

## PARCHMENT OVER BOARDS

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This workshop will explore the binding of books in parchment over boards. Because of its reputation, people tend to shy away from parchment as a binding material; it is the focus of this workshop to dispel some of that anxiety. We will explore techniques that will enable you to work successfully with parchment. You may not be able to completely control the material but you can learn to work with it to achieve excellent results.

For the purposes of simplicity, I will use the term parchment throughout. Vellum and parchment are often used interchangeably and structurally they are the same. Vellum is the skin of a young (six months or less), unborn or stillborn calf that has been unhaired, then dried under tension. All other skins unhaired and dried under tension; older calf, sheep, goat, deer, etc. are referred to as parchment. With its more supple nature and thin, consistent surface vellum is more often used as a substrate for writing, while parchment is more often used for binding, practically speaking there is no difference.

Parchment differs from leather in its manufacture, its response to the environment and how it is worked. To get a better understanding of working parchment it is helpful to know how it is made and to see how it differs from leather. Working parchment merely requires techniques you already use with leather and cloth binding. The main difference, unlike leather is that parchment is stiffer and needs to be worked as dry as possible.

Because of its hygroscopic nature, the surface area of parchment expands and contracts greatly. It can change by as much 10 % when the humidity of the environment changes. If a piece of parchment is a 10 cm square it can grow or shrink as much as 1 cm. This is what gives one pause when beginning a parchment binding. We are going to explore two types of board construction that will give you an advantage when working with parchment. The techniques explained here will give you a book with boards that are flat. Parchment, however, is very susceptible to warping when poorly stored. Extreme humidity will permanently alter the physical structure of the skin and therefore may cause the boards to warp. Extreme dryness will desiccate the skin also causing warpage, but proper re-humidification may bring the boards back into equilibrium. A temperature above 140°F (60°C) will also damage parchment irrevocably.

### HISTOLOGY

For thousands of years animal skins have been treated in some manner to limit or halt putrefaction. Skins have been used for many purposes, among them: clothing, shelter, storage vessels and as a surface for writing. Without a means to halt the natural breakdown from bacterial action, the skins would soon decay. Parchment and leather are created in differing methods but both are a chemically and physically stable material.

Even though they both begin the process as a flayed, unhaired skin, parchment and leather are quite different materials. They are produced by divergent methods and the techniques for using them vary as a result of their differing natures. To understand parchment or leather and therefore work either with more confidence, knowing how these treatments alter the skin is important. We will start by looking at the structure of the skin itself.

There are three main layers within a skin: the epidermis, dermis and the hypodermis. The **epidermis** is the outer layer, that which you see when you look at your own skin. It is composed of **keratinous** (or lining) tissue. During processing, this layer is removed along with the hair.

Below the epidermis is the **dermis**. The dermis itself is divided into two layers. The uppermost is the **papillary**, the layer from which hair grows and the layer that becomes the grain we associate with the processed skin. The epidermis dips down to the dermis at the point where hair follicles form. The hair grows from its base in the papillary layer of the dermis up through the epidermis. The hair is in fact, made of the same keratinous materials as the epidermis. The **reticular fiber** network of the dermis, the layer below the papillary layer, contains the blood vessels that feed the hair, the **arrector-pili** (or erector-pili) muscles that cause the "hair on the back of your neck" to stand up as well as sweat and **sebaceous** (oil) **glands**.

The dermis also contains **ground substance**. This is a sticky, viscous material, made of mucopolysaccharides (long chains of sugars) and proteins that aid in the lubrication of the dermal fibers and healing of the skin. For our purposes the most important aspect of the dermis are the ramified bundles of **collagen** (which means "glue forming") **fibers**. Ramified, means that the fibers branch as a tree. These bundles of fibers are tightly wrapped with an amorphous group of stretchy fibers of the protein **elastin**. It is this layer that gives the leather or parchment its strength.

The third major layer is the **hypodermis**. That is the layer where the muscle and fat are found. During processing this layer is completely removed. In essence the processed skin is solely the reticular layer and papillary layer or grain of the dermis.

## MANUFACTURE OF SKINS

The processing of skins for either leather or parchment, as it is now practiced, follows a standard model. The chemicals may vary in order to give the skins differing characteristics but the process is basically the same as it has been for centuries. Flayed skins are soaked in cold water to remove dirt and hydrate them. Next the skins are unhaired. This process is more important than the name would imply. Usually the skins are placed into a bath of lime containing sodium sulphide (a water soluble salt with a high pH) that is used as a sharpener, reducing the time necessary for unhairing. The sodium sulphide reacts with keratin proteins that make up the hair and epidermis. This aids the lime in loosening and dissolving the keratin, allowing the hair and epidermis to be easily

removed. During this process, the collagen fibers swell up due to contact with the alkaline solution. This swelling will aid the infusion of other solutions later in the process.

Following the unhairing, the skins are scraped to remove any remaining hair and epidermal tissue. This may be done by hand with the skin draped over a wooden beam and scraped using a blunt double-handled knife or run through a machine that performs the same task using rollers and helical blades. Again, using the wooden beam and a sharp, double-handled knife, any hypodermal tissue and muscle not removed in the flaying is shaved from the flesh side of the skin, this is called **fleshing**. As in many tanning operations nowadays fleshing can also be accomplished with machines.

## Leather

If leather is the material to be produced, the skins are taken from fleshing to delimiting. The skins are placed into a weak acidic solution to reduce the pH. After delimiting, the skins are **bated**. Bating was historically accomplished using dung from dogs or fowl. Enzymes in the dung acted by digesting parts of the skin. Over the years dung has been replaced with processed enzymes. Through bating many things are accomplished, among them are removing dirt and grease. It also reduces the plump and swollen nature of the unhaird skins. This gives them flexibility and drape. The use of specific enzymes, pH and temperature as well as the length of time the skins are bated determine the nature of the final product. Bating also dissolves and removes most of the remaining ground substance and weakens the elastin that binds the collagen fibers so tightly. This relaxes the skin making it more pliable. Imagine a bundle of flexible rods tightly wound with rubber bands, then the rubber bands are cut. Once the bands (elastin) are cut and the ground substance is removed the fibers are freed and become softened.

The final treatment for leather is the tanning. This involves an infusion of tannins, derived from plant material or certain metal salts (chromium, aluminum or zirconium) that bond to the proteins transforming the skin into a material that resists putrefaction and does not readily absorb water. The result of tanning is a skin where the fibers have some loft, suppleness and stretch.

## Parchment

Parchment is completely different. Several things have happened within the skin to bring about these differences. Parchment as well as leather is bated but in the case of parchment it is mainly to remove the dirt and grease so the duration of bating is shorter. Much of the ground substance remains and the elastin is not broken down so it is still tightly wrapped around the collagen. The rubber bands have not been cut and movement of the “flexible rods” (collagen fibers) is restricted.

To complete the making of the parchment the skin is taken from the bating process and dried under tension on a herse or stretching frame. The damp skin is stretched by means of strings and clips or with strings wound around small pebbles embedded about the

edges of the skin. The skin is allowed to dry under strong tension. After drying, the skin is scraped to thin it while still taut on the frame.

Being dried under tension has created the most important changes. The fibers have chemically and physically bonded with each other further limiting their movement. The stretching has also caused the fibers to lie over at a low angle, aligned nearly parallel to the surface of the skin. This is quite unlike the more vertical nature of the fibers in leather. The result of these changes within the skin is the characteristic rattle of parchment, its opacity, great tensile strength and ability to withstand tearing. The strength and tear resistance are what make it such a wonderful material for binding. Keep these aspects in mind when working with parchment. Disruption of the structure changes the nature of the skin. Unlike leather, parchment can revert back to a raw state and therefore, is also more susceptible to biological attack.

When working with parchment it is best to avoid the use of too much water, as it can disrupt the structure that the tension has built into the skin. If you wish to gently soften parchment, the use of a 50/50 mixture of either water and isopropyl alcohol or water and ethanol will achieve this with less disruption to the structure. The alcohol will evaporate faster than the water, pulling the water out with it so the skin dries quickly and doesn't disrupt the internal structure.

### PARCHMENT BINDING

The first thing we want to do is to cut out a piece of parchment slightly oversized for covering the book. For an average size book parchment about .010 - .015 thick is good. Thicker parchment is more difficult to work, the cover joint will be less flexible and the material is so strong that an overly thick piece is unnecessary. For limp parchment bindings though, a thicker skin may give the book some structural stability. If one has a choice when cutting the skin, take it so that the joints of the book are aligned with the spine of the animal. The final size of the parchment should be large enough to wrap around the book with about 1.5 - 2 centimeters, all around, for a turn-in. For this initial cutting add about a centimeter more in each direction in case the laminated parchment shrinks.

The flesh (under) side of the parchment then needs to be lined with paper. The paper lining fulfills several distinct needs. It reduces the translucent nature of the parchment (assuming you are not utilizing that aspect of the parchment for design), stabilizes the material and allows you to use most any type of adhesive you wish when putting the parchment onto the book. Choose a light to medium weight paper with very little intrinsic characteristics; laid lines, watermarks or other features. These may “telegraph” through the parchment. Note also that the lining will influence the “color” of the parchment, this may be used to advantage. The grain direction of the paper should, as usual, be running head to tail on the finished binding.

You can use any of several different types of animal based glues for the purpose of laminating the paper to the parchment; gelatin, rabbit skin, hide glue or parchment glue.

Each of these glues contain collagen, a protein found in the dermal fibers of skin, which makes them more suitable when adhering parchment. Some people add glycerin to the glue, but it makes parchment even more hygroscopic than it already is, softens it too much and gives a foothold to future mold growth, so it is not recommended. If crystals are used they should be well stirred into cold water, placed in the refrigerator and allowed to stand overnight in order to swell before heating. Powdered glue, stirred well into cold water, may be ready to heat within thirty minutes. A double boiler or electric glue pot can be used for heating the glue but care should be taken because too much heat will damage the protein in the glue. The glue should not be allowed to boil nor the container holding the glue be placed in boiling water, 104° F (40° C) is an ideal temperature. At 178° F (81° C) or above the glue will be ruined. It is safer to suspend a container of the glue in a pot of hot tap water. Another good, practical way to heat small batches is a cup warmer.

Paste will work as well as animal glue but will introduce more moisture so it may take longer to dry. If the laminate is dried in a controlled manner there should be no problem with cockling. PVA doesn't have the chemistry to be as compatible as animal glues, but will also work. The various starch and collagen based adhesives are better suited.

Whichever adhesive is chosen, glue off both the paper and the parchment, but keep the moisture to a minimum. Allow them to relax, then glue them both again. Place the parchment and paper together and smooth down by hand. Lay Holytex (or other suitable non-stick open weave material) and blotters on either side and give a quick nip. It should be born in mind that too much pressure for too long can cause transparent areas to appear in the parchment. This effect can be used to advantage for design purposes but may not be desired for a standard binding. Upon removing from the press, change blotters and place between boards and a heavy weight. Change the blotters often for the first several hours, then daily until the laminate is completely dry. Several days are best to ensure the parchment dries flat.

## BOARDS

Now we turn our attention to the boards. There are several ways to construct boards for parchment bindings. Besides the usual single piece of binders' board there is "cross-grain laminate" and a "floating board" construction. The cross-grained board is usually made with at least five layers and sometimes more of very thin board or card stock. The counterposing grain will yield a stiffer board that can withstand the pull of parchment better than standard binders' board. If you wish to build a board of only three layers don't cross-grain. A laminate of three boards, with the grain aligned in parallel will still offer a stronger board than a single ply. Regardless of how many layers are used, there has to be an odd number. The layers should be made with stiff thin board around .010 - .015 thick. To make a board with five pieces, cut three of them with the grain running head to tail and two of them with the grain running spine to foreedge. All boards should be cut oversize. The makeup of the cross-grained boards is a sandwich with a long-grain board in the middle, two short-grain boards on either side of that and two long-grain boards on the outside. It is easiest to moisten the inner long-grain board, then paste or glue off the two short-grain boards. Allow them to relax, glue them off again and place them on

either side of the central long-grain board. Glue off the remaining two long-grain boards, let them relax, glue them off again and place them on either side of the sandwich. Press for at least 30 minutes (longer if desired) between Holytex and blotters, then allow to fully dry under weight. Change the blotters often for the first hour or two, then daily until the boards are completely dry. Cross-grain boards can have a tendency to become saddle-shaped if dried too rapidly or used before drying is complete. Make them up well in advance.

More than five boards can be used to make a laminate but it is wise to cut the two outer boards on the long-grain and to be sure that each board's neighbor has an opposing grain direction. To make cross-grain laminate boards even more rigid, soak the laminae (individual pieces) in water. When thoroughly wet, take them out of the water and press to remove the excess moisture. Using paste, assemble the boards as before. The paste permeates the boards and makes them more rigid. Because of the extra moisture introduced by this process a longer drying period will be required. With either method, the boards will need to be dried in a very controlled manner. After they are completely dry the spine edge of each should be trimmed clean and the boards lined with plain white paper and paste to add stiffness and mitigate any color that may show through the parchment. As with the parchment lining the paper should have no characteristics that may later show through the parchment. Paste off the paper, let it relax and paste off again. Lay it on one side of the board, wrap it around the spine edge and onto the other side. Leave them standing, leaning against each other for 1/2 hour to air dry a bit and then press between Holytex, blotters and weight until completely dry.

There is a second type of board to consider, a floating board construction. It takes advantage of the propensity for parchment to fluctuate dimensionally throughout its life. Instead of fighting the parchment, it moves with it. On some older parchment bindings you may see where it has shrunk back from the foredge causing the boards to warp, pulling the parchment back from the foredge and tearing the pastedown. This board is built to help counter that tendency. It consists of a thick board and a thin board. The thick or "base board" board may be a laminate, like the previous boards or single-ply binders' board. For large books, a laminate may be better. Depending upon how thick a board is needed, the base board laminate might be only three layers thick. On large books you may want to make the floating board a laminate of two thin layers, in this case both pieces should have the grain running head to tail. The thin board can be anywhere from .010 up to thin binders' board. Once you have the two components, they should both be lined with paste and plain white paper as above. Until needed leave the boards between Holytex and blotters, under weight.

### TEXT BLOCK

Sewing a book for parchment binding is no different than for other books. They can be sewn on flat tapes, flattened cords, sunken cords and for the adventurous, raised cords or alum tawed thongs. We will look at sewing on parchment tapes. The tapes will be laced through the cover, which makes a stronger connection to the textblock and gives an added visual element to the finished binding. Using a straightedge and knife or the drop gauge

of a board shear cut enough tapes for each of the sewing stations intended and the two endbands plus one extra. Use a slightly thicker skin if available .015 - .020 and cut them running in the same direction as the spine of the animal, not too near the skirt. It is fine to cut them along side the spine but the strips not only need to be strong but flexible as well. If the spine of the animal is too horny the tapes may be hard and inflexible so stay several centimeters away from the spine. Avoid any imperfections in the skin; these tapes need to be as strong as possible. Their width should be 2-3 mm and the length equal to the thickness of the book plus about 10 -15 cm. Once you have cut the strips give them each a moderate tug to test their strength. If they break easily, cut more from a different part of the skin. If you pull on them very hard you can break them so use judgment.

The endsections for the book can be any of the various types commonly used; single or double folio, made endsheets or hooked ones. A hooked endsection is a good way to add some color to the book and is simple to make. Take a single folio of white (text) paper and a single folio of a colored stock about 5 mm wider than the white folio. Mask off 2 mm along the spine edge of the white folio with a waste strip and apply a glue mix of 60% polyvinyl acetate and 40% of a 3% methyl cellulose solution (PVA/MC). Overlap the spine edge of colored folio onto the spine edge of white 2 mm in, bone down and nip between Holytex and blotter. Remove from the press and allow to air dry for a while. If you wish to have a thicker endsection you may slip another white folio inside the single folio of white. Using a straightedge and bone folder score the colored folio right up against the fold of white folio. With the straightedge still in place, slide the folder underneath the colored stock, turn both leaves over onto the white folio and bone down. Place both endsections on the book with the colored stock facing out.

A guard of Japanese paper, about 3 cm wide and the length of the signatures, should be adhered to the spine edge of the first and last signatures. This will ease some of the stress at the opening of the book and serve to cover over the small tab of colored stock showing on the inner side of the endsection. Using a waste strip mask off all but about 2 mm of the spine edge of the first signature, on its last page and brush it with paste (paste should always be used on the text pages). Remove the waste strip and place the Japanese paper guard onto the signature covering the 2 mm strip of paste. The rest of the guard hangs over the edge of the spine fold of the signature. Rub down through a piece of Holytex and set aside. Do the same with the first page of the last signature. When dry wrap the guards around so they face the beginning of the first signature and the end of the last signature.

To make a jig for poking sewing holes cut a piece of card stock the length of the book's height and 3 - 4 cm wide. Measure the width of the sewing tapes and add 2 mm, for thicker tapes add a bit more. This will allow space for the sewing thread to exit the signature, cross the tape and re-enter the signature. Add the width of the tapes plus the extra 2 mm and multiply that by the number of sewing stations you will have. If you are sewing on 3 mm tapes take that number, add the 2 mm extra and multiply times the number of sewing stations you plan to use, let's say 5 stations. That would be 5 mm times 5 stations giving 25 mm in total.

From one end of the strip mark off this distance. Starting at that point with a pair of dividers adjust the legs to an approximate spacing that you think will reflect the distance between sewing stations. Lightly walk the dividers down the strip marking off six lengths for five stations. Always mark one more space than the number of stations. The last space will ultimately be longer than the others. The extra length gives the spine a visual stability when the book is shelved. In order to achieve this the planting of the last leg should fall short of the end of the strip by anywhere from 1 - 3 cm, depending upon the length of the spine. The last panel is usually 40 - 50% longer than the other panels. After pacing the dividers down the strip the first time adjust the legs if you don't achieve the desired result and lightly mark off again. Do this until you have the spacing you require.

Once you have the dividers set to the right spacing place one leg of the dividers at the end of the strip and walk down one space and poke a hole into the strip. Measure from there 5 mm (the width of the tape plus 2 mm), make a hole with the dividers at that point and mark off the next space. Measure for the tape again and continue. If planned correctly the last planting of the dividers should stop short of the end between 1 - 3 cm. No tape is placed at this point so the space remaining between the last tape and the end of the strip will result in a larger space giving the spine its weighted bottom. Now measure in from both ends of the strip and make marks 1 cm in for the kettlestitches.

Place the strip inside the center of each signature, align it to the top and using a needle awl poke small holes in the signatures. By keeping the holes small the sewing needle will enlarge them only as much as it needs to. Large holes cause more damage to the pages than necessary. They will let glue inside the signatures and may cause the sewing to loosen over time. For the endsections with a hooked construction the holes should be made right near the edge of the fold, not in it. That way the thread won't show in the joint after the book is cased in. To do this lay the end section down with the colored or decorative folio facing up. Open it to the inside of the innermost white folio holding the outer pages at 90° to bench. Push the awl straight down along the face of the upright pages. This will make the holes just off center from the fold. Retain this hole punch jig for later use in the process.

Jog up the pages and place them front facing up and spine away from you. Pull the top endsection over towards you so the head is to the right and the spine fold is facing you. Cut a scrap piece of binders' board a bit larger than the book. Place the board against the spine fold with a light weight on it. Lay one of the parchment tapes on the board at the sewing station indicated by the signature. Less than half of the tape should be placed on the board with the grain side of the parchment facing up. Using a low-tack tape fasten the sewing tape to the board. Do this to all the tapes except those for the endbands. Turn the board over; tapes towards you and you have a makeshift sewing frame. We will be backing the book to approximately a 45° - 60° angle so you should choose thread that will give you the most strength and a moderate amount of swell.

After sewing, the guards need to be put up. Open the book between the endsection and text, slide a metal cutting plate or piece of 10 mil Mylar under the guard. With a straightedge and knife cut the guard down to 3 - 4 mm (enough to cover over the thin strip of colored endsheet showing and go just up onto the white endsheet). Replace the



cutting plate with a strip of Holytex and a strip waste paper on top of that. Glue off the narrow guard with PVA/MC. Remove the waste paper, leaving the Holytex in place and put the end-section back down onto the textblock. Because the holes in the endsection were punched slightly off center the endsection will want to pull back toward the spine of the book. Pull it towards the foredge and carefully line up its spine edge and head to the spine edge and head of the book; give a light press with the hands. Put a weight on the spine of the book to dry. Check to see that the sewing supports are not caught by the glue.

When the guard is dry jog the book up to the head and spine and place it in a lying press with the spine facing up. The tapes should be fairly easy to slide back and forth. Even them out front to back. If any tapes have gotten damaged during sewing or you have any reason to doubt their strength this is the last chance to address that. You can weave a new tape underneath the sewing thread. Pull out the offending tape and cut the end of the new tape to a stubby point. Poke a hole in the point and slip a piece of thread through the hole. Double the thread over and with a needle run it under the sewing thread where the damaged tape was removed. With the thread you can pull the new tape under, remember the grain side should be facing up, away for the spine. Using the tip of a bone folder, close up the sewing holes to keep paste from seeping inside the signatures. Take the folder and gently flatten the backs of the signatures, closing up the gap between them. This will keep paste from penetrating too far in between the signatures. With the spine firmly locked in the press brush paste well into the spine and over the signatures. Brush away any excess paste and remove the book from the press. Set it on the bench with the spine over the edge and place with a weight on it to dry.

If the book is to be trimmed this is the time to do it. Next is the rounding of the spine. Using a lightly dampened cotton ball or sponge, moisten the spine of the book and let it set for a moment so the paste and paper may relax. Moisten it again and lay the book on the bench with its spine away from you. Make certain the sewing supports aren't trapped underneath the book as the hammer will cause them to make indentations in the textblock. Place one hand (the same hand you will later use to hold the hammer) on the spine with moderate pressure and take the foredge in the other hand. With that hand fan the foredge up and hold the pages securely in the fanned position. Lessen the pressure on the spine a bit but keep it firmly in contact with the bench as you roll the fan down toward you. The top side of the textblock will slide forward as the fan flattens out. You will see that the spine and foredge are slanting up toward you. Now hold the foredge down firmly on the bench, release the spine and with a backing hammer or the heel of your hand strike the spine edge along the endsection with a glancing blow using only moderate force. Do this from one end of the spine to the other. Flip the book over, hold the spine edge down, fan the foredge as before and start the process over. Always work in a consistent manner going from one end to the other and working each side the same number of times. Usually it will only take two or three times on each side to work the textblock into a rounded shape.

If you find that the front or back is not rounded as well as the rest of the book, place that side face down on the bench. Fan the foredge as before but drop about one third to one half of the pages before gripping and rolling the fan towards you. Concentrate the blows along the spine where the slant stops and the flatter area begins. This will send the force

into that less rounded part of the spine. You may need to do this again, dropping more of the fanned pages each time until the round is correct. You can also use this to correct one end of the spine if it is misbehaving.

When satisfied place the book into a backer or lying press with backing boards and push it down until the shoulders of the joint come to a natural stop, where the slope of the shoulders flatten out. You may accentuate the shape of the shoulder with a hammer, your thumbs or a Teflon folder. If using a hammer apply only glancing blows. Starting just off the center of the spine work the backs of the signatures over towards the shoulder in a consistent manner from head to tail. Do the same on both sides of the spine. Proceed again with the same motions but starting further down toward the shoulder. Keep doing this, coming closer to the edge of the shoulder until you have the desired angle. Be careful if you are using a hammer. As the hammer comes closer to the shoulder edge the same force you were using before may be enough to break the shoulder joints or the tapes. Back the book to approximately 45° - 60°. A 90° shoulder is a holdover from 19th century leather bindings and does not benefit the book in any way and it may cause damage to the paper fibers.

It is at this time that you should make the boards because only now can you judge the exact thickness you need based upon the height of the shoulder. The choice of sewing thread, the hardness of the paper, the number of pages per signature and the number of signatures will determine the thickness of the spine. Before sewing you want to choose a thickness of thread that gives you the most strength and later couple that with a board whose proportions compliment the thickness and size of the book and gives the required protection. A thin book will want a thin board and usually that will mean a thinner thread so the spine doesn't swell too much. Since a thinner book doesn't have as much sewing as a thicker one, a heavier thread may work fine. Obviously you don't want a thread that is too thin for the strength that is necessary or so thick that the spine has a lot of swell. As with many other aspects in bookbinding you must use judgment.

With the book in the press measure the width of the rounded and backed spine with a strip of paper and pencil. Cut a piece of medium weight Japanese paper to the width and length of the spine. Moisten the paper, let it relax and paste off the spine of the book. Lay the paper on and rub down with your fingers, then go over again with a folder. Apply a bit more paste to the top side of the paper and rub that in well until the paper is saturated. Remove the book from the press, place it on the bench with the spine over the edge and weight it.

While this is drying cut a piece of muslin or linen on the bias. Cutting the fabric on the bias will make it harder to tear along the joint and the fabric will mold over raised bands much easier. It should be a few centimeters longer than the spine and as wide as the spine plus 8 - 9 cm. Using a 1.5% solution of methylcellulose or thin paste, size the fabric onto a piece of Mylar. The sizing will be convenient later on in the binding process. When the fabric is dry place the book into a lying press. Peel the dried fabric off the Mylar. Cut it to the height of the spine and to the width plus 6 - 7 cm. Glue off the spine with PVA/MC

and center the fabric onto it. Rub it down with a folder, glue off the spine again with a small amount of glue to saturate it, then rub down again.

If the book is sewn on tapes and you want a very smooth spine cut out the areas of the fabric that correspond to the tapes. That will give the spine a flatter profile. To do this pinch the fabric in half at either end, lay a pencil along the crease to mark the center at head and tail. Take a strip of paper, hold it against the spine and with a pencil mark the outer edges of the spine width. Fold the strip so that the two pencil marks are aligned, crease the paper and touch the pencil to that fold. Using the center point of the fabric find the width of the spine on it using the paper strip. Draw two parallel lines along its length describing the spine width. Take the sewing jig, center it head to tail against one of the lines and mark the width (2 - 3 mm?) of the tapes, do not include the extra spacing for the sewing holes. Do the same against the other line and with a pencil join each pair of marks across the width of the piece of fabric. Working across the width of the spine part of the fabric, cut out the boxes that define the parchment tapes as they cross the spine. Place the book into a lying press with the spine up and glue the spine with PVA/MC. Lay the fabric on the spine threading the tapes into and out of their respective boxes so they are on the outside of the fabric and rub down. Put a small amount of PVA/MC on the outer side of the fabric and rub down again. After the fabric is on cut two pieces of card stock the height and width of the textblock. With a folder and straightedge turn up 3 - 4 mm down one long edge of each piece. That way they will be able to nest up against the backed joint. Slide one each underneath the fabric where it lies and tape the fabric to the card stock. This will act as a dirtsheet.

The next step is to sew the endbands. The act of sewing the endbands after the fabric lining is to further secure the lining and give support to the backs of the signatures so the endbands create less stress on the folds. To make the endband cores take the three extra strips of parchment you cut earlier and cut one of them in half. Place a small dab of straight PVA in the center of the flesh side of each of these smaller pieces and center them on the flesh side of each of the long strips. Make sure the glued pieces are aligned along their length and place under weight for a few minutes. The extra strip will give more thickness to the part of the strip on which the endband is sewn. Center the strip and sew the endbands. It is not the aim of this paper to go into sewing endbands. Most how-to books on bookbinding have sections devoted to this. Consult one of those books for instruction. One thing to bear in mind is not to make the endbands too wide. Just as with a leather binding room is needed for tucking the extra covering material down beside the endband. Usually you would start and finish the endband within the first and last signatures excluding the endsections. Keep the wrappings tight against each other.

If you wish, you can make a “stuck on” endband by wrapping the core with paper, silk or other sheet material instead of sewing one. To do this cut the material to the width of the spine and its length to 2 – 3 cm. Glue it off and lay the core 2/3 of the way up the length of the material. Fold the upper 1/3 over the core down onto the lower 2/3. Work it tightly round the core and put aside to dry. When nearly dry, glue it onto the spine as you would any stuck on endband. Once the endbands are sewn carefully cut away the extra length of the shorter piece of parchment tape up against the wrapped silk.

Once the book is up to this point, a hollow tube needs to be made. Using a scrap of handmade paper cut a piece 5 - 10 mm taller than the spine and three and a half to four times the width. Moisten the paper; while the paper is relaxing, place the book in a lying press and glue off the spine with PVA/MC. Center the paper on the spine and bone it down well. Let the bond set up briefly then remove the book from the press. Lay it on its side and with the folder, break back the excess paper into a sharp crease along the shoulder creating a flap. Turn the book over and do the same on the other side creating a second flap. Stand the book up on its spine trapping the first flap between it and a cutting surface. Roll the book on its spine away from the shoulder where the paper is folded. Where you see the crease on the unfolded, second flap - mark just to the inside of it with a needle awl, going through it and into the first flap - do this at both ends. Lay the book on its side with a cutting plate on top and the first flap laid over onto the cutting plate. Place a straightedge down connecting the two holes and cut. Load the book back into the press, place a waste strip underneath the cut flap and glue it off. Remove the waste strip and lay the flap down on the spine. Fold the larger uncut flap over onto it and rub down. After that has briefly set up, remove the book from the press and lay it on its side. Take a folder and break back the excess of the second flap, lay a knife underneath the excess and slide down the spine cutting it away. Be careful not to cut the sewing supports.

### BOARD ATTACHMENT

All board attachments are done in the same manner but for the remainder of this paper we will focus only on the floating board. When the boards are dry mask off a 2 mm wide strip along the spine edge of the base board, glue it off with PVA/MC and place the floating board on it. Carefully line them flush to the spine edge and give them a quick nip. The boards may be removed from the press and set aside to dry under weight.

Cut the cover boards to the correct height, this would be just a smidgen above the endbands. On a larger book with thicker boards you may want to cut the individual boards to size before joining the floating board to the base board.

Now the boards need to be attached to the book. The cover will be built on the book as opposed to a case being made and later attached, however like a cased binding this type of binding has a groove. For the average book a groove of approximately 3 - 5 mm is fine. This can be accomplished with the use of an 1/8" or 3/16" dowel for average size books. Thick boards or large books may require a broader groove. If you choose to sew on alum tawed cords you may also want to increase the size of the groove. Later you will weave the sewing supports out from the spine, through the parchment. It will travel across the lowest point of the groove and back inside to reinforce the connection between the cover and the textblock. The pair of holes needed for this have to be far enough apart from each other that they won't tear out, therefore holes for thicker supports may need to be further apart than those for parchment tapes. Making the groove wider will allow for this.

Cut two pieces of 10 mil Mylar or similar material, larger than the book. Take a pair of nail clippers and cut off the pokey corners of the Mylar. These will be slipped in between

the textblock and the dirtsheet, fabric and tapes to protect against impressions forming in the textblock. Place a dowel against the shoulder and dab a couple of dots of PVA on the sized fabric, near the spine edge in an area that will avoid the tapes. Locate the board against the dowel, note that the head and tail square are correct and press down. Turn the book over and do the same on the other side. Use a right angle to make sure the two boards are even with each other, slip in the Mylar and nip.

Take the book from the press, remove the Mylar and note the size of the head and tail squares. Mark the foredge of the boards with a pencil at head and tail the same distance from the foredge of the textblock as are the head and tail squares. With a pencil and a strip of paper note how far the marks are from the boards' spine edge on both front and back. If they are different decide which mark to use or choose a comfortable middle ground so that the boards are square and equal to each other. Draw a line from head to tail using your final measurement. Lay one board under the clamp of the board cutter and cut along that line. Turn the book over and do the same on the other board. With a sharp knife, take a small nick out of the foredge at the head and tail. The nick should be the thickness of the lined parchment tapering away to nothing about 2 - 3 mm in along the edge. This will allow for the extra parchment on the board corners when the cover is made, creating a nice neat corner.

With the boards in place lay a pair of scissors along the board edge and trim the height of the hollow to match the height of the boards. It is easier to cut the hollow straight by holding the scissors steady and rolling the book into the scissors rather than following the round of the spine with the scissors. Afterward, hold the book out at arms-length, spine towards you. Note if your cut is straight and if not, rectify it. Lay the book down on the bench, take a sharp knife and slit the hollow at either end of the spine for about 2 cm along the fold at each joint so the turn-ins may be slipped inside the hollow later on. After slitting the hollow you may find a small bit of paper stuck to and showing above the backside of the endband. Take a pair of scissors and trim it back level with the top of the endband, being careful not to trim the outer layer of the hollow or cut the endband silk.

### COVERING

Now we turn our attention to covering the book. To make a pattern for cutting the parchment, square a larger piece of paper. Locate a squared side at the foredge of one of the boards, wrap it around the entire book to the foredge of the other board, working it down into the grooves and mark that distance on the paper. Add to that the turn-ins for both foredges. A turn-in of 1.5 cm is adequate for a book with average boards. Thicker boards may want 2 cm. Place the book on top of the paper pattern, note the height of the book and add to that both the top and bottom turn-ins. Cut the pattern to its final size. Place the pattern around the book again and check to see if it makes sense. Lay the pattern on top of the previously prepared parchment and cut to size.

With a strip of paper and a pencil find the width of the textblock's spine. Fold the strip to align the two marks and note the center with a pencil. On the paper lining of the parchment use a ruler or strip of paper and pencil to find the center point, left to right

and mark that on the lining using only a bone folder. The paper lining will retain the impression of the folder mitigating the need to use a pencil of some other marker which may show through the parchment. Transfer the marks from the spine width to the center point on the paper lining at head and tail. Join these marks with a straightedge and a bone folder to describe the spine width on the paper lining. Place the closed book over the spine area of the paper lining, centered top to bottom to reveal the head and tail turn-ins. Using the cover boards as a guide, mark the turn-ins. Starting at a distance twice that of the turn-ins begin thinning the endband area of the parchment.

To thin the parchment, you can use a high-speed sanding drum (such as a Dremel or Foredom flexible shaft), sandpaper or a paring knife; historically a piece of freshly broken glass has also been used as a scraper to thin the parchment, a cabinet scraper such as those used for edge gilding will also work. If using a paring knife, lightly moisten the hair side of the parchment (not the paper lining) in the area you wish to pare with a 50/50 solution of alcohol/water. This will soften the parchment enough to allow you to pare it similar to leather. It will have a different feel from leather but will still pare fairly well. It is best to keep the moisture to a minimum. If using sandpaper, don't moisten until you switch to the paring knife.

As you near the beginning of the turn-in area widen out to include the width of the grooves. If you are sanding to thin, finish out the very edge with a paring knife. As you begin to thin the parchment it is only the paper lining you are removing. As you advance toward the edge you will begin to take away some of the parchment as well. You are striving to create a gentle bevel beginning the width of two turn-ins in and going out to the edge of the parchment, much the same as with a leather binding.

After the endband areas of the parchment have been thinned you will see that the bone folder marks you made are gone. Redraw them with the folder and straightedge. After you do this hold the straightedge firmly and gently slide a Teflon folder underneath the parchment and slightly turn the sheet up against the straightedge. Do this on both sides of the spine. It will give you a convenient sighting later as you place the parchment onto the book.

Before continuing on you will need some press boards. The standard press boards with a metal edge will not form grooves of the correct shape for parchment over boards. A dowel, such as the one used earlier for setting the distance of the boards from the spine will give the best shape. Lay the dowel into the joint and then lay successive pieces of binders' boards on top of the book board until the level of the top of the dowel is reached, it may take 2 - 3 boards for this. Cut those boards to a size about 2 cm taller than the book and about 1 cm wider. Tip or laminate them together into a stack. Cut another board the same height as these and about 5 mm wider and tip or laminate it to the stack so that the stack is flush on three sides. Cut a dowel of the chosen size to the same length as the height of the boards and glue it into the reveal left by the addition of the last board. Make two of these. This type of press board works well for many types of bindings in addition to parchment over boards.

Before gluing the parchment, place the book in a lying press with the spine up. On the paper lining of the parchment place a piece of low-tack painters' tape along the outer edge of both of the lines running the length of the spine. This will define the width of the spine. Using a cotton ball or small sponge and 50/50 alcohol/water, moisten the hair side of the parchment in the area of the spine. This will soften the surface of the parchment so the glued area can be more easily worked.

Apply PVA/MC to the area between the low-tack tape and wait for a few moments to allow the parchment and lining to soften. With the book still in the lying press apply a thin layer of glue to the outside of the hollow and glue off the parchment again. If you have raised bands to work over then use paste on the parchment instead of glue to further soften it, but still glue off the hollow. Remove the tape and wrap the parchment around the spine of the text block, taking care to keep it even head to tail and front to back. You can use the fold marks made earlier to sight the left to right placement and for top to bottom, place the index finger of each hand against the book edge under the parchment. Note how close to the first joint of the finger the parchment is at either end and adjust accordingly. Work the parchment down well upon the spine using a Teflon folder or a bone folder and a piece of paper to protect the parchment. Remove the book from the press and slip pieces of 10 mil Mylar between the textblock and the dirtsheet, tapes and fabric to protect the textblock against impressions. Work the parchment into the grooves and put the pressboards in place. At this point there is no glue in the grooves but the use of the press boards will help pull the parchment tightly around the spine. Place the book into the press and nip for about 10 - 15 minutes, then remove the book. If you are working the parchment over raised bands the book should be tied up instead of placing it directly in the press. After 10 - 15 minutes untie the book, moisten the joint areas and put into the press between pressboards.

After removing the book from the press, mark the corners of the boards on the lined side of the parchment using the bone folder. With scissors cut the corners of the parchment off at a 45° angle, leaving a distance of one and a half to two board thicknesses from the board corner. Either sand the parchment corners, so they will lie flush when folded over, or moisten them with 50/50 alcohol/water and pare. The result is a typical corner for a cloth binding.

Another way to work the corners is to cut them leaving a tab along the foredge instead of the simple angled cut. Draw a 45° line on the cover as you normally would but about 2 - 3 times the board thickness away from the corner. With a sharp knife trace a horizontal line from the head or tail edge of the board where it meets the parchment straight out to the foredge of the parchment. Measure the thickness of the board and draw a line parallel to the cut line that much further out from the board edge but **don't** cut this one. Starting at the top or bottom outer edge of the parchment cut the corner off along the angled line stopping where it crosses this drawn line and starting again at the horizontal cut line on the other side of the defined tab. The horizontal line that was cut and that part of the angle will fall off. Cut the drawn line from its meeting point with the angle, straight out to the foredge of the parchment and that piece too will fall off. You are then left with an angled cut and a tab sticking out from it. Cut the length of this tab to fit into

the nick made earlier on the foredge of the boards. Pare this corner down as you would a regular corner, taking care not to pare away the tab. Test this first by using a piece of paper to make the same cuts before cutting the parchment. This will avoid a depressing mistake.

Glue off the boards but not the grooves, with PVA/MC and lay the parchment onto the boards working it into the grooves as you go. Place the Mylar inside and the pressboards outside as before and press for about 10 - 15 minutes then remove. Gently open the boards up pulling them away from the fabric where they were glued down. With a small bone folder go into the hollow at the head and tail to check if the slit is still free and accessible. Using the 50/50 alcohol/water and a cotton ball or small sponge, dampen the outer side of the top and bottom turn-ins. Glue them off with PVA/MC and let them relax. Remoisten and glue them off again. Apply a small amount of paste in the endcap area of the turn-ins to extend the drying time so you can more easily mold the endcaps. Turn the edges in, sliding the turn-in of the endcap inside the slit hollow. It is the turning in of the edges that trap and hold the floating board to the base board and complete the structure. If the turn-ins are fighting with you tape them down to the inside of the boards with low-tack painters' tape. Keep the tape away from any part of the parchment that will show after the pastedowns are put up - it may leave indentions in the parchment. Work the turn-ins well with a folder while they are still damp. You will find that the parchment molds easily.

While the top and bottom turn-ins are still damp the endcaps must be worked. With your thumbnail or a small bone folder, pull out enough parchment so that when it is folded over the endbands, they will just be covered. With a leather binding you pull out the needed amount of leather, stretch a string across the endcap and mold the leather into the backcornering of the boards to take up the excess. Then you pull out the "ears" of the endcap with a pointed folder and tamp the endcap down flat. With a groove there are no backcorners and the excess parchment pulled up to make the endcaps has to go somewhere. If you merely tamp down the excess parchment it will cause the endcap to become wrinkled and misshaped. You have to get rid of the excess at the outer points of the endcap and the way to do that is to tuck it down beside the endband. Take a fine pointed bone folder and poke some of that excess parchment down between the parchment which forms the groove and the endcap in a "V" shape. As you do this you will see the parchment tighten across the width of the endcap. Work the other side in the same manner. Place the folder underneath the endcap and gently pull the parchment to the left and right. When you are satisfied that you have tucked away the excess, tamp the endcap down with the flat of the folder. If your endbands are too wide they will be in the way and the endcap won't be successful.

Moisten and glue off the foredges, turn them in (tab first if using this method) and form the corners as you would for a traditional cloth cover. While still damp use the flat of your folder to neaten the corners. Put the Mylar back in and place some cardstock or blotter between the covers and the Mylar for 15 - 20 minutes under light pressure before removing the painters' tape, if used. After a while place fresh card stock between the boards and the Mylar. Press the book under moderate weight overnight.



The next step is to lace the sewing tapes through the cover. Free the tapes from any glue that might hinder them and cut their ends to a stubby point. Long thin points will just bend as you use them. Next you will need to make slits in the parchment cover to lace the tapes through. A fine chisel will work better for this than a knife as the depth of knife may be difficult to control thus widening the slit as you push. The chisel should be 2 mm wide, if you are making a larger opening then move it over and cut again. [Using a grinder, you can make one from pieces of scrap metal, hacksaw blades, packing crate banding, old butter knife, small screwdriver, etc. The chisel is a useful tool so the effort won't be a waste, but if you decide to use a knife just be careful to keep your cut small.]

With the book lying on the bench place a cutting plate (metal or thick Mylar) inside the book underneath the board as far into the joint as possible, taking care that the tapes are underneath the plate, out of danger. Take the hole punch jig made earlier for sewing and lay it in the groove alongside the spine. With the boards now on the book the jig doesn't come to the head and tail so it needs to be centered. If there are raised bumps on the spine indicating the tapes double check that the jig lines up with these. Notice that the groove is shaped like a rounded valley. Place the jig on the spine side of that valley, a tiny bit below the apex of the shoulder. Using a fine pointed awl poke a small hole on either side of each tape. Make certain the cutting plate is located so that the awl hits it as you poke through. Then take the chisel and join the pairs of holes into slits. Fold the board back exposing the slit and work the chisel further in, enlarging the slit enough to allow the tapes to be pushed through. Lace the tapes and gently pull them through. You have tested the strength of the tapes before sewing but you could still break them if pulled very hard. You may need a pair of tweezers or a hemostat to help with this. Once the tapes are through pull them taut across the joint, perpendicular to the spine. Make tiny prick marks to denote the tapes on the other side of the joint just where the parchment lays against the lower edge of the board. Make the slits right at the board edge and run the supports through to the inside of the book.

For the endbands the process is the same except they are not run straight across as that would severely weaken the endcap. Run the support at an angle of about 15° away from the endcap. This will give more material between the slit and the edge of the cover so as not to weaken it. On the outside, when making the second slit continue the angle.

The next step is to put up the fabric reinforcement. Trim out the turn-ins to an even and consistent measure. Using dividers set one leg against the outer edge of the board and dial the other leg to the width of the narrowest turn-in. With this as a setting slide the outer leg along the board edges and at either end of each board edge place the inner leg down and prick the turn-in. Connect the pair of prick marks along each edge using a knife and straightedge and remove the excess turn-in material. With scissors trim back the head and tail of the fabric reinforcement even with the trimmed out turn-ins. Place a piece of 10 mil Mylar, larger than the book, underneath the fabric and a piece of waste paper on top of the Mylar. Glue the fabric with PVA/MC. You will see the tapes laying on top of the fabric, glue them as well and keep them perpendicular to the spine. The two tapes from the endbands might not be caught by the fabric, they can however be glued off at the same time. They should be laid up at the same 15° angle they are already

running. Remove the waste paper and close the cover onto the textblock. Turn the book over and do the same to the other side. Place the book between pressboards and into the press for about 10 - 15 minutes. Remove the book from the press, take out the Mylar sheets and let the book stand partially open until the fabric is dry. Next trim back the long edge of the fabric and the projecting tapes square to the turn-ins. You can minimize the amount of thickness from the tapes and fabric if you cut through the fabric along side the tapes, peel it off the tapes and clip it away in the gutter area. Seeing the tapes on the inside however, are a clear sign of the book structure and should be considered as part of its beauty.

You will want to fill the area between the turn-ins and the fabric reinforcement. The fill prevents the turn-ins from showing through the pastedowns in the finished book and gives a smooth inner surface to the boards. It may be best to allow the book to acclimatize for a few days before filling in and putting up the endpapers. You can then determine, depending upon how warped the boards are if paste, PVA/MC or straight PVA should be used for these operations. Paste will pull the boards in more than PVA/MC and straight PVA will pull the least. If you glue off the trimmed out area of the board and only the edges of the fill material itself there will be even less pull because the fill will not have a chance to relax and stretch. Whichever way you decide, rub down the fill well. Place blotter in between the cover boards and textblock and weight the book until the fill is dry.

After the fill is completely dry the endpapers can be put up. Place a piece of waste paper under the pastedown and glue it off. You can use the same considerations in choice of adhesive as you did when putting down the fill. You can also choose to glue off the board and the edges of the pastedown if you need very little pull. Some papers will immediately begin to stretch along the edges giving problems with wrinkles so do this with caution. Remove the waste paper, place some stiff card stock between the boards and the first flyleaf to keep the turn-ins and tapes from telegraphing through and excess moisture away from the textblock. Place the pressboards on either side and put into the press. After 15 - 20 minutes the book may be removed from the press. Leave it under moderate pressure for a day or two, changing the card stock occasionally, until the book is completely dry.

If there are any rough areas to the finished binding, such as the slits, corners or maybe some whitening of the parchment where it has been stressed, gelatin or rabbitskin glue may help. A small amount can be brushed on and the softened parchment remolded or burnished with a folder. Once dry it will not show. A little alcohol/water or glue may remove the stress markings especially along the board edges.

If you follow these steps you will have a stable book, but as stated previously, parchment will change. To best maintain stable parchment covered boards, keep the book in an environment with a relative humidity of 50% and a temperature of 65° F. The most important storage consideration is to keep the humidity and temperature constant.

## SOURCES OF INFORMATION

Specific references to publications consulted for this paper are not made but there are many which have influenced my thinking as to how to bind a book in parchment over boards. These sources as well as other materials that may be of interest are listed below.

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