And the hammering must be equally distributed for each portion until it fits the book and its paper softens, and gathers to each other from the strength of beating because the hammering will affect it as the press will not do by pressure. And the press after that hammering will adjust it delicately. Should you press it in the press without beating the press will not benefit it at all, neither will the paper and itself, some upon the other, at all. No matter what type of press it is, and should you place the book in the press after the hammering, no matter what press, you gather it in, its paper will obey you and it would spread and soften even in the weakest of presses and in the hammering it is a great secret. So choose how become initiated upon this benefit, oh binder, ask Allah for me for mercy. Perhaps Allah will favor me with his mercy.

Sufyani gives instructions for adjusting the gatherings so that, when bound, the written areas of text will be aligned. This is followed by a description of the marking of the position of the sewing stations, of the sewing thread, and of the final knocking down of any swelling caused by the sewing:

After that mark the central paper of the gatherings with the five marks. After that gather the gatherings all of them by their headings to the edges of its upper part. If it was collated in the preparation and the regulating of the format, and should it show variation in the writing the one overlapping the other—you push the papers some according to the other, adjusting the leaves higher or lower and collate the work by what is necessary at the time. After that you run two lines of ink upon the spine of the gatherings in the place where you sew the book and introduce the needle with the thread in the base of the gatherings in the point that you traced by ink and the thread with which you bind it must be delicate and strong. Draw it, twist it, of three or four (strands) and the profit of the command that you should collage will (readily) appear to the binder in gathering the sections of the book by sewing one to the other. Should the sections be many and a mistake appear in the position of the sewing let him hammer at this place of the string with a hammer upon a slab of marble until he correct the thread mistake and finish the work according to this method.

Lining of Spine & Attachment of Hinges

After the sewing is completed there may be some swelling of the textblock in the spine area, caused by the form of the folds of the gatherings and by the sewing threads and stitches. This swelling is beaten or pressed out with a hammer or heavy folder on the slab, an operation described by both Ibn Bādis and Sufyani (see above). The spine is then lined, most commonly with a medium (or medium-light) weight, unbleached or semi-bleached linen tabby of rather open weave. This lining helps to consolidate the spine, allowing uniform flexing and distribution of stresses as well as providing an even basis on which to paste the leather covering. The lining operation is carried out with the book held firmly between boards in the press so that the gatherings are evenly aligned. The lining is attached with a controlled amount of paste. It is usually cut so as to allow hinges, or flanges, about 20-25 mm, to project either side of the spine to which ultimately will be attached the boards of the cover. The hinges may be of paper or leather and both Ibn Bādis and Sufyani describe their preparation and pasting to the spine (and to the bookcover) at some length.

Ibn Bādis describes the steps of first placing the seven book in a rope press so that it is firmly held with the spine projecting (onto which the spine lining/hinge is pasted), the mixing of the paste and the making and application of the spine lining/hinges.

Then hold it [the book] between your knees. Take one side of the press resting it against your left knee and the other side against your right knee with the book in the middle. Take the end of the rope in your left hand and bind it about the press until it ends, and tie the ends. Take the book (now in the press) from between your knees. The projecting sewn spine protrudes. Place the spine upon the slab and beat the edges of the (sewn) folds of the gatherings) paper sections with the nāṣīb, folder, until it is equal in thickness to the rest of the book. Then gently tighten by the two sticks called marqātī. Too much pressure would turn the back of the book and spoil it.

In preparation for the next step addris, ashpooled paste, is melted by taking a small pot, placing a little water in it and bits of ashtr. Mix it by stirring with the middle finger of the right hand. The paste should be runny, not too thick if it is summer time, while in winter it should be in order to dry quickly. Then take a thin paper (for the hinges), fold it, and cut it in half. Each half should be two fingers wide—wider than the spine. Taking the paste with your middle finger, suspending the other fingers, smear the spine of the volume lightly with paste, being careful that none runs between the gatherings. One paper is placed and pasted on top of the other so that the excess width projects on either side of the spine. Another sheet of paper is placed on top before pressing the two strips down with the folder because the folder would pull up the paper dump with paste and spoil it. This is one of the secrets of the craft. Then the papers are left to dry in the air either in the sun or near a low fire. Do not take it away until it dries evenly, otherwise it will warp—so be careful of that.

You must previously have taken the measurements of the book before you left it in the press. Smear a piece of paper with paste and cover it with another. Then, protected by another paper, press smooth and rub them with a rag, then even them with the folder. 'Iqā'a paste the (cover) to its pages without these linings, busāfā, or endpapers. They are called "strengthenings," tashqawiti, and people think that by using them they strengthen (protect) the book. Their strength is like that of cloth, tawb, or book. Thus as the volume dries the strengthening dries also. Then the volume is taken out of the press carefully. Place it upon the slab, then fold over the excess of the two papers (hinges). Press it (the excess) to the strengthening and smooth it well. Place a ruler along its side and make it straight. Paste along the margin in order to stick the hinge which you have pasted on the volume. Now place the strengthening on the book, mounting it between the hinge and the core. Thereupon paste you paste it (the strengthening). When you paste it, put paste on both sides, and take a long, narrow strip of paper about two fingers wide, and paste it upon the other (of the strengthening) to prevent it from opening wide. When you reach this point the leather is put on it.

Sufyani similarly gives instructions for knocking down the spine folds of the sewn textblock to reduce any swelling caused by the sewing and on how to adjust the book in the press prior to pasting on the spine lining/hinges (in this case the hinges are made of leather):

Then you hold the book in the press completely leaving out a little of the book the width of two fingers and equalize the gatherings together completely. But beware not to hold back or restrict anything of the gatherings and you should have an iron blade like the blade of a shoe-maker and count by it the number of gatherings from one side and check their number and count again from the other side. Should you find the number equivalent there is no doubt that none of the gatherings have been imprisoned. Should you find an increase or diminution of number look to the side where it is missing and search for what is minus according to the complete side until you find it. Should you find it move the press a little bit and enter the oval in the middle of the minus section and raise it delicately until it equals its companions. When they are all aligned tighten the press and put the wheat paste at the base and apply it with your finger until it is applied between the sheaves and take the applicator in your hand and enter a bit of its edge between the section and apply with it the paste between the gatherings delicately, and deepen not; and also do likewise between the gatherings, and that which follows them, until you finally reach the last of them. After that run the index finger over it until you are sure that the paste has entered between them all of it. At that time loosen the press and pass the whole book in the heart of the press until the gatherings are aligned while the press is open. Then tighten the press with the leverage from both sides in order that the superfluous paste between the gatherings will come out except that which is correct for the condition and wipe the back of the gatherings with the applicator until you dispose of what was
superfluous of the paste and should any thing appear high, hammer it lightly until it events and smooths.

And after that stand the press along the wall and prepare for the book two sides of soft leather in which there is no hardness and the measure of each hinge according to the size of the side of the book and that which you fold upon the back of the sections I mean the back of the book. Should the book have along its margins papers written with gold or in color thickened by gum arabic and you are afraid that when you work upon them, the two hinges, while they are damp from the traces of water, the colors will absorb the moisture and will stick one to the other. So put what you have of the two hinges beside the book so that the hinge does not reach the book and injure it by dampness. Then you, when you make the two broad wings (hinges), glue them to the book whenever they become dry, without moisture or dampness. And when you wish to glue the press close the press and ease it delicately from the book and pull out by both edges of the hinges of the book. After you take out the book from the press the measurement of ١٨٣٥٥٥٤٥٥٥٥ (a string?) and tighten the press well and evenly. And smooth by the wood at the edges of the book until it produces between the hinge and the book a straight passage for the paste. After that do so to the back of the book and the two hinges and turn the hinges upon it the one over the other through pressure and equalization and take after that three papers and paste them with paste and place them on the back of the book and paste above them with paste and pass over it with the applicator until you fasten them from both directions and the middle and the edges of the book. And stand the press in the temperate air a day and a night.

When it dries and solidifies run a cutting iron over the two edges of the book and cut what was in excess of the paper which was gathered by the paste and glued on the spine of the book; loosen the press and enter the instrument between the book and the press to separate it.

As well as the hinges which are an extension of the spine lining or are applied to it, there may be other systems of reinforcing the joints. The simplest form is to paste a strip of paper as a hinge along each inside joint (before or after the doublet has been attached). The doublets themselves may have a projecting hinge which is passed down onto the adjacent first and last leaves of the volume. In a number of 14th–16th century A.D. bindings from Syria or Egypt the doublet hinges of leather or paper are decoratively trimmed giving a wavy outline which suggests central or east Asian influence.192

Although Ibn Bādīs does describe how upper and lower endleaves may be pasted down onto the inside of the covers as an extra means of securing the textblock to the bookcover and we do have some early evidence of this practice, for instance in two 2nd. or 3rd. century A.H./8th–9th. century A.D. Qur’ān bindings in the Egyptian National Library, Cairo, which have parchment pastedowns which are contiguous with the adjacent endleaves, the evidence of Islamic bookbindings from the 14th–17th centuries A.D. suggests that the use of pastedowns rather than doublets was uncommon during this period. Its reintroduction is a relatively recent phenomenon, possibly under the influence of European bookbinding techniques.

**Bookbinding Adhesives**

Two two main plant extracts used as pastes in the making of book boards and the attachment of paper, leather and textiles are illustrated in an incident mentioned by Muqaddasi (fl. 737 A.H./A.D. 985). He wrote that in the Yemen they used ماء, or wheat starch, for those purposes and that, when the governor of Aden sent him a māqūf to bind, and he asked at the pharmacist’s for شرط, or asphodel paste, they had not heard of it, and sent him to the muḥtasib, or public welfare officer, who knew better.444

Ibn Bādīs, the Maghrībi, in the next century says that شرط may be dissolved by putting a little water and bits of broken ماء in a small pot, stirring it as it melts. The ماء should be fluid, but not too thick in summer; in winter, however, it should be thicker in order to dry quickly. In Egypt, ماء was the subject of a royal proclamation in 791 A.H./1387 A.D.400 Qalqashandī discussed its preparation both in an uncooked and cooked form at about that time—the heated ماء is put in a container and its colour on paper is pure white, while the other type is formed by only adding water and letting it stand until it becomes paste. Later, Sufyānī also chose ماء instead of شرط, to prepare the paste boards, to paste up the spine prior to lining and attaching the hinges, and to apply the leather to the boards.401

The use of both pastes appears to have been widespread in the Islamic world, both ماء and شرط being known by the 10th century A.D.: a wheat-starch paste had been used from the beginning of Islamic paper production. Sufyānī applied a third vegetable product, ساماغ, or gum arabic, the consistency of thin honey, as an adhesive, to both the leather covering of the spine and the leather core over which the endband is sewn. Allowing the two to dry, one is then moistened with saliva and are then pressed together. He assures us that they will adhere tenaciously.402 Both Ibn Bādīs and Sufyānī recommend ساماغ as a binding medium for ink.

Vegetable paste rather than animal glue was predominantly used in the construction of the traditional Islamic binding, but in 20th. century Iran Walford observes that the spine lining is glued with a leather glue (serīṭum), boiled from leather scraps, or fish glue (سریط ماهی), made from boiling the swimming bladder of the sturgeon. However, he records that vegetable paste (سریط, سریت) is also used for attaching the textblock to the case and is prepared from the bulbs of Asphodelus ramosus or Eremurus aescu-

Both Ibn Bādīs and Sufyānī give details of other adhesives used as binding media for inks and paints. Those that have applicability as media used to decorate book covers will be discussed in the relevant section below.

After the attachment of the lining/hinges to spine and the trimming of any excess material at head and tail, a board is placed on each side of the book, which is then carefully aligned and placed in the press so that the edges of the paper leaves contained can be evenly trimmed. The rope press described by Ibn Bādīs (see Tools, above) had its boards grooved or bevelled where the rope goes around the edges so that the sword may be used along the press and not cut into the rope.

Head, tail and fore-edge are cut in turn. The book is repositioned each time so that the appropriate edges of the boards are lined up level with the cheeks of the press with only the edges of the parchment or paper leaves projecting. The trimming is done, according to Ibn Bādīs, with a sword or large knife. He says that, It is necessary that the sword’s length be twenty or less, of medium width, and its blade should be well tempered. Its hilt should fill the palm. And I am told that some craftsmen do not know how to use the sword at all, That is because they have a long sharp blade with which they cut according to their system.

Such a tool and the action of trimming are graphically represented in
the 19th century Kashmiri manuscript painting with the bookbinder standing up to do the work (Colour Plate B).

In 20th century Iran after drying (hoškdan), following the gluing of the spine, the book is trimmed (borez dadan) with a bookbinder’s knife (kird, kefeh). During trimming, the edge to be trimmed is held in a trimming press (quid, gireh).174 A different tool, a large file, is illustrated in a marginal painting of the Freer Gallery Jahangir Album leaf showing a craftsman trimming the fore-edge of a book (Fig. 8).175 Ibn Bādīs describes how to measure the cover for trimming operations.

When the leather is dry, it is necessary that the book be trimmed equally with the cutter which is called the trimmer. The book is put between the hands to do this. Only some craftsmen do as I am describing. A straightedge is put diagonally on the book. Its middle is marked. Then the straightedge is turned back to the other sides and the same is done. Thus, in the middle of the book, a cross is formed. One leg of the divider is put down on the intersection of the cross. Its other leg is opened to the side of the book.

Endbands

After the spine has been lined and the edges of the textblock have been trimmed, endbands are sewn at the head and the tail of the spine of the textblock.

We have little evidence of endband types from the first centuries of Islam, although some Coptic endbands have survived,176 but by the 14th century A.D. a type of endband is found which, with subtle variations in decorative sewing, continues to be used by traditional Islamic bookbinders (Fig. 10). For the endbanding operation the book is held in the press with the head or tail end to be sewn tilting upwards towards the craftsman. The endband is constructed in two main stages. A thin strip of leather thong is placed or adhered along the spine most edge of the end being sewn (this step is described below by Sufāyān). This acts as an endband core, both to give a rounded bulk to the finished decorative sewing and to prevent tension on the primary endband threads from cutting them down into the spine folds of the gatherings. Then a primary endband thread, often of silk and the same colour and material as the principle textblock sewing thread, is sewn, starting at one side of the spine, through the inside fold of each gathering 30-40mm down and out through the back of the gathering. It is then brought over the endband core into the inner spine fold of the same gathering and out again and over into the inside fold of the next gathering and so on until a continuous row of parallel vertical primary endbanding threads is created which forms, as it were, the double warp threads of a miniature loom through which the weft threads of the decorative sewing will be woven.

The decorative or secondary endband sewing most frequently uses two threads, which may themselves be double, usually of silk and of different colours; red and white, red and yellow, green and pink etc. To sew, the bookbinder holds one of the threads in the left hand. The other which is threaded at a needle, is held in the right hand (i.e., if the craftsman is right-handed) and, starting at one side of the spine, is passed alternately under and over the double primary endband threads (each group corresponding to one gathering) in turn, twisting around the thread held in the left hand each time so as to produce a pattern of small bi-coloured chevrons. When the end of each row is reached sewing proceeds back in the other direction until the desired number of chevron rows is reached (Figs 9a- c). Slight changes in the manipulation of the threads can produce varying chevron patterns. The chevrons will vary in size depending on the thickness of the threads and the interval between the primary anchorage threads.

Just as the chevron endband is such a characteristic feature of Islamic bookbindings, so is the damage it causes to paper bookblocks. More often than not the protective endband core is omitted with the result that the primary endband threads (not being anchored around the sewing stations of the gatherings) cut into the spine folds of the paper gatherings and eventually tear out. Thus it is almost inevitable that Islamic rebindings will have repairs to most, if not all, the spine folds, made of small square or triangular patches of paper during each rebinding phase. These are,
however, useful in helping to determine the chronology of the present
binding of a book and its earlier history.

The only mention Ibn Bādis makes of endbanding is of the needle suited
for the purpose, called ḥarazm which should be shorter and heavier than
the ones used for sewing the textblock gatherings together. Šufyānī pro-
vides further details: [16]

The method of weaving the endband. You should have in your possession gum
arabic dissolved in water the consistency of thick honey. Then place some of it
at the tops of the gatherings at the edges of the cuttings under the little band of
leather on which you weave the endband, in order to place upon it the band. And
the band itself should be of tanned leather covered by gum arabic beforehand so
that it dries. And you begin by taking from it the band which you will need for
the endband. Then when the gum which you have placed at the top of the book
faces, you moisten it with your saliva and moisten the band and place it upon the
part containing the gum arabic. Then both will stick together tenaciously. And
the threaded needle enters the center of the gatherings along the right side after
you have fastened the end of the thread in the back of the book at its back edge
in the place where the point, of the needle started from, then you entered it in
the midst of the last folded paper and follow along with the sewing of the gath-
erings until you finish to the end section and tie the thread in the last stitch very
meticulously. In order that the sewing holds tightly and correctly and finish what
remains of the weaving with colored silk so that the endband is perfectly worked
from both sides.

The Islamic Bookcover

John Bagford’s notes on bookbinding, written about 1700, record the
immediate distinguishing characteristics of the Islamic bookbindings
which he knew. [27]

The Turks and the Persians have a peculiar manner in binding their books, and
they are for the most part covered in leather of a sad red or dull (sic) colour
leather, which they say is the skin of goats: others are of the opinion that it is the
skins of wild Asses. Their binding is very neat, and the covers stamped in the
middle of the cover with a brass stamp cut very fine, in an oval for the most part,
and they have their sizes for their books as we have, as folios, quartos, and
octavos, 12, 24, etc., but they set not their books on shelves as we in Europe do,
but are kept in apartments in their mosques and put into drawers, as most trav-
ellers that have been in those parts relate. Their books are not bound as the
Europeans, theirs are set together with a sort of paste on the back of books, and
over that they cover it with a piece of linen cloth, and with the headband the book
is fastened to the cover, and all their books have flaps that cover the fore-edge
of the book, not unlike our vellum pocket book and almanacs, but they have no
cloths to them.

Although his intelligence of the sewing techniques used is imprecise and
the decorative panel stamping he describes only flourished from the 16th.
century A.D., this is a faithful summation of the major features of most
Islamic bookbindings we see today. Above all, the fore-edge and pentag-
onal envelope flap has become the feature which characterises the Islamic
binding. Although it seems to have been customary for the envelope flap
to have been tucked under the upper cover so that it was hidden when
the book was closed, depictions of the book in Islamic painting almost
invariably show the flap exposed, so important a sign had it become. This
flap seems to have survived as a vestige of wrap-around flap systems
found in early Christian oriental (Coptic) bookbindings. Up until the 18th.
century, traditional Armenian bindings retained a characteristic fore-edge
flap. [27]

A number of the early Islamic bindings from Kairouan, studied by
Marçais and Poinssot, [27] have fragments of leather flaps, usually of double
thickness, at head, tail and fore-edge of the lower board. These three bookcovers were considered to offer sufficient proof that the flaps formed a continuous rigid wall which, together with the flexible spine, made a protective box for the manuscript with the upper cover serving as a lid. It was thus inferred that some 125 of the other Kairouan bindings whose flaps were in a more fragmentary state were similarly constructed. The evidence for this rigid box flap form is not completely conclusive. The edge pin catches projecting from the edge of the upper boards of many of these bindings and the associated loops connected to the lower boards may indicate the use of folding flaps.

The earliest recorded example of an Islamic bookcover of the classic fore-edge and envelope flap type may be a fragment of a lower cover and flap, probably belonging to the 4th century A.H./11th century A.D. in the Rainier collection, Vienna (inv. Chart. Ar. 14.100 b.),119 By the 12th and 13th centuries A.D., the flaps at head and tail had been discarded in favour of the form which remained an intrinsic feature of Islamic binding until the fore-edge and associated envelope flap started slowly to be omitted under the influence of European bookbinding forms in the 18th century A.D.

Regardless of the sequence of operations used to construct it, the Islamic book cover (a complex of upper and lower boards; fore-edge and envelope flap boards and the hinges joining them to one another and to the lower boards; the leather or paper exterior covering; and double lace) can be considered as a separate structural unit—as the fact that so many covers have survived intact, but separated from their original textblock, abundantly witnesses. The bookcover is only attached to the latter by a thin layer of adhesive to the spine lining and the hinges. As these are precisely the areas that undergo the most flexing and mechanical movement it is here that they tend to break or detach and the cover may come away. However, the portfolio nature of the cover with its wrap around flap holds the parts of the codex together and the textblock is easily reattached to the cover with new hinges, which are usually of paper. Such repairs, more often than not quite crudely executed, are commonly found in Islamic codices of any age. The bookcover itself, because of the thin oriental bindings, tends to wear and split along the joints between the more rigid board elements and repairs, often in many layers and once again crudely executed, are very frequent in these places on Islamic manuscript bindings. Another common practice in the mediaeval period was for cover elements from different original bindings to be reincorporated into new bookcovers.

The first copy of the Qur’an was said to have been placed in between wooden boards during the Prophet Mohammad’s own lifetime.120 Most of the early Islamic bindings from Kairouan used wooden boards and three early Qur’ans (of the 2nd–3rd centuries A.H./8th–9th centuries A.D.) in the Egyptian National Library, Cairo, are bound in wooden (cedar) boards which Grohmann considers to be contemporaneous with the manuscripts.121

Although the majority of surviving early Coptic bookbindings (i.e., of the first millennium A.D.) have boards of papyrus sheets pasted together, a small number dating from the 4th–7th centuries A.D. have wooden boards. Boards of wood were undoubtedly more suitable for the housing of parchment leaves, as their weight, rigidity and thickness (together with the restraining action of strips, ties or clasps) helped to shield the susceptible skins from the cockling caused by changes in relative humidity. However, with the eventual dominance of paper as the writing material for Islamic books, the use of boards made from pasted-together sheets of papyrus or paper became perfectly suitable. In the Near and Middle East, with the tremendous increase in Islamic book production which may have influenced the introduction of a number of materials and book production methods whose principal virtues were economy and speed (e.g., simplified sewing styles, uses of case-in-bookcovers etc.), paper may have become a more available material than the type of wooden boards needed for bookbindings. This material also reduced the overall weight of a bound volume.

Sufiyanı devote considerable space to the description of the preparation of paper pastebords:

Chapter on the manner of making the cover boards:

Meaning the cover boards of paper which they cover with the leather over the book. And that is you take the paper122 and smear a leaf of it with starch and leave it to your right and smear another paper I mean which faces it and place down the pasted page of one paper upon the pasted face of the second and press upon it with both your palms and turn it over, the lower page upon the higher one. And see if there is in it anything of slackness. If so you stretch and smooth it with your palms until it spreads to the limit of its stretching leaving no wrinkles nor flaccidity, then you lay down the two papers which are both pasted one to the other. And take up two other papers, and treat them, as you did in the case of the other two papers which preceded them. Until you join the papers all in this with the two pasted boards and spread them in a warm place upon the earth which does not contain (dirt) that might stick to the pasted leaves.

For it (the dirt) will roughen your dressing of the tablets. When they dry, then take them and divide them according to the number of the tablets which you will use. And see how many are fit of the number of leaves from which you will make the cover and if you wish to make them thin, subtract what you wish of the number of leaves and if you wish to thicken it, add what you want according to your objective. After that take what you have gathered of the leaves for every cover separately. For instance you may take as an example 5, 6, or 7 portions according to the quantity desired and place them around you. Take the first paper and stretch it upon a wooden or marble board and paste it with paste and lay it to your right and paste the second and place it in front of it and paste the third and the fourth to the end. And each that you paste you leave in front of the one before it. After that you take the first and spread it upon the above-mentioned board of marble upon which you pasted the papers and when you have spread it upon the board, take the paper in front of it I mean which was previously pasted. Place the one upon the other I mean the pasted one upon the pasted face. You press upon it with your palms. After that you paste the upper dry face with paste also and take upon the third previously pasted paper, and place the pasted face upon the pasted one and smooth them. Again you paste the dry face and place upon it the fourth paper.

After pasting it thus to the last paper. Then when you smooth it, take a sheet of dry paper, and place it upon the last sheet’s dry face (to protect the surface). And massage the dry paper pressing firmly with a thick board like the qalab and which should be void of splinters (literal meaning, broken boards), you press with its edge until the superfluous starch comes out from between the pasted papers. Then you will take it up and place it upon the place leveled as for a tablet or paper and like materials. And you make another cover and place it upon it until you finish what you wished in the making of the cover then you take what you have manufactured of the covers and place them between two thick boards of clear wood, the press for pressing. After that you put between each two covers two leaves of paper whose dimension should project over the covers with the
press tightly until you note the moisture come forth from the paste with which you have passed the paper. Leave them in the press about half a day or a complete day. Separate them from between the boards and take away the paper which you placed between them, you will find them as you wished and hoped and ask mercy for he who taught you. Then you will spread them in a place of warm air without and because the sun spoils the work and leave them overnight until the morning comes. And in the morning you stand them upon their edge near the wall. When they dry they become extremely beautiful and especially if the paper was good, and perfect, free of water stains, coarseness, or mold.

Sufyání further describes the steps to be taken in preparing the cover boards to the desired sizes:

When you loosen the book, measure upon it two covers after you go around its two ends with the tracing. And press down upon the edge of the cover the ruler and because the sun spoils the work and leave them overnight until the morning comes. And in the morning you stand them upon their edge near the wall. When they dry they become extremely beautiful and especially if the paper was good, and perfect, free of water stains, coarseness, or mold.

A vigorous leather trade was well established in Central and Southern Arabia in pre-Islamic times. Knowledge of tanned and dyed leather is reflected in 6th. and 7th. century A.D. Arabic poetry and the traditions about the 7th. century. At the dawn of Islam in the 7th century, Mecca’s caravans reserved the main place for skins and leather, sometimes also carrying the zabib ʿaṣṣ al-sīn, or currants, used for tanning in the town of Ta’if, which exported leather, prepared by a special method, to all points of Arabia, Iraq, and Syria. Ta’if’s fame in the 10th. century A.D. as a centre for bookbinding is praiseworthy of the praise of Ibn Surraṭ (d. 347 A.H./958 A.D., d. 421 A.H./1030 A.D.) for a costly contemporary manuscript, written in Kufa and bound in Ta’if. Other centres of tanning and the leather industry in 10th. century Arabia were Sa’ada, Ṣanʿā’, Harrān, Ḫūrāṣ, Najrān, and Ṣabid. To the east of Arabia, the unknown author of Ḥunḍīd al-ʿulam wrote, in 372 A.H./982 A.D., about the towns of Sind producing pště, and chari, or leather. In the same period Sīsūt and Būkhrā were productive leather centers, as was Turkistan in later times. To the west of Arabia, Egypt relied on its own supply of leather, importing only the hides of rare animals. Farther west in North Africa (Maghrib), the reputation of the tanners was so great from the tenth to the twelfth centuries that its products were exported to Baghdad. Across the straits in Spain another leather producing and exporting center was already well established in the tenth century. Europe as an importer encouraged great production not only of leather but also of the alum used in the tanning process. There was then, in Islamic times, an extensive leather industry.

Ibn Bādīs differentiates between Egyptian leather, tanned in the Yemenite fashion with gall-nutts and sweet water, which should be washed in sweet water, and leather from the manufacture of Ta’if, which should be washed in salt water because it is tanned in salt water. To touched by sweet water, the Ta’if leather discolors and fades, but washing it in warm salt water brings out the oil and beautifies it.

If the water separates into drops on the surface of the leather, it is a sign that the leather has a surplus of oil, which impairs the brilliance and the lustre of the finished product. To remove this oil, two ounces of powdered gall-nutts should be spread on each layer of leather which is laid out flat, and the gall-nutts should be sprinkled over every section while it is still wet. Then the leather should be folded over, tied together and put into a vessel, containing enough water to cover it. The leather should be left to soak for a night or a day, weighted with something so it will remain covered by the water. It should be well scoured when it is removed from the water. The addition of brass in the tanning paste is helpful. Should the leather still be imperfectly tanned, that is too dark in color and too soft to the touch (because of too much oil), the process is repeated.

The effect of the ṣaṣ or gall-nutts on leather is stated by Ibn Bādīs as follows:

If the leather is too plant they harden it, if too hard they soften it, if too oily they remove the oil, and if the leather lacks fat they supply the fatty substance. Understand this (point) well, he insists.

These directions of Ibn Bādīs which deal with the improvement of insufficiently processed leather are further clarified by some details of basic tanning processes discussed by Ibn al-ʿUkhwaw (c. 772 A.H./1370 A.D.), in his rules for the tanning industry over which he as maḥfīz had jurisdiction. He disapproves of the use of wheaten flour or bran in tanning and recommends instead the qaraṣ ʿaṣṣ al-sīn, or fruit of the mimosa (Acacia pyrenantha Benth.). He considers the use of oak-galls, in the last soaking of the skins otherwise tanned with qaraṣ, a deceptive practice because it harms the skins and causes them to turn black in the sun. He cites the qaraṣ method as one of Yemenite origin and used for goat-skins and he considers summer tanning preferable to that of winter because warm water is best for softening the skins. Bark tannin must have been much used in tanning and the Bedouins’ traditional method is to obtain it by boiling green oakwood.

It is of interest to note, by way of comparison and contrast, the modern methods for the preparation of vellum and leather in use at Constantine, Rabat, Féz and Marrakesh in North Africa. The modern tanners have introduced a coating of pigeon excrement for goat-skins between the lime and bran baths, and a fig coating (although it is expensive) in place of the date dressing that Nadim spoke of in the Fitzhirst. Traditional practices still used are: the rubbing of hides with an earthenware tile for suppleness; tan baths made from the tannin of gall-nuts, or of cork, acorn-oak bark, and sumac; and the use of a brine rinse (at Rabat).

Covering Materials: Leather Dyeing

Jābir ibn Hajjāy al-Ṭust (d. c. 200 A.H./815 A.D.), known as Geber to the alchemists of the medieval world, wrote a Book of Dyes and a Book of Red Dye which do not seem to have survived. In his Kūtbāl-
Rahmat, or Book of Mercy, there is a section dealing generally with tinctorial methods, such as: mixing the dyes with something to aid their retention by the material, using stronger dyes and teaching particularly with the yellow dye ‘asfar’ (كَفُّ وَأَصَفَر) or Carthamus tinctorius.214 Aṣma’ī (d. 216 A.H. 831 A.D.) touched on the subject of dyes when he said, Four things have filled the world which can only be found in the Yemen, among which two he mentioned were the wars (بَطَرَمْلَة) or Momecen tinctorum, the berries of which give red and yellow dyes,ārāf to make naranjā, or Bees tinctoria, whose leaves are used for blue dye.215 Dābās, a pupil of Kūndī (c. 257 A.H./870 A.D) the philosopher, wrote a book on dyes of which only the title remains.216 Ḥāfiz al-Khalī (d. 340 A.H./951 A.D.) tells us that Dārābih in Persia was noted for black ink and sīlah (سْيَل) or dye, which were preferred to all others.217 ‘Abdullāh ibn ‘Abd Allāh (11th century), describes a Greek embassy of 338 A.H./949 A.D. to ‘Abd al-Rahman III, says that, They had covered the message of their king in parchment dyed the blue of heaven, masībah sāmāt (مَسِيْبَة سَمَات).218

A finer differentiation between dye substances is found in the story of ‘Abd All al-Tanṭūkhi (b. 329 A.H./940 A.D. – 384 A.H. 994 A.D.), who relates the episode of a drinking party given by Mutawakkil (reigned 232 A.H./847 A.D. – 247 A.H./861 A.D.), who desired to be surrounded by yellow, even with yellow water flowing through the channels and fountains. In order to do this za’farān (زَفْرَان) or saffron (Crocus sativus), was used until the supply was exhausted; then ‘asfar, or safflower (Carthamus tinctorius), was substituted. When Mutawakkil was informed that there was no more wood or fel of either dye, he commanded his servants to take fabrics dyed yellow with qaṣab (قَصْب) calamus aromaticus which yields a resin for dyeing, and soak them in order to dye the water in the channels yellow. The yellow dyes in this tale are graded according to their cost at that time. It is to be noted that qaṣab was evidently not a fast dye.219 The dyes were primarily those used for fabrics.

The North African, Ibn Bāḍīs, delights us with his exact and practical directions for obtaining dyes suitable for leather. He begins with a Description for dyeing leather and paper red (see above p. 34).

In connection with the use of buqaman for dyeing it is interesting to find that Saqāt’s 6th. A.H./90th century A.D. rules on the bijāb demand that the dyers be prevented from using the buqaman in dyeing cloth as it is not permanent when washed.220 When it is used on leather or paper it is not washing which would have to be considered but rather the effect of light on the dyed material. In a later and anonymous addition to the Siyāsāt al-ṣūfīr of Sufyanī, there is a chapter on The Craft of Dyeing Leather Violet. Buqaman and alam are used in the application of dye. Instead of the careful application with a brush or felt tied on a stick, the washed and knapped leather is soaked in an alam solution and then in a liquid in which dark buqaman has been cooked.221 It was probably a red-violet dye. We continue with Ibn Bāḍīs’ account of the yellow dyes. Again there are two asfar (أَصَفَر) or yellow, and naranjā, or orange. The yellow dye is made of za’farān,222 while za’farān and ‘akkar together make the reddish-yellow dye. To dye leather with the naranjā dye, it should be completely wet or completely dry otherwise it will be streaked. Both the yellow dyes are dissolved in yellow myrobalan juice and applied with a brush if the leather is to be tooled or a sponge if it is to be plain.

Ibn Bāḍīs’ green dye is made of buqaman (بَقَام) or paritaria, the flower of which is to be found among the cumber plants,223 its blossom green like the plants. The method of preparation is simple. The flowers are rubbed on pine needles, which are hung on a rack over old urine. When dye is needed the needles are dipped into the urine which turns a beautiful blue. If the color is too pale more buqaman is added, and if too deep more water. It should be applied to leather, like yellow dye is applied, and it yields a “wonderful” blue.

The mention of the yellow dye, and Ibn Bāḍīs’ use of za’farān and ‘akkar to make naranjā would make it seem logical to couple za’farān with the buqaman to make a green dye from the “wonderful” blue.

We have now the possibility of dyeing leather all the primary and secondary colors except purple and even that gap is partially filled by Sufyān’s buqaman which he calls “violet” and a darker color, “raisin” color. He warns us that for dyeing the leather “raisin” color, it should be well-washed to force out the oil of tanning, since the oil will prevent the color from taking effect evenly. After washing the leather, wringing it, and spreading it out carefully Sufyān applies a solution of zdīl (زَدِل), or sulphate of iron, in water. He cautions against using too little water because this dye is deceptive and if the color of the leather becomes too dark in the first application it could not be remedied but if it is too light succeeding applications could easily darken it.224

Black dye in Ibn Bāḍīs’ recipe is made in a baked clay vessel glazed inside and out, which is filled with vinegar into which nail-heads cleansed from rust are thrown and left for two or three days until ready. When it is necessary to dye, the dye is applied with a stick to which a piece of wood or has been tied. Care should be taken in application if the black dye touches the hand it will stain it. If this occurs, lemon juice will remove the black stain, as it does the red stain of the buqaman dye. When the leather is be dyed black, it should be wet, not dry. The leather is dyed in two applications, then rubbed and washed immediately so that the dye will not eat into the body of the leather and spoil it. To intensify the blackness of the dye, either yellow myrobalan juice or juice of a pomegranate, macerated in water until the water absorbs the color of the pomegranate, may be used. The leather should be dipped in that solution and left to dry.225

This, then, according to our main sources, was the general range of colors for dyeing mediaeval Islamic bookbindings. Other colors were probably in use, for Ibn Khallūk tells us that Abū Bakr al-Sūfi (d. 335 A.H./946–947 A.D.) had a room filled with works composed by himself and all bound in different colors, which Sūfi used to call “the fruits of his studies.”226

Another source of information on leather and which contains information on tanning as well as dressing and dyeing is the Pliechio of Giovanni Ventura Rosetti, first printed in Venice in 1458.227 It was the first printed book to reveal, in detail, technical information on the art of dyeing textiles as well as leather. The chapter which is of interest to us here is headed, “Le cristal.” This book teaches the art of dressing leathers: to tan them and dye them colour by colour, as seeks out the whole art according to the manner of Damascus, Syria, Spain, Turkey, Italy, and Venice, as here below you will understand.

Contrary to the evidence of most surviving historical Islamic leathers, particularly those on bookbindings, as well as the other historical sources and the modern studies of Maghribi leather manufacture, of the nine
studies in the Plicto (out of a total of 50 recipes) devoted solely to the preparation of skins none uses true tannins but describe instead alum tawing. Most of the recipes indicate a final treatment of softening agents such as egg yolk and oil (sometimes also involving flour) to reduce the harsh effect given by the alum treatment and to make the skin more pliable, thus producing a soft leather like chamois. However, there are a further nine recipes for the production of black and grey leathers and two for brown leathers. All of these make use of tannin obtained from gall nuts and in one instance from gall nuts and sumac. The tannin is reacted with iron salts to produce a black or brown. In some of the recipes there is actually a separate treatment of the skin or hide in the tannin solution followed by further treatment with iron salts. In other cases the iron salts and the tannins are mixed together and the skins soaked in these. To give two examples:

To make black tanned skins: Take four ounces of gallnuts pestled and make it boil in three small mezzette of water of leaf of that for dyeing leathers. Let it boil so much that it drops by one third. Then pull it away from the fire and let it air well. When it is a little cool take of that water and put some in a small basin. Have the skin spread on a table and give it the colour of the gall or the water of the gall with the brush or bristles. Give as much to the skins as they can receive, or absorb, and then set them to dry. When well dry, rub them. Have the remainder of the said water boiled so that it is hot, and throw into it two ounces of Roman vitriol. Stir well together and then give one hand (coat) to the skin. Set them to dry and when dry rub them. Then give one other hand (coat) of dye to advantage and thus for three or four times return to dye. Each time you must mix it, rub it and when you see that it gets harsh or that it is dry, rub it. Have a bristle with a little oil of olive and common yex and beat up together that it becomes to the manner of white broth. Smear your skins with this mixture and they will be bright black. When you get it to your liking, put it to dry and as it is dry, rub it and pull it and it will be a beautiful black. Really this is the manner of Skopia with which one dyes the fine cordoruns.24

To make tanned skins brown on the back: Take your dressed skins, and rasp with the pumice stone on the reverse. Then take that quantity of water that would be a measure of three flasks of river water. For each skin put four ounces of gallnuts and boil in said water until it drops by a third and then take it from the fire and strain it. Take as much also of Roman vitriol and one ounce of gum arabic and you will take oil for burning six ounces and four ounces of yex for washing the head. Mix well together, and skim it, and warm all these things. Use two yolks of eggs, and ink and this will be good dressing. If you want to add a little oil of flax, and water for dressing skins, or flings, all these things help to make good colour. Give them one hand (coat) on the side of the skin and then give them one the side of the reverse, as much as you like. This will be notable brown. If you want it to have odor, throw in some powder of iroes (a hedge mustard) or powder of carnations. Make them dry in the shade so that they remain sassy and creamy to the eye. This is a true recipe.25

Nine leather recipes are devoted to blacks and greys, eight to various red colours (vermilion, crimson, morello, brazil, lac, sienna red, red), nine to blues (azure, blue, light-blue, woad, peacock), one to yellow and two to gold.

Leather Preparation and Covering

The seriousness with which the medieval leatherworker in general, and the Islamic bookbinder in particular, considered this material is clearly indicated in the historical sources and is reflected in the quality of the Islamic bookbinding leathers which have come down to us, as well as in the actual workmanship of their tooling and other ornamentation. It is of interest that the binder was not necessarily expected to use the leather he was provided, without further modification before paring and cutting, and that he was expected to take on some of the roles one might consider to be the province of the tanner. That this continued to be so until a late date in the Islamic tradition is indicated by the representation in the mid-19th century Kashmiri manuscript painting of a bookbinder and his tools of a large scraping tool with a half-moon-shaped blade and a crescent-shaped support held against the chest—a tanners’ tool still used today by Moroccan tanners (called teddiya in Marrakesh) to make the tanned skin more supple.26 (Colour Plate B)

In selecting skins as material for book covers, Ibn Badis recommends that they be clear, beautiful of colour, and well-tanned. The tanning is tested by kneading the leather with the hand, the softer leather being preferred. He advises that the leather should be washed in warm water to open and soften it.

Further considerations in selecting leather depend on whether it is to be manganit (manganese), or tooled, in which case it should be smooth, lightweight, that is weighing less than a manm (2.75 lbs) or about two pounds, and it should be well-tanned; or whether it is to be plain,27 in which case it should weigh a manm and have a ground surface. In washing the leather in sweet or salt water, according to the tanning, care should be taken that nothing like a nail or piece of iron touches it as it would blacken it. While washing leather tanned with ‘afs (ozone), or gall nuts, the back should be thoroughly rubbed with a piece of earthenware to remove the gall and other acids which, if allowed to remain, would eat into the material. The leather should then be squeezed well folded face to face, and then opened until it dries.

Ibn Badis advises that the best time to pare leather is when it is nearly dry, because then the paring knife will not tear it. The legs should be cut away and the remainder of the skin spread upon a slab should be massaged with a heavy work ruler, and then pared, care being taken not to cut through the skin. Again the leather should be washed until the water remains clear and pure.

Sufyan also stresses the washing of leather before covering:

If you wish to cover the book with the leather with which you worked upon it, beware of confounding and forbid you that you take the piece of leather that you worked upon it with the water and wash it with water because the tanners when they dye the hide it is affected by the alum, so the color of the dye comes out bright and they grease the leather with oil which accentuates its color. Oh my brother I advise you earnestly and by my best advice that you place the leather, which you had cut according to the measurement for clothing the book, in water, and let it run over it between your hands, and rub it, in order that the oil will come out on the surface of the water. Then pour out the water and repeat the washing and rubbing between the hands it will let out oil on top of the water. Then you continue it until the oil disappears, because if you place the book before washing it and applied the gold over it the oil will prevent the leather from absorbing the glue. From absorbing it I mean here by glue, the fish glue.

In one of the very few areas of the Islamic world where traditional bookmaking crafts have survived, the city of Istanbul, it is customary for the leather to be washed and then pared on a marble slab while the leather is still slightly damp. A broad curved-bladed paring knife is used (Fig. 4). Its short handle fits in against the palm of the hand and paring is done in even strokes working with the hand held tight to the body and pressure coming from the chest. The bevel of the blade is on the side in contact with the leather.
rather than the uppermost side as in the traditional European paring knives. These techniques permit fine even paring of the skin which is a characteristic of Islamic bookbindings from mediaeval times onward. The fine leather with the pasteboard substrate holds the impression of the tools well but is prone to wear and splitting along the flexing zones of the joints.

Examination of Islamic bindings with fore-edge and envelope flap indicates that usually the bookcover was prepared as a unit separate from the textblock right up to the completion of the tooling and other decoration, somewhat like the case bookbindings developed for the mass production of books in Europe in the 19th. century. In the case of the mediaeval Islamic bindings with block-pressed leather doublures (see Doublures below) it appears that the whole inside of the cover may have been lined with a single piece of doublure leather which was pasted in place after the covering of the exterior. The piece crossing the spine may have been pasted down but cut to form a hinge on either side which would eventually be attached to the textblock. Alternatively the inside of the upper cover could be lined separately leaving a hinge and the inside of the lower cover, fore-edge flap and envelope flap lined with a single piece of doublure leather, also leaving a hinge. In later manuscripts with paper doublures the area on the inside of the bookcover where the lower board was attached to the fore-edge flap board and the envelope flap board was provided with a textile or plain leather hinge. The textile was of a type similar to that used in the lining of the spine and was sometimes blue-dyed linen. Paper doublures were usually applied after the covering of the exterior with leather and so cover the leather turn-ins (as did later leather doublures).

The leather covering was applied with paste, probably with the leather first slightly dampened, and smoothed into place with the hands and the help of a folder. No systematic procedure seems to have been followed for the corners of the turn-ins which are left lap-mitered or occasionally roughly butt-mitered.

After covering with leather the covers would be left to dry. Sufyanī indicates that in his method of bookbinding the finishing (the tooling of the leather) is done at the same time as the covering with leather (see below). After the covers are dry, the turn-ins are trimmed fairly close to the edges of the boards with a knife.

Although leather was the most commonly used material for the covering of the traditional Islamic manuscript book throughout its history, other materials were used. Textiles were applied to precious manuscripts but few examples of the earlier periods have survived. Saladin in 1174 A.D. sent to Sultan Nūr ad-Dīn Mahmūd valuable gifts including two sets of Qur'āns bound in silk, one in 30 volumes bound in blue silk enclosed in sheets of gold and closed by gold clasps and another in 10 volumes bound in pistachio-coloured silk. It is recorded that the jurist Abī Thābit (d. 1335 A.D.) commissioned an embroidered satin covering costing 4500 dinars made for a copy of a Qur'ān, believed to date back to the time of the Caliph ʿUthmān. Textiles were also utilized for less special books. An interesting group of bindings, whose outer and inner cover surfaces are covered with simple striped and checkered textiles and the cover edges bordered by strips of defining leather, was produced for the court of Mehmed II Faith in Istanbul.

As well as leather or leather covered portfolios to protect bound or unbound codices, simply constructed satchels with a triangular flap and carrying straps were made of textiles, often very beautiful and expensive ones, for the carrying of manuscripts.

Paper was also used, particularly in the 18th. and 19th. centuries in the Ottoman and Persian domains, as a covering material for more modest books or as an element in cover decoration.

Doublures

After applying the leather exterior covering Sufyanī says, you line it (the bookcover) with leather or cloth. Ornamented endleaves or pastedowns are known from Coptic bookbindings. Grohmann has recorded a number of examples of the 10th.-11th. century A.D. in the Rainier collection, on both vellum and paper. Decorative techniques include painting, block-printing, punch work and filigree.

Doublures, or linings to the inner face of the boards (rather than pastedowns, or pasted-down endleaves), are found in the earliest surviving Islamic bookbindings from Kairouan, in these instances of parchment (often re-used manuscript leaves). The use of skin for doublures continues in Islamic bookbindings on through the 14th., 15th. and 16th. century A.D. and later. In these examples tanned leather is used. Sometimes these doublures were tooled and painted using the same techniques as those for the exterior leather covering (although in these cases the leather is characteristically of a lighter tone) but of particular interest are doublures of thin leather with a block-pressed pattern. For these the leather used is more open and supple than those used for the exterior covering (it may take the blockprinting better) and somewhat resembles chamois. There seems to be a preference for sheepskin rather than the almost ubiquitous goatskin of the external covers.

The patterns on the doublures have been noticed and described by several Western authorities and the techniques employed, the types of ornamental patterns, and their distribution have been investigated by Bosch. Textiles printed from wooden blocks were fabricated in Egypt since late classical times and then imported in quantities all over the Mediterranean area. This early printing on textiles continued into Islamic times and is attested by a 9th. century papyrus which gives a list of materials which includes printed fabrics. Wooden blocks, belonging to Mamluk times or somewhat earlier, used for textile printing have been found in Egypt, and such printing has been continuous to modern times there and in Syria. Thévenot and Chardin both remark the use of blocks for printing textiles in Persia also.

Since we do have early Islamic examples of block-printing on paper, including designs for end-papers the idea of patterning the more durable and stronger leather for doublures logically follows. Block-printed papers, and eventually machine-printed patterned papers, were used for doublures in later Islamic bookmaking.

Two Christian Oriental bookbinding traditions of the Middle East which have many features relating them to the Islamic, the Syriac and the Armenian, used textile doublures. The former preferred monochrome, usually blue, linen and the latter block-printed textiles, often of Indian production (the Armenians of Western India playing an important part in their
Finishing: Covering

The instructions of Sufiyan seem to indicate that the finishing, or tooling of the leather with the decorative stamps, was carried out during the covering operation itself. Tooling at this stage could not have been done on the complex Mamluk or Herati style bindings, but would have been possible with the panel stamping techniques and simple vocabulary of tools used in the Islamic world for most bookbindings of Sufiyan\'s time.

Then after that divide the first cover with the line of the folding knife into two halves and place the panel stamp in the middle of the cover if the manner of binding is eastern and circle about it by the curved line with the folding knife. After that follow the line with the cutter and the point and measure the panel stamp upon the cut out and remove what was excessive until you see that when you lower the design in the cut out you see it lowered with ease and is not tight in its placing in order that the work will be perfect. Then when you clothed the first board with the leather and smoothed it right and left, take off the panel stamp from the book and spread it upon the marble slab in front of you and place the panel stamp upon the cavity from above the leather and hammer upon the design with a small mallet beating gently, which should not be very strong for fear you might cut the leather. And repeat the tapping by the mallet upon the stamp for this will extract the unnecessary starch from below it and the leather will swell by it from the edge of the stamp. So press with your left thumb upon the stamp and smooth with your right hand leaving what is useful of starch at the edges of the design and what is useless massage out to the right and left until it is gone and hold the edges of the leather near the stamp suddenly so that you take the design from its place the impression of the edges will remain with a clear trace as though you have taken it off the wax and by repeated tapping on the stamp the design is raised in it and will leave an excellent impression.

Then when you have finished making the stamp fold the edges of the leather upon the edges of the pasteboard—so when you finish the work of the first cover lay it upon the marble slab before you and lay the book upon it in the same manner in which it was laid before the covering. Attach the cover board temporarily. The leather may contract after drying and after the endband is sewn so that the thread of the endband adds bulk to the spine of the book. If you wish, fit the unbound book in the cover after you mark it, dry it, and line it inside. Then if you find that the binding is small on the book because of the sewn endband, let out the amount of that excess tightening from the binding. And the binder should be capable and intelligent knowing what increases and diminishes and what harmonizes and what does not harmonize.

While the book rests on the first cover, the second board is pasted and covered with leather. Then the narrow fore-edge board is placed on the other beside the second cover with the width of an 'azgah ٦٨ درجة , or leaf of the doctulas palm, between them. Two or three 'azgahs width are left between the fore-edge board and the tongue board which is then glued into place. The edges of the leather cover are folded over the two flap boards and the second cover and some thinly pared leather is pasted over the points between the second cover and the flap.

We have said when you put down the book upon the first pasteboards spread the wheat paste upon the second board and cover it with the leather and finish the work upon it as you did on the first, place beside it the second board the small board, over the fore-edge, after you smear it with wheat paste, and massage it and put it in place and there should be between it and the cover board the width of a palm leaf or less and place after that the tongue or long flap gluing it and massaging it. Upon it the stamp is placed and there should be between it and the small board the width of two or three palm leaves and the matrix of the tongue should be a fourth of the large stamp which is in the center of the first cover and the second cover and you fold the edges of the leather upon the two boards upon the second cover. After that you place some thin leather upon the edge of the back cover and upon the edge of the tongue cover and the small board should be in the center under the thin leather and you massage the work and you decorate it.

The whole leather cover should be smooth and Sufiyan offers a trade secret in describing this operation. He says that, should there be weak spots in the leather this smoothing would help correct them, especially if the softness can be adjusted (that is, the leather be pushed together at such a place) near the decorated section, because in using the panel stamp the soft spots would not be as apparent as on the plain surface. And beware, lest you be deceived in the leather. If there was in it any wrinkles or softness then press anything wrong out of it by massaging. When you clothe the second board, continue massaging it towards the vicinity of the panel stamp cavity for if you gather what is loose in the cavity and tap upon it, this looseness will go away by the tapping, by the rubbing, and massaging, and artfulness, so that nothing of the softness appears in that.

Sufiyan now removes from the book the boards decorated with leather and hangs the cover on a reed or cord in the warm air, but not in the sun because that would spoil it, leaving it overnight to dry. In the morning it is inspected and polished if it needs it; otherwise it is left to dry for a day or two. If the leather needs more polishing it should be dampened, firmly held on a marble slab and polished with a smooth shell or well polished piece of wood. If any of the decoration should be spoiled by the polishing it should be retouched:

If some of the decoration is spoiled by the vigor of the rubbing, then restore it by tapping the decorating tool with a mallet. It is thus returned to its old form as you want it.

The next stage is to, Leave it to dry and work on the sewing of the endbands.

The preparation of the hinges and their attachment to the spine and then to the cover has been touched on above. The final steps in the binding of the Islamic codex are concisely summarised by Sufiyan.

Fix the cover boards on the book after you have pasted it (the hinges and spine). Tie on the spine side with strong thread. Put the book between two heavy tablets
Islamic bookbinders are indebted to their Coptic and other Eastern Christian predecessors and neighbours in matters of ornamentation. The arrangement of the field of the upper and lower covers in longish rectangles set within each other parallel to the sides and the practice of choosing different decorative patterns for the armament of the front and back cover are some familiar survivals. Blind tooling, coloured inlaying, incising and leather cutting are among those Coptic ornamental techniques which, in addition to certain stamp motifs and the use of geometric diaper patterns, were adopted by the Islamic bookbinders.

Tools employed in these techniques are included in Ibn Bādī’s list (see above, p. 44). For the layout of the design, of importance are the compass used for the drawing of the suns or circles to be tooled in the center of the covers, and the two rulers, one for designating the other for takhlīf, perhaps for heavy outlining (as eyes are outlined with kahf, or antimony, which has a dark brown color), or for rubrication. Takhlīf may refer to the blind-tooling of leather, when the pressure leaves a darker brown or darker colored effect when the tool has been applied. Blind tooling was executed with simple tools, some with names descriptive of their design, and others unspecified. The simple tools which are not specified by Ibn Bādī are probably the common stamps of straight and arciform shapes combined in early bookbinding with ingenuity, skill, and patience. Their arrangement results in an amazing variety of patterns. Further information is lacking because although Ibn Bādī promises a chapter on toothing either he does not fulfill his promise or this section has not survived.

In blind toothing the tools appear to have been applied cold on slightly damp leather, although there is a suggestion in Ibn Bādī’s section on tools that a heated tool may have been used (he advises that a willowwood ruler be used to avoid scorching). The simpler tools producing lines and dots left simple impressions in the leather but those more complex motifs were designed so that the positive parts of the design would stand out in relief against a sunken background. Tools which produced a complete design were at first small in scale and used as a frieze or as a repeat to form frames and borders or to fill a larger decorative form. Large scale or complex decorative areas were built up and drawn with simple tools creating fillets, bars, arcs and dots. It was not until the late 14th. or early 15th. century A.D. that panel stamps were used which could create the whole design or an important design element with one impression. This innovation appears to be a Persian one although germainal forms appear in Mamluk bindings used as corner-pieces or as finials or pendants to the large mandorlas of the inner panels. Panel stamps of ovoid shape became very commonly used in Islamic bindings of the 16th.-20th. centuries for the central cover motif, in association with flattened ovoids or circles for the envelope flap, as well as corner piece final and epigraphic panel stamps. The 15th. century Herati workshops also developed large scale panel stamps which could emboss half of a cover at a time. This technique long continued in the Eastern Islamic world.

In the above description of tooling with panel stamps Suyfān uses the word, tarunjah, or citrus-shaped, for both the panel stamps and the impression left by it on the leather. The change from “sunsa,” or circular central medallions, for the decoration of covers in the 14th. century A.D., to this tarunjah shape is one of the more obvious alterations in decorative style. In Suyfān’s method of using such stamps, the board is shaved away in the center to accommodate the form of the panel stamp so that there will be a depression when the leather is pasted onto the board. The stamp is placed in this depression and hammered gently, forcing out the surplus paste under the leather toward the edge of the panel stamp. From this edge the paste is taken away, leaving “what is needed.” Then the leather is held firmly while the panel stamp is suddenly removed, so that the impression will remain as clearly as if pressed in wax. The operation is repeated for the second cover and for the flap, the panel stamps for the flap being also of a citrus-shape but only one-fourth the size of the panel stamp used on the covers. In 18th. and 19th. century bindings we sometimes find the tooling done over paper.

The scissors and some of the burins, engraving points, and tweezers, which Ibn Bādī lists, would be utilized in decoration by incising, leather cutting, and mosaic leather techniques. The technique of incising or scoring leather was not limited to the decoration of bookbindings but was also used in other leather working traditions. Adam considers this technique a common one, and it was probably familiar to both Ibn Bādī and Suyfān. Particularly fine examples were produced in the Herati workshops of the 15th. century A.D. The latter author also deals with the making of such an incised and inlaid design of an oval shape from leather. He takes peeled leather, applies strong glue on both sides, and pastes upon it two pieces of unpared leather, which have been spread with glue on their rough sides. He prepares a design for it by taking thin paper, setting it with saliva, leaving it until the saliva has been absorbed a little, and pressing it with the thumb and fingers over the designs of some other bookbinding. The design may be a tarunjah, or citrus-shape, a cufi, or corner (for the rectangular panel), in either nāwārah, floral, or zūriqī, curvilinear arabesques. The paper is lifted from the design and left to dry, then the design is traced with pen and ink. (For such a tracing of a bookbinding panel stamp by an Islamic craftsman, see Figs. 12 & 14). This paper with the ink design is pasted to the leather of three layers. The design is traced on the leather with a sharp tool, like the lancet for blood-letting. After it is traced, further work may be done on the leather until it pleas the craftsman. Suyfān suggests that if it is faulty it should be tried again on another piece of leather.

A number of Coptic bindings exploit the filigree technique. The idea of fine leather cut-work or filigree, which is ornamental openwork of a delicate or intricate design often backed with colored skin, paper or textile, seems to connect with the “durchbrucharbeit” tendencies of Late Classical and Byzantine work in stucco, wood, and metal. An early example of leather cut-work is on a binding from Chotscho, dated the eighth to ninth centuries. The theory advanced by Gottlieb of producing filigree work...
by stamping has been refuted by Karabacek who showed that the sources use only qāṭiʿ, or “to cut” in discussing the process. Although there were Coptic precedents for this technique it was not until the 15th century in the Mamluk and Herat workshops that it was exploited creatively. The process is mentioned by Dūst Mūhammad (writing in 951/1544) as munahbat-kārī, literally “made to grow by digging.” Mūsāfā’All (writing in 966/1557) lauds the skill of the Persian bookbinders, “in point of the muqāʿīṣ, or cutting, of the adorned parts...” when comparing them with the contemporary bookbinders of Asia Minor in his time.

The third type of decoration associated with the use of cutting tools and tweezers was the mosaic leather technique which combined variegated leathers. It was a specialty of Spain and has been discussed by Adam as the forerunner of the famous Maioli-Grotter bookbindings of Europe.

Lacquer painting on bookbindings was first introduced by craftsmen from Herat in the early 15th century as the result of close ties from China. Baysanghur had two representatives in the embassy of Shah Rukh to China (1419-1422). We find lacquer used by the second quarter, and polychromed painting by the end of the 15th century on bookbindings. The

highest achievements in this art were those of the 16th century when the work was closely related to that of the miniature painter, and this relationship continued in fine productions up to the early 19th century in the Ottoman, Persian and Islamic Indian domains.

At first the lacquer was painted on leather but the painting had a tendency to crack. Soon painted covers, made of layers of pasted papers, became more common. A thick coating of gesso or chalk was first laid on. Then several coats of colourless lacquer served as a base for the drawing and painting of the composition in water colour. Finally, to protect the water colour, several coats of colourless, transparent lacquer were applied to which could be added embellishments of gold, silver, and shimmering mother of pearl.

Fig. 12. Metal panel stamps for the tooling of cover centre-piece motifs and their pendants and envelope flap motifs. 16th-19th centuries A.D. Chester Beatty Library, Dublin.

Finishing: Binding Media for Inks and Paints

As well as using ṣamakh as a vehicle for ink (see p. 51, above), Ibn Bāḍīs specifies ḥamal raqīʿ, or thin honey, and dubs habīl, or flowing molasses, as ingredients for dissolving lamp black, mentioning kandar Mashqīgh, or powdered mastic, sukkar abyasad, or white sugar, and sukkar nabi, or rock sugar, as thickening agents for inks. He speaks of
soaked in a vessel or trough covered with water two spans deep, until it decomposes and rots. Then glue is left over a fire so that it cooks slowly. After that, the glue is filtered through a woolen strainer, is poured on a tray to cool, and is cut into strips.

The animal glue Safyàni mentions is extracted from the *'arâgh*[^2] or hooks of cattle. This glue is yellow verging on red in colour, and is melted in water over a very low fire. Originally it was extracted by cooking the hooks as the skins were cooked; in fact the author learned to make glue from hooks by watching the skin process. This glue serves as a vehicle for gold.

The *ghirî' al-ba'dâl*[^1] or snails' glue, says Ibn Bâdis, will never cease adhering, and he prepares it by taking about five handfuls of desert snails, which have been well-pounded in an iron mortar and putting them in a kettle to boil for a day until nightfall. A little water is added at a time to keep them from scorching until the glue becomes thick and strong. He considers it the best glue for writing or painting with gold or silver since it will never flake off but remains cohesive.

[^1]: *ghirî' al-ba'dâl*
[^2]: *'arâgh*
A glue which does not permit the colour to flake is very important, some such ingredient being responsible for the durability and tenacity of the colours painted on the Egyptian-Syrian leather bindings.

The ghārī al-samak, or fish glue, is more summarily treated by Ibn Badis, who describes it as pure white glue which is crumbled and soaked in water overnight. In the morning, the excess water is poured off and the softened glue is kneaded until it becomes white and waxy. In a special copper vessel it is melted over a light fire, then filtered through a piece of cloth and used. Sufyānī discusses two types of fish glue: whitefish glue and a Syrian variety.

The ghārī al-khuwāṣī, or whitefish glue, is uncooked and in its original state looks like dried old bread. It comes folded in layers. Sufyānī takes the amount needed, softens it in water, then takes it out and hammers it considerably on a marble slab. It is carefully folded and the hammering is repeated until it stretches. It is cut in small pieces which are placed, with sufficient water to dissolve them, over a low fire. The glue is removed from the fire after the pieces dissolve and rubbed with the fingers. More water is added and the glue is returned to the fire until it becomes like old olive oil, then left to cool.

Sufyānī says,

I swear by it and distinguish myself over other masters of the craft (of bookbinding), and they know not by what means I excel them... He who is satisfied with the Syrian glue—let it suffice him.

Not only dyes but other materials helped to make Islamic bookbindings beautiful by enhancing their ornamentation. Gold and silver were treated in the same manner; therefore the following remarks could be applied in most instances to both although there is a decided preference for gold.

Leaf gold was applied as a background for some of the Coptic bookbinding designs. In Muslim leather bindings both “brush-gold” and gold-tooling techniques are found in the decoration of the covers.

In bookbinding, applying “brush-gold” (powdered gold suspended in some vehicle) with a pen or brush is not difficult. Ibn Badis gives us several preparations, like those we have from antiquity, made both with gold as an ingredient or with yellow-coloured substances as substitutes for gold. Both Ibn Badis and Sufyānī call for fish glue in their mixtures (see Finishing: Binding Media for Inks and Paints, above); while Qalqašandi prefers the juice of a lemon and gum arabic to suspend the gold.

Sufyānī is careful to discriminate between the use of fish glue and gum arabic as a vehicle, the former being employed on leather, the latter on paper. He warns the bookbinder to beware of the process of using the leather without washing it, if the gold is to be used with whitefish glue, because the tanners rub the leather with oil in order to accentuate the lustre of the hide. Washing the leather will bring the oil out and the process should be continued until no oil can be seen in the water. If the book is covered with unwashed leather and the gold with the whitefish glue is applied over it, the oil will prevent the leather from absorbing the glue. Then when the leather written with gold-whitefish glue mixture is rubbed or polished the gold will peel off.

To prepare the Syrian glue it is only necessary to melt it in a vessel and then let it coagulate. Whenever it is to be used, a few drops of water, in

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Fig. 15. A bookbinder decorating a bookcover. From the procession of bookbinders and metalworkers. Istanbul, c. 1736 A.D., Topkapı Sarayi Museum Library, Istanbul. A.3594.
proportion to the amount needed to suspend the gold, are kneaded with the glue for an hour and the gold is suspended in it. If the leather written with this gold-Syrian glue mixture is polished, the gold will not peel off whether the leather is washed or not. This polishing of the leather is one of the last processes in covering the book.

Sufyání warns us against leaving the gold with the glue in it, for it will not and maggots will appear in it, and flies will be attracted to it on account of the smell of the remaining glue. If the gold is not used on the same day or week he suggests that water be added and the mixture strained repeatedly until it contains no glue.

Not only primary colours but many intermediate hues of paint were used in the ormamentation of the bookbinding. Blue was particularly favoured by the Mamluks but the Persians and Ottoman Turks exploited a wide range of colours. Ibn Bāḍīs devoted a chapter to the mixing of paints and described the effects achieved by them. The main colours were white, black (the colour of heaven), sky blue, red, and yellow; the white being ḍariq, white lead; the black being muṭṭad, ink; the colour of the heavens over the Nile being ẓalzāl, lapiz lazuli; red being zīnjar which was compounded of zīnjar, cinnamon red, and israiq, red lead; 24 bright yellow being from yellow zāniḥ, arsenic trisulphide, to which red arsenic was added when an orange colour was desired. The paints would not mix with each other unless in powder form, and they were more easily ground when moist. Ibn Bāḍīs considered arsenic and lapis lazuli pure colours. He added ḍariq or white lead to most of the colours.

There are more recipes for shades and intermediate colours designated as colour of blood, rose colour, orange, ruby of the East, blood of the gazelle, brown of dates beginning to ripen, white and marble, colour of the wastes of the desert, falcon colour, blossom of the pomegranate, and many more, showing a fine discrimination of hues. These colours certainly were used in addition to dyes mentioned in the chapter on bookbinding, which were necessary to the preparation of the leather background. These paint colours are opaque especially with white lead added, and were used with gold and silver in the decoration of the manuscripts and of the covers of the book.

Conclusion

The craft of Islamic bookmaking was a conservative one, many of the categories of tools, materials, techniques and structures evidenced from the early centuries of Islam being retained right through to the present day in those workshops carrying on the tradition. Basic structural changes were introduced slowly, those that did being in response to the introduction of new materials, such as paper, or in favour of a single form out of a number of variations offered by the cultures by which Islamic bookmaking was tutored, such as the case binding with wrap-around fore-edge and envelope flap. The desire for an efficiently executed assembly of techniques can be seen in this classic form of the Islamic book, sometimes at the expense of durability. However, in the realm of decoration there were few concessions to expediency and continuing exertions were made to achieve quality and variety of invention. It is in this area that we see the most signs of change and evolution, though the most popular forms survived for centuries before being superceded. The workmanship of the master binder was much lauded. Qādi Ḩāmid wrote of Maḥmūlā Qāsim-Beg Ṭubrizi, (he was) an incomparable bookbinder, a peerless master of leather binding. He was so unique and skillful that he would have sewed the pages of Fatī in the back of the binding, and with the binding knife would have levelled the days of Deyson; his work in the corner pieces (kamān) was similar to that, and in medallions (tūmūn) like the sun.

It was through such respect for the craftsman from the bookreading public together with the strength of the craft tradition in the passing on of techniques from master to apprentice (in spite of the pessimistic response of Sufyání) that Islamic bookbindings of such completeness, from the most luxurious court productions to the most modest manual, were produced for such an extraordinarily long time.

7. Ibid., p. 29.
Pour la vente, l'animal du présent document est similaire, avec des axes de substitution majeurs bâties à mouton.

Les textes étaient stockés dans une usine pour plusieurs années avant leur être vendus.


5. Les documents et lettres de R. B. L., Comptes Rendus.


17. Les documents et lettres de R. B. L., Comptes Rendus.

The Catalogue

The catalogue entries have been arranged, not according to strict geographical groupings or chronological evolution, but in a sequence relating to their place in the four major design schemes used in Islamic leather bookcovers as proposed by Bosch (1952), pp. 160-169:

1) A central pattern fills the entire inner panel. The central element of the design does not really repeat itself, although quarter portions of it may be suggested in the corners of the panel. The inner panel is contained by one or more frames. (1-23)

2) An overall pattern with repeats fills the inner panel. This is surrounded with single or multiple frames, one of which may also contain overall filling. (24, 25)

3) A medallion or other centre-piece motif is placed at the centre of an uncoated inner panel field, defined by one or more frames. The corners of the inner panel may be decorated, as may be other areas, particularly above and below the central motif in the vertical axis. (26-68, 72-91)

4) As for design scheme (3), but the field of the inner panel around the central motif and other decorated areas is filled with an overall pattern. (92-133)

Catalogue entries 92-94 are manuscripts whose exterior coverings are of materials other than leather. Entries 95-100 are items of particular didactical interest.

A small number of bookbindings in this catalogue were not collected by Moritz but have been included to provide examples of styles of Islamic bookbindings which have either been neglected in the published literature or inadequately presented. No attempt has been made to include examples of extensively published styles not represented in the Moritz collection.

In describing the tooling, the calyx terminology is taken from Farid Shafi, "Simple Calyx Ornament in Islamic Art: A Study in Arabicesque," Cambridge, 1956.

Tooting is in blind unless otherwise indicated. The term 'vertical axis' refers to decorative elements which run in the direction parallel to the fore-edge and spine of the bookcover, and the term 'horizontal axis' to those which run parallel to its head and tail. The dimensions given are those of the upper cover which are related to the paper format and thus may be more useful than the overall measurements of each complete object. The heights only are given of separate fore-edge and envelope flaps. The authors were unable to note the leather types, dimensions and some particulars of tooling of those bookbindings in the Islamic Museum, East Berlin. All Chester Beatty bookcovers and fragments from which the pasteboards and doublures have been removed have had their edges trimmed before they were mounted and it is these dimensions which are given. In 1978/80 the Milne collection was acquired by sale to a collection of Islamic bookcovers of a provenance closely related to that of the Moritz collection now dispersed between Berlin, Dublin and Chicago. Some of these covers are referred to in the appropriate catalogue entries by the number given in the Chiswick catalogue.