A. 2006. *Gift of the Conquerors: Hand Paper-Making in India*. 2nd ed. Ahmedabad: Mapin Publishing Gp Pty Ltd.
- Tamasbpour M.R. 2013. Photography in Iran: a Chronology, *History of Photography*, 37 (1):7–13.
- Sciacca, C. 2007. Raising the curtains on the Use of Textiles in Manuscripts. In *Weaving, Veiling and Dressing, Textiles and their Metaphors in the Late Middle Ages*, Ed. by K. Rudy and B. Baert, Turnhout, Belgium: Brepols Publishers.

FURTHER READING

- Kirby D. Pand all. 2013. Identification of collagen-based materials in cultural heritage. *Analyst* 138.

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