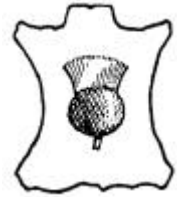




BY APPOINTMENT
TO HER MAJESTY THE QUEEN
MANUFACTURERS OF LEATHER
J. HEWIT & SONS LTD. EDINBURGH

J. Hewit & Sons Ltd.

TANNERS AND LEATHER DRESSERS



Skin Deep

The biannual Newsletter from J. Hewit & Sons Ltd.

No.3 - Spring 1997

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Introduction

We would like to welcome you to Issue No.3 of 'Skin Deep'. We are delighted to bring you in this issue, a most interesting article from Colin Meays on the history and activities of the College of Arms, a very useful piece from Terry Buckley on Staining, Dyeing and Decorating Leather, a humorous feature on B.O.O.K.™, part 3 of The Manufacture of Leather and an item from our German agent.

Our thanks go to all of you who have taken the trouble to write to us regarding this newsletter. Your thoughts and comments are most appreciated. We have included a few of these letters in our 'Letters and Feedback' page.

We did mention in the previous newsletter, that it was worth 'watching this space'. We have been quite busy during the last six months, establishing a presence on the World Wide Web. For those of you with access to the Internet, you can view our site at:

<http://www.hewit.com/>

We have crammed our site full of information on our products, our company history, a J. Hewit & Sons who's who and directions on how to get to us, and 'links' to other bookbinding related sites. We have of course, also published this and previous issues of 'Skin Deep' on our web pages.

We can now also be contacted by e-mail at the following addresses:

Sales	sales@hewit.com
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Roger Barlee	roger@hewit.com
William McLean	william@hewit.com
David Lanning	david@hewit.com

Please enjoy reading this issue of 'Skin Deep' and/or browsing our pages on the Internet.

David Lanning
Sales Director

The College of Arms, London

By Colin Meays

From the late 12th Century onwards Heralds have been connected with the households of rulers and important nobles. They originally acted as messengers, diplomats and army staff officers. They were required to be able to identify the devices painted on the banners, shields and coats of army commanders. Heralds also organised tournaments and gradually became involved in ceremonial occasions. In 1484 the Heralds received their first Charter of Incorporation from King Richard III. Queen Mary Tudor gave the present site for the College of Arms in 1555. However half this land is now covered by Queen Victorian Street.



*The Court of Chivalry in session - from a print by Rowlandson and Pugin c.1808
Reproduced by kind permission of the College of Arms ©*

There are thirteen Officers of Arms who form the College today. The Heralds come under the direction of the Earl Marshal who is the Duke of Norfolk. The Dukes of Norfolk have had the hereditary title of Earl Marshal since 1672. The highest ranking Heralds are called Kings of Arms, followed by Heralds and Pursuivants. The three Kings of Arms are called Garter, Clarenceux and Norroy & Ulster (amalgamated in 1943). The six Heralds are called Windsor, Chester, Lancaster, York, Richmond and Somerset. The four Pursuivants are called Rouge Croix, Bluemantle, Rouge Dragon and Portcullis. Currently the positions of Lancaster and Rouge Dragon are vacant. Usually to become an Officer of Arms one starts as a researcher working for an Officer. The researcher then progresses up through the system starting as a Pursuivant.

The Earl Marshal and Officers of Arms, are responsible for arranging the opening of Parliament, coronations, state funerals and the annual Service and Procession of the Order of the Garter, which is held at Windsor Castle. Garter King of Arms is also responsible for the introduction of new peers into the House of Lords.

The Heralds have private practices where they undertake research into genealogical matters, including the right to assume existing coats of arms and requests for grants of arms. A right to have a coat of arms by inheritance can be established only by proof of a direct male line descent from an ancestor who is recorded previously with a coat of arms. Many people are interested in their family history and the Heralds undertake research on their behalf. In addition to their private work they receive a small sum of money from the Queen for their services during state occasions.

The original college building on this site was destroyed in the Great Fire but the records were saved and returned to the current building which was built between 1671-88. The main rooms of the College of Arms are raised above the level of the ground and a fine set of stone steps leads to the Earl Marshal's Court (sometimes known as the Court of Chivalry). This is the principal room in the building being two floors high, with a gallery and throne.

The record keeping of coats and arms involves the recording of family history. Over the centuries a unique collection of armorial and family records has been formed. The library records are very large and diverse, ranging from original early Heralds' Visitations to modern case bound periodicals. Also included are both printed and manuscript books, including parchment manuscripts with ancient seals. The collections has been repaired over many years and it is now a constant battle to keep the ever increasing collection in good order. The college of Arms is totally self-financing and receives no state funding. As with so many libraries, raising money to continue conservation work is always a problem.

The conservation Department currently consists of one full-time member, three part-time members and a volunteer. Working in the Conservation Department requires a knowledge of a range of conservation matters and there is a great deal of work to be done due to the continual use of the books and documents. The Department also undertakes the conservation of illustrated prints, framed manuscripts and occasionally simple water-colour paintings. Whilst priority is given to the College of Arms library, a small amount of work for private clients is also undertaken.



The College of Arms Today

A plan for the future is to conduct a survey of the collection, recording the state of each item. As a result it is hoped that a picture of the general condition of the library will be achieved. This will make it possible to establish a record of the material requiring attention in the future.



Colin Meays has been involved in bookbinding for the past ten years and received formal training at Brunel College of Technology Bristol (1990-92), gaining Advanced City and Guilds in Bookbinding, Book Restoration and Paper Conservation and also the Brunel College Diploma Certificate. In 1991 he was awarded the prize for best work in the first year at Brunel. He then studied at Camberwell College of Arts undertaking the Conservation Honours degree course (1992-95). In 1994 winning the second price of the Stationers Company for an outstanding example of forwarding which was judged by Zaehnsdorf Ltd. Currently he is Head of Conservation at the College of Arms, London



Product News

We always endeavour to keep our product range up to date, to ensure that we are at the forefront of our customer's requirements. Some of the more recent improvements to our comprehensive range are listed below.

Band Sticks

We are pleased to announce the launch of a new range of tools to ease the problem of creating 'raised-bands'. Band sticks were developed to ease the forming of bands and are a much cheaper alternative to band nippers.

They are manufactured from the finest mahogany and are available in 2 sizes:

Small Grooved	with 3mm and 4mm grooves	£9.35 each
Large Grooved	with 5mm and 6mm grooves	£9.35 each

Archival Paste

We are please to introduce a very high quality pure starch paste suitable for all paper and leather gluing applications. This paste has excellent tack and is extremely easy to spread. It also has a neutral pH with very good long term storage stability.

This Paste will be available by mid-January and will be sold in

1kg tubs	£3.88 each
10kg buckets	£17.10each

*All prices above are ex-warehouse and are exclusive of vat @ 17.5%

Leather Staining, Dyeing and Decorating

by Terry Buckley

This article was taken from the notes of a workshop given by Terry Buckley at the Guild of Bookworkers Conference, in Pasadena, California - October 1996.

No records can tell you when animal skins were first used or discovered. Primitive man is credited with using skins for protection but these were subject to decay and rot in a very quick time. When tanning and leather were first discovered is also a mystery and was, by popular belief, probably found by accident - as many important discoveries are. Tanning or tannic acid, which is used to convert raw hides and skins into leather, is available from parts of trees. How this connection was made is still a mystery and probably the theory that the discovery was made by chance is valid.

Any bookbinder who has worked with leather will appreciate the qualities of its suppleness as well as its strengths and versatility. It can also be demanding; preparation of leather for binding can be tedious, and soul destroying. Most binders (if not all) have made a hole in the wrong place whilst pairing leather (this always seems to be the very last spot you have to shave down). This amounts to frustration, waste of time and also a waste of an expensive skin.

Why, after so many years of using leather, should we feel it necessary to stain or dye leather? I can only answer this using my own personal experiences.

Goat Skin leathers come in an extensive range of colours and I have rarely had to dye them to obtain a colour match. The only form of colour alteration that I am currently using is air-brushing with acrylics, but this is for specific decoration and would not be over the entire skin or cover. Air brushing is a very positive method of placing a design on a cover. The only preparation required is to test your colours and techniques first on a trial piece of leather, mask off the areas not requiring brushing and off you go. Some of my students have achieved dramatic effects using acrylics on goatskin. As the acrylics offer a range of very bright and vivid colours, they can achieve startling designs in a very short period of time.

Again, back to my original question, why stain or dye leather?

I really only stain or dye Calf and there are three main reasons:

- ◇ To match the covers on a repair; either spine, corners or both.
- ◇ To antique the covers on a rebind.
- ◇ To prevent keeping a lot of different shades in stock.

Calf is very porous and, having this quality, is very amenable when it comes to staining. I do use skins that have already been coloured but I would only use them when I did not want to try and create an antique or worn (used) look but to achieve a pristine, prize style binding.

I use three different types of stains/dyes - one somewhat controversially- but I will get to that a little later and explain my reasons why. The main two dyes that I use are ANILINE & SPIRIT. Aniline being a water based dye and spirit, IMS (industrial methylated spirit) based.

There are things for and against each type of dye. Water based dyes are not so strong in colour and are more difficult to achieve an even colour over the skin: the plus point is that the skin does not lose any of its character. Spirit based dyes are much stronger, give a much more even finish, but make the skin stiffer and not so easy to use for covering. They also lose that wonderful leather smell that always pleases visitors to my studio. Conservators prefer spirit stains being used as the skins will not be so open to attack from insects etc.

The third stain(s) that I use are, Hydrated Potassium Carbonate (salts of tartar) & Ferrous Sulphate (Copperas).

Hydrated Potassium Carbonate (salts of tartar) & Ferrous Sulphate (Copperas) have been used by bookbinders from around 1775 to decorate calf, either by what was known as calf marbling or later as a tree calving. Both methods have the enviable reputation for deteriorating the leather quicker than normally expected: the fact that many eighteenth and nineteenth century examples are still around does not convince conservators, maybe for genuine reasons, that there is still no substitute for these chemicals to achieve an antique marbling effect. I have never been afraid of using this method of staining as there has never been any indication that the text could be damaged by this process. It may be an old fashioned ideal, but I still believe that the text is most important part of any book and that the covering can either be renewed or repaired.

Producing a Cambridge Panel, with an aged staining.

My main concerns, when rebinding an antique volume, are to make the binding sound and the appearance to match its period. Bernard Middleton, an English binder of renown, has mastered this technique - even to the extent of ageing the corners - and, in my humble way, I have tried to expand on his ideas and enhance the ageing effect in the staining.

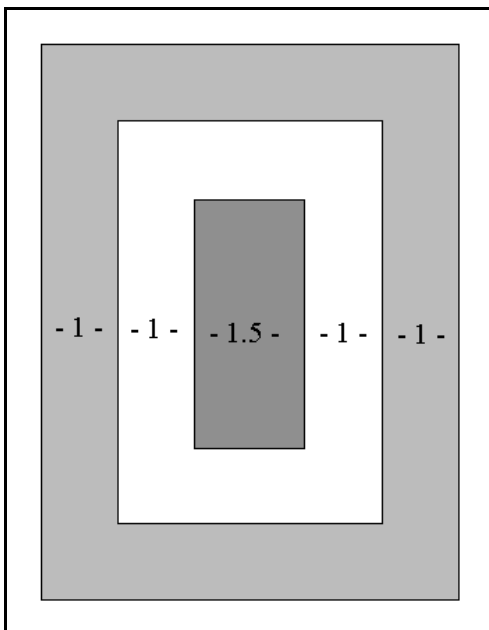
I would like you to assume that the book has been prepared to the covering stage and the natural calf has been edge paired and is now ready to be used as the covering material.

Lay the covering material down flat on clean waste paper, sponge the cover with clean water, then load a large piece of cotton wool with the chosen water stain (lighter than the required finished result). Flood the skin, wiping the loaded cotton with upright strokes, followed with a sideways stroke action making sure that the skin is thoroughly soaked and

even. Turn the skin over, paste out, cover in the normal way, allow to dry, and open up in the normal way. The next stage is to decide (this should have already been organised) on the finished stain colour (SPIRIT). This will be darker than the water stain used. I would now rub paste over parts of the cover sparingly, remembering that these will remain a lighter shade on the finished binding. Allow to dry. Load up a wad of cotton wool and thoroughly cover with the spirit stain. The finished cover should now have a two-tone appearance-how much of the lighter colour you wish to remain, or wish to see remain, will come through practice and experience. If your final staining has a metallic bloom on the surface, this can easily be removed by wiping over the surface, with a wet sponge.

I will now take this a stage further and convert this binding into a Cambridge Panel. If you do not wish to use this pattern then you can complete the binding without using the Cambridge Panel style.

To prepare for the staining of a Cambridge Panel, you will need two soft greyboards (or similar) cut to the exact board size of your covered volume. There has never been a formula for measurements of the panels, it is basically left to the binder to determine his own style. I would assume that this was, in its day, a very quick and cheap way to decorate leather bound books.



I work to my own formula, which may not suit everyone, but there is scope to produce your own styles and patterns. There is a diagram to explain my methods below. Basically, I divide the width by 5 and a half, the panels working out as 1,1,1½,1,1 (see diagram). Mark out square and even, to pattern board, cut along panel lines, making sure that you have cut all the way through, keep the cut boards as one and repeat on the other board.

Open the book out with the boards at right angles, place in a finishing press with the text between the jaws, the book should be capped up at this stage, tilt the press at a very slight angle, placing the head of the book upright. I must emphasise that the press should only be slightly tilted, too much angle and the stain might run.

You can use three types of stain for the next process: either Indian Ink, Spirit Stain or Ferrous Sulphate (this will need different process which will be covered later).

I personally prefer to use a strong spirit stain, the best example of which is shoe dye.

To apply the stain, place the two pattern boards (square to book on the binding), place a weight onto the centre of the board and carefully, without letting the pattern board move,

remove the outside panel, this will leave the outside panels and spine exposed. To apply the stain I use a toothbrush. This gives a very fine pattern and makes the amount of stain you require much easier to gauge. Load the brush with the stain (usually black). use a knife to flick the bristles with an action pulling the knife towards you (the opposite way will decorate you !!) It is best to test this on a piece of paper first. You should also make sure that the toothbrush is never directly over the book as there is a chance of the brush dripping. Once you have achieved your desired pattern, allow to dry for a short time, replace the outside pattern boards, mask the spine and remove the centre panel of the pattern boards. Repeat the staining process to desired amount. The most common pattern would be for a light sprinkle on the spine and outside panel with the centre panel being darker, this being achieved by applying more stain. remove pattern boards and allow to dry.

The finishing technique is as for normal calf bindings - marking up, paste wash, glaire and tooling etc. If you wish to leave the binding plain (Cambridge Panel or Antique) then lightly paste wash the cover, allow to dry and dress with a leather dressing. If you require a finish that is not too shiny, then I would recommend J. Hewit's white leather dressing. This is a wax and water based liquid which you apply all over, allow to dry and polish off with a soft cloth this will enhance the staining and improve the antique look.

I said earlier that I also use Hydrated Potassium Carbonate (Salts of Tartar) and Ferrous Sulphate (Copperas) to stain leather. This is the original way to achieve Calf Marbling. Unfortunately, and justifiably, it has the reputation for deteriorating leather. Many of the styles can be achieved by using safer stains/dyes such as described in the Cambridge Panel demonstration but there does not seem to be such a good substitute when it comes to tree Calf.

My apprenticeship of six years was served with W.T. Morrels, a Bookbinders in the west end of London. They were known for fine leather bindings and tree calving. My boss in those days, Ralph Themburg, was credited as being one of the last commercial practitioners of tree calving. I have kept his notes but I rarely use this type of staining due to its reputation for deterioration of the leather.

Equipment and Materials for calf Marbling using Hydrated Potassium carbonate and ferrous Sulphate.

- ◇ Albumen Glaire, matured
- ◇ Hydrated Potassium Carbonate (salts of tartar) a solution of two rounded teaspoons in a one pound jar of water.
- ◇ Ferrous Sulphate (copperas) a solution of three rounded teaspoons in three pints of water.
- ◇ Paste Wash solution.
- ◇ Large Brush and Knocking Stick.
- ◇ Sponge and Cotton Wool.
- ◇ Water Spray, or bundle of birch twigs.
- ◇ Wooden Roller, 3 to 4 ins. in diameter, 12 to 16 ins long.

The Process

Tree calf bindings are bound using a thinner board than normal. The boards are not lined with a draw sheet before binding but are encouraged to pull out away from the text once covered. The freshly covered book is allowed to stand on its foreedge whilst drying, keeping a careful eye that the binding will not topple over during the drying stage.

The text must be capped during the staining process, there is a strong possibility that water will be splashed onto the text so careful capping is important.

Wash the leather and allow to dry.

Sponge the leather with Hydrated Potassium Carbonate. the leather will turn brown. Keep on applying the solution until the right colour is reached, make sure you do the spine and the turnings as well. the boards will soften. Now take the roller and gently roll the boards create an even more exaggerated warping. Allow to dry.

Coat the boards (not Spine) with glaire (a generous coating applied with cotton wool). Allow to dry.

Suspend the book in a finishing press. tilt at an angle, the head of the book should be uppermost (mask the spine if you want a traditional style masking tape is sufficient).

Using either a sponge, bundle of twigs, or water spray, forcefully splash water on to the boards. The water should be encouraged to run down the boards, flowing to the centre from the sides. Once this pattern has been achieved using the large brush load up with the Ferrous Sulphate solution and (as if you were sprinkling edges of a book) sprinkle the boards. A pattern of black spots should appear which should run in the water flow and create a tree-like shape. Allow the stain to take hold for a couple of minutes and then wash down with water.

Place the book between two very clean pressing boards. Place a heavy weight on top, allow to dry and fill in with draw sheets.

The Cambridge Panel can also be achieved by using Hydrated Potassium Carbonate as the basic colour and Ferrous Sulphate as the panel stain- preparations as with Tree Calf, Pattern Boards as described earlier.

Patterned or Marbled Calf can be achieved by using the same preparations and, either sprinkling, or lightly sponging (using a dabbing action) over the covers.

Every bookbinder appreciates the qualities of working with leather, why in this modern technology world has there never been a worthy replacement found?

Terry Buckley - In 1961, Terry joined the old London firm of W.T. Morrell where he served six years as an apprentice. The first four years were spent as a binder where he then transferred to the finishing department. In 1969, he left Morrells and spent 10 years working in various binderies. In 1979, he joined the Cambridge Bindery of John P. Grays as their overall manager. Since 1982, he has lectured in bookbinding at the London College of Printing where he now holds the post of Senior Lecturer.

During the last four years, he has conducted several lecture and workshop tours in the USA, including the recent Guild of Bookworkers, Standards of Excellence Conference in Pasadena, California.



Agent Profile - Germany

Anton Glaser - Martin Rustige

Unlike J. Hewit & Sons, the Firm of Anton Glaser has only been in business for 75 years! The company was founded in 1920 by Anton Glaser who was the grandfather of the current owner Martin Rustige. He was a bookseller and started to sell bookbinding materials just after the end of World War I. This rapidly became a good business because at that time there were a lot of small bookbinders in Germany! Anton Glaser died relatively early and his daughter (the current owner's mother) took over, expanded the company and also rebuilt the business which was completely destroyed by a bomb during World War II.

I joined the company in 1966 after having worked several years for different companies and in different fields in France and England. General bookbinding was then declining in Germany and a lot of the smaller business had disappeared, but not the "top end". i.e. high quality binding.

So there was a small but good market for high quality materials such as leather or exclusive paper which could not be found in Germany any more. With my experience gained abroad I was looking for suppliers of appropriate materials in other countries. I heard of J. Hewit & Sons' excellent reputation of being a good tannery. The quality and service they offered were up to the demanding standards of our customers, and good personal contacts were established. Business increased rapidly and in 1969 we made a sole agency agreement for Germany, and this has lasted since then to the mutual benefit of both companies.

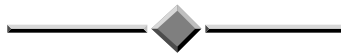
We stock relatively large quantities of CLANSMAN Nigerian Goatskins (many of the 22 shades we have in stock are specially produced for us), the complete standard range of Chieftain Goatskin, Pigskins, Aniline Calf (12 different shades all specially made for us), Alum Tawed Goat, Pig and Calf, as well as some

aluminium re-tanned Archival leathers. Further to this, there are special makings for particular books. J. Hewit & Sons can produce the relatively small quantities often needed in these cases but they are also good if the quantities are larger (some years ago they produced 500 skins of a beautiful specially tinted Alum Goat for the reproduction of medieval book, no other tannery in the world could have produced such a fine leather!!)

I can say that today Anton Glaser is by far the largest stockist of bookbinding leather in Germany. Besides leather we stock a wide range of high quality papers and boards for bookbinding, printing, printmaking, as well as materials for conservation and restoration and are one of the leading German supplies of these materials.

Our customers are quality bookbinders, printers, printmakers, publishers of limited edition books and more and more conservation workshops, either privately owned, or in large libraries, archives and museums. Compared with England, France or specially the USA there are only relatively few amateur bookbinders in Germany, so this is an important market as it is in other countries.

The economic situation in Germany is unfortunately no longer as brilliant as it was, and this obviously affects bookbinding like all other industries, crafts and trades. But in spite of this we have recently experienced a slight revival of small bookbinding workshops created by a new type of bookbinders with a more "modern " approach to market their work.



Letters & Feedback

Thank You

Thank you for the Autumn issue of Skin Deep. I have already bound a book of magazines using the Rigid Concave Spine Method as shown by James Brockman in this issue - it proved to be a great success.

The following trick may be of use to other amateur bookbinders like myself. When rubbing down end papers, instead of using ordinary paper, try using the silicone release paper from 'Fablon' or other such product or even a cornflake packet using the shiny side uppermost. The bone folder will glide like magic with little or no drag - superb!!!

With many thanks to your excellent staff and your very good delivery service,

yours faithfully,
A.W. Martin, Lowestoft

Concave Spines

My initial reaction when reading James Brockman's article on The Rigid Concave Spine was "lucky fellow having that much time to spend experimenting, some of us have got busy workshops to run you know".

My next reaction was one of interest and I am now full of questions such as:

- 1 Does the grain or weight of paper affect the work?
- 2 What sort of glue is used?
- 3 Why sew on tapes?
- 4 Is the thickness of the volume a deciding factor in the suitability of a concave spine?
- 5 can concave spines really be called fine bindings?

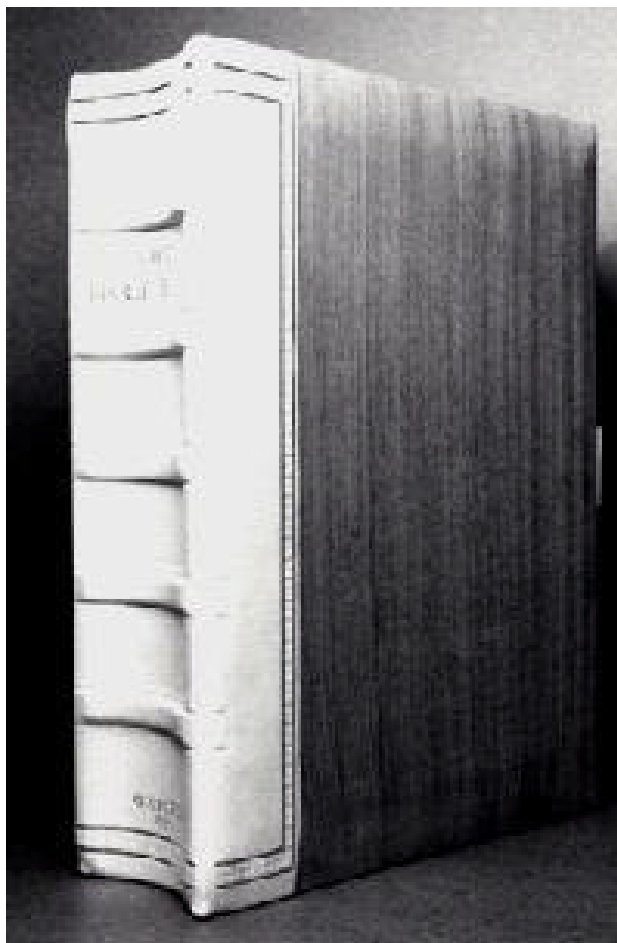
I am not convinced that there will be less strain on the sewing and in my opinion the book may have more tendency to move than with a conventional style of binding. Who knows, maybe one day I will have time to discover for myself, but in the meantime it is interesting to hear other binders ideas. Thank you James.

Barry Brignell, Cambridge

James Brockman replies:

I am grateful to Mr. Brignell for taking the time to respond to my article "The Rigid Concave Spine" in your newsletter, Skin Deep Number 2. I was hoping for some reaction from fellow binders and hoped that a discussion in your columns would follow.

I, too, run a busy workshop employing several people with the pressures of maintaining quality, meeting deadlines etc. but I have always found time to experiment and develop new ideas along side my everyday work. This approach has worked well for over 20 years and I can remember in 1975-6 there were months of evenings and weekends designing and making my first electronic binding. This was a purely speculative exercise and in fact the binding was brought by the first collector who saw it for £2000!

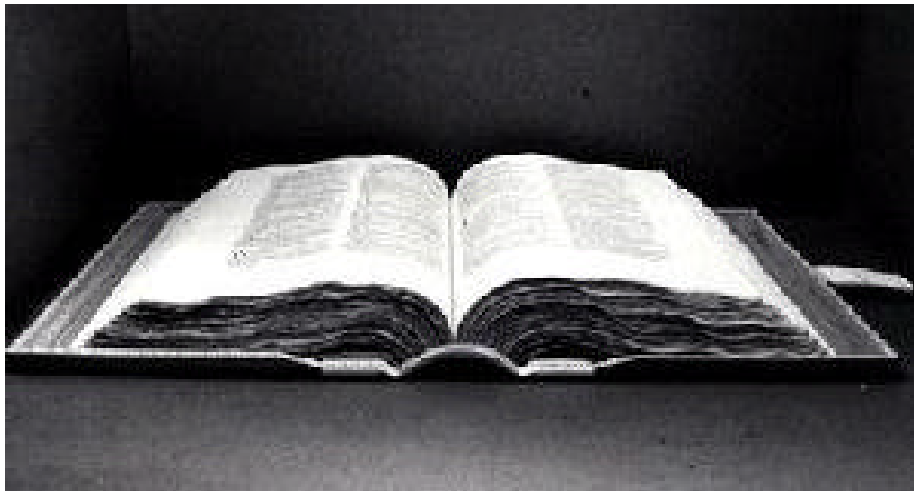


*Quarter sawn oak boards with alum-tawed leather,
Gold & blind tooling*

I have maintained this approach to binding and question every technique and style I come across. No binder in the past had all the answer and no binder today has all the answers but I believe we should pass on more that we inherit.

In response to Barry's particular points:

1. I do not believe the grain or weight of paper would present any additional problems over the rounded and backed book.
2. I always use a thin layer of edible gelatine on the back of the sections for good reversibility. After the initial linings unbleached Irish linen and acid-free paper - PVA may be used.
3. I prefer to sew on tapes as this cuts down on the bulk over the joints and makes lining and spine easier (8 or more linings are needed). I have bound one rigid concave spine binding sewn on single raised cords. The boards were attached by flattening the slips and gluing into the split boards.



Book open

4. To date, the thinnest book I have bound using this method was 1/2" miniature book and the thickest 5" Bruce Rogers, Oxford Lectern Bible (See photographs).
5. I did not invent the Rigid Concave Spine with a view to using it on fine bindings. In fact it evolved from my interest in binding structure whilst rebinding manuscripts, early printed books etc. and I have always considered the structure most suitable for conservation binding. However, my earlier invention of the single hinge binding produced a concave spine automatically, therefore if the techniques, materials and structure are fine, then I see no reason why it cannot be used on a fine binding.

With regard to strain on the sewing, I would emphasise that it is a Rigid Concave Spine. There must be enough spine linings to guarantee that the spine will not move - WHAT DOES NOT MOVE DOES NOT BREAK!

The Manufacture of Leather - part 3

By William McLean

The previous instalment of **The Manufacture of Leather** covered the various stages of processing which take place in preparation for tannage. These preparatory operations are mainly concerned with the removal of unwanted components to leave the structural material which gives the skin its strength. The next step is to stabilise this fibrous residue so as to give it a long term resistance to further breakdown. This tanning stage is the crux of leather-making and has given its name to the entire process.

As mentioned in Part 2, the fibrous tissue is made up of a protein called “collagen”. At a molecular level the protein consists of three amino acid chains¹ wound together in a tri-helical formation. The molecules have a tendency to line up end to end and to aggregate into larger macro-molecules called “fibrils” and these, in turn, join up and twist together with others to form fibres and ultimately the fibre bundles which can be seen by the naked eye. The unique physical properties of leather come from the way in which these fibre bundles are woven together into a three dimensional network which extends throughout the bulk of the skin.

The snag is that untreated collagen is susceptible to putrefaction when wet and although this decay can be halted by drying, the resultant material is hard and inflexible. Furthermore, if the pelt is allowed to become wet again the breakdown will continue. The fundamental job of the tanner, then, is to transform the pelt into a durable leather which can dry out whilst remaining flexible and which can undergo repeated wettings and dryings without further biological decay.

In order to understand what these changes are we must look more closely at the untreated pelt in both the wet and dry states:

A large proportion of the water content of wet skin is present within the spaces around and between the fibres. Removal of this water during initial drying has little effect. The remainder, however, which is approximately one third of the (dry) weight of the collagen, is very closely associated with the collagen molecules which are said to be fully hydrated. The bound water forms a “sheath” around the protein chains and, in effect, keeps them separate from adjacent chains. This water is attracted to the protein by weak inter-molecular forces and as drying continues the protein structure collapses to the point where the same forces begin to act between adjacent collagen molecules, in effect, gluing them together. This force gives rise to a mechanism known as “hydrogen bonding” and is due to the fact that

there is a subtle variation of charge along the protein chain with an attractive force between areas of opposing charge. These bonds are fairly easily broken by the re-introduction of water.

There is also the possibility of much stronger chemical bonds forming if appropriate sites on adjacent chains come together. Generally, this sort of cross-linking is much less easily broken which can lead to a degree of irreversibility during drying and re-wetting.

In the wet state protein is susceptible to a process known as hydrolysis - molecules or groups of molecules become detached from the chains and fail to reattach. In other words, the protein gradually dissolves. The process may be accelerated by the presence of certain enzymes or other chemicals but will still occur even in their absence ("auto-hydrolysis"). Incidentally, the effects of hydrolysis are much more serious when dealing with the skins of younger animals (e.g. calfskins) as the bonds holding the individual molecules together are significantly weaker than those in older more mature skins. It should be noted that hydrolysis takes place throughout the pre-tanning stages especially during unhairing, liming and bating. Tanners refer to this as "loss of hide-substance" and strive to minimise it without compromising the benefits of these processes.

In essence, then, the primary purpose of a tanning agent is to:-

- ◇ Inhibit cohesion at a molecular level so as to retain mobility and flexibility after drying.
- ◇ Modify the chemical structure of the protein to make it less soluble and hence lessen or eliminate the effect of hydrolysis of the resultant leather.

There are a great many substances which are able to interact with pelt to bring about these requirements to varying extent. They fall into a number of broad categories, as follows:-

Vegetable Tans - Extracts from many hundreds of plant species have been shown to have a tanning effect. They contain large poly-phenolic molecules which act by displacing the bound water from the protein and taking up many of the exposed hydrogen bonding sites. These molecules have acidic groups on them which are attracted to, and can form stronger bonds with, the basic side-groups on the protein¹, further reducing the bound water. The size of these molecules is important in that they are able to fill many of the voids and spaces within the structure. The extracts also contain many other components referred to as "non-tans" which are more easily washed out but which have an important influence on the final properties of the leather.

Synthetic Tans ("Syntans") - Originally these were the results of the chemical industry's attempts to copy naturally occurring vegetable tans. They produced a stable leather but rarely gave the fullness and desirable handle of a genuine vegetable tannage. The category has now grown to include a huge variety of products with widely varying properties. Some of them are used as sole tanning agents, for example in the production of white leather, but mostly they are now used as modifiers in combination with other tanning materials.

Mineral Tans - These include compounds of chromium, zirconium, aluminium and iron. (The use of chromium salts has dominated the tanning industry in recent decades and this remains as the most widespread method of tanning today although there is growing pressure in the developed countries for replacement by materials with a lower environmental impact. The commercial benefit of the use of chromium salts is such that any change will be gradual.) Mineral tans act in a different way to vegetable and traditional syntans in that the fixation takes place with the acidic side-groups and involves strong dative or co-ordinate bonds. Furthermore, the molecular size of these tans is, initially, much smaller giving rise to significantly less filling of the leather. The principle feature of the tanning compounds is that they are able to link together into much larger complexes which can grow sufficiently to bridge between adjacent protein molecules giving a high degree of stability to the structure. The importance and predominance of chromium stems from its ability to form these large complexes.

Aluminium does not form the large complexes nearly as readily as chromium. Furthermore, at the higher pH values which favour good fixation with the protein, aluminium salts have a tendency to be sparingly soluble and hence to precipitate out of solution. The result is that a traditional alum-tawed leather is not particularly stable and the aluminium salt is easily washed out. The fixation does improve with time but this is a slow process.

Aldehydes - Formaldehyde and glutaraldehyde are used commercially, and readers will be familiar with the use of formaldehyde as a preservative for tissue samples. These materials react to form very strong bonds with the un-ionised basic side-groups and have a tendency to polymerise under alkaline conditions to create large molecules which are able to cross-link protein chains. The resultant leather is rather thin and empty but has an extremely high resistance to washing out of the tanning material. Chamois leather production which involves the treatment of pelt with raw cod oil is also an instance of this type of tannage, since complex aldehydes are created by oxidation of the oil during the tanning process.

There are many other materials which have some tanning properties but which are not used in commercial leather production, generally because they are too expensive or are hazardous to handle.

Notes:- Different amino acids share the ability to link up with each other by the formation of a peptide group between molecules. This joining involves a condensation reaction and creates a very strong covalent bond. One might visualise the resultant long chain molecule as having a central poly-peptide core with a variety of side chains (the "bodies" of the individual amino acid molecules). The side chains or groups exhibit quite different properties. For example, some show acidic behaviour and become ionised (negatively charged) under alkaline conditions while others show the opposite effect. In addition to these ionic properties, certain of the side groups and, in particular, the peptide group itself have a marked unevenness in the electron density distribution. This gives rise to the charge variations which favour hydrogen bonding.

B.O.O.K.™

A New Aid to Rapid Learning

A new aid to rapid - almost magical - learning has made its appearance. Indications are that if it catches on all the electronic gadgets will be so much junk. The new device is known as Built-in Orderly Organised Knowledge. The makers generally call it by its initials, **BOOK™**.

Many advantages are claimed over the old-style learning and teaching aids on which most people are brought up nowadays. It has no wires, no electric circuit to break down. No connection is needed to an electricity power point. It is made entirely without mechanical parts to go wrong or need replacement. Anyone can use BOOK™, even children, and it fits comfortably into the hands. It can be conveniently used sitting in an armchair by the fire.

How does this revolutionary, unbelievably easy invention work? Basically BOOK™ consists only of a large number of paper sheets. These may run to hundreds where BOOK™ covers a lengthy program of information. Each sheet bears a number in sequence, so that the sheets cannot be used in the wrong order. To make it even easier for the user to keep the sheets in the proper order they are held firmly in place by a special locking device called a "binding".

Each sheet of paper presents the user with an information sequence in the form of symbols, which he absorbs optically for automatic registration on the brain. When one sheet has been assimilated a flick of the finger turns it over and further information is found on the other side. By using both sides of each sheet in this way a great economy is effected, thus reducing both the size and cost of BOOK™. No buttons need to be pressed to move from one sheet to another, to open or close BOOK™, or to start it working.

BOOK™ may be taken up at any time and used by merely opening it. Instantly it is ready for use. Nothing has to be connected up or switched on. The user may turn at will to any sheet, going backwards or forwards as they so please. A sheet is provided near the beginning as a location finder for any required information sequence.

A small accessory, available at trifling extra cost, is the BOOK-MARK™ (- Modular Address Retrieval Komponent). This enables the user to pick up his programme where he left off on the previous learning session. BOOK-MARK™ mark is versatile and may be used in any BOOK™.

The initial cost of BOOK™ varies with the size and subject matter. Already a vast range of BOOK™s is available, covering every conceivable subject and adjusted to different levels of aptitude. One BOOK™, small enough to be held in the hands, may contain an entire learning schedule. Once purchased, BOOK™ requires no further upkeep cost; no

batteries or wires are needed, since the motive power, thanks to an ingenious device patented by the makers, is supplied by the brain of the user.

BOOK™s may be stored on handy shelves and for ease of reference the program schedule is normally indicated on the back of the binding.

Altogether the Built-in Orderly Organised Knowledge seems to have great advantages with no drawbacks - we predict a big future for it.

An Anonymous Response:

BOOK™ does not, in spite of the claims, seem "to have great advantages with no drawbacks". Soon, it probably won't even be legal. Consider:

"It can be conveniently used sitting in an armchair by the fire" - Being paper, it might burn in the fire. Probably fire laws in most locations wouldn't allow its use there. Worse, such a device, which encourages close proximity of the user to fire, will be outlawed at the Health and Safety Executive's request.

"Each sheet bears a number in sequence, so that the sheets cannot be used in the wrong order" - How quaint; to think that the programmer (author) would be allowed to turn over such an important task to the user! "cannot" is clearly misused; any user could incorrectly turn to the wrong page. A proper user interface might correct that, of course, such as requiring that each sheet be torn off to expose the next. This is a clear conflict with - "The user may turn at will to any sheet, going backwards or forwards as he pleases."

"BOOK™s may be stored on handy shelves and for ease of reference" - The user interface obviously needs more work before such a system can be practical.

"the motive power - is supplied by the brain of the user" - Clearly, the inventors have not examined recent trends. No serious person would suggest even expecting a "user" to have a brain present, much less to use it so continuously.

I'd suggest the inventors return to their consoles and do a thorough associative search of various data banks, like the rest of us, and forget this nonsense.

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Do you have an eye for a bargain? If so, then can you afford to miss the opportunity of viewing our extensive selection of special offers that we now have in our London Warehouse? A list of our current offers is listed below.

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by Einen Miura

This beautiful book published by Zaehnsdorf, really is the last word in reference books on marbled paper. It illustrates the myriad of designs of contemporary marble papers with over 120 excellent quality colour photographs. There are also descriptions, details and pictures on how to produce the various designs.

This book was £29.95 but has now been reduced for a limited time to **£24.95**

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Overall Length

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