HENRY HEBERT AND MARIEKA KAYE

Pre-Meeting Symposium: The Current Use of Leather in Book Conservation

INTRODUCTION

When confronted with the treatment of a damaged leather binding, conservators have many choices about which materials to use. The traditional approach is to repair "like with like," selecting a tanned skin of the appropriate animal and dyeing it to match. In the past 20 years, many techniques that make use of alternative materials such as paper or cast acrylic media have been described in the conservation literature. With so many options available, how are conservators choosing which materials to employ?

This symposium offered an opportunity for wider dialogue about the materials used to repair leather bindings and a chance to ask questions or relate lessons learned at the bench. Speakers presented on all aspects of this material, from manufacturing, evaluation of "vintage" repair techniques, decision-making, and use of new materials.

SUMMARY OF PRESENTATIONS

DAVID LANNING
A VIRTUAL TOUR OF THE J HEWIT & SONS TANNER AND THE LEATHER MANUFACTURING PROCESS

J Hewit & Sons has been in business for over 200 years, producing leather from goat, calf, and sheep skins. Many of the skins are sourced outside the United Kingdom, from Scandinavia, New Zealand, or the Indian subcontinent. Skins arrive at J Hewit & Sons in one of three different states: wet-salted, pickled, or native tanned.

Animal skins are made up of many layers of tissue, containing hair and glands for the secretion of oils and sweat. The leather manufacturing process involves several steps to remove or alter these components prior to tanning, including washing in large drums, liming with sodium sulfide or hydrosulphide to remove hair and inter-fiber proteins, and mechanically defleshing to promote penetration of chemicals.

There are many different types of tanning agents, including vegetable, mineral, aldehydes, and synthetic. These tannins can be used alone or in combination. Good quality bookbinding leathers should be vegetable tanned with slower acting pyrogallol tans. J Hewit & Sons predominantly uses sumac and tara tannins.

After sorting by quality, the leathers may go through several steps to be finished. They are first wet shaved to an appropriate thickness and then dyed in drums. At the same time, the skins may also undergo retanning, archival tanning with aluminum, or fat liquoring to replace lost oils. After drying, skins may be sprayed with additional dye or pigment, glazed, pressed, or embossed with a false grain using a large hydraulic press as a final finishing step.

Throughout the presentation, videos and images of each of these processes were shown. Additional details of the leather manufacturing process are available through J Hewit & Son's biannual newsletter, *Skin Deep.*

Q: Have you seen any trends recently in the use of your leathers? Are conservators buying less?

Lanning: There has been a lot more demand for our archival, aluminum retanned leather recently. Business is steady, though. The managing director's son is currently studying chemistry and intends to follow in his father's footsteps.

Q: Have you done any fold endurance testing?

Lanning: Yes. The Craft Project carried out 10 years ago included many specialized leather testing techniques, which had a big impact on our processes. The aluminum retannage that Hewit's is using now was influenced by this study and the report can be found on our website (Barlee 2014).

Q: Why isn't sheepskin a good bookbinding leather?

Lanning: The naturally high fat content in sheepskin creates voids with its removal during processing and it is prone to

Summary of symposium, AIC's 46th Annual Meeting, May 29-June 2, 2018, Houston, Texas

tear or delaminate. The climate actually has a big effect on the animal whilst it is alive, so Hewit's is acquiring sheepskins from warmer climates. But it still isn't recommended for durable bookbinding leather.

Q: You mentioned that a lot of the machines that you use are quite old. Are machines like those still manufactured?

Lanning: Most of our machines are well over 70 years old! Today, there are companies in China, India, and Italy that manufacture tannery equipment.

Q: Is there a detrimental effect of the alcohol in consolidant recipes? It appears to be pulling the moisture out of the skin and maybe that is making the problem worse. Isopropyl alcohol appears to be moving the dyes less than ethanol, so maybe it's the lesser of two evils.

Lanning: Yes, that is true. In fact, we recommend against the use of spirit-based dyes for that very reason. Traditionally, we would try to rehydrate the skins with some sort of oil, but I know that is a point of contention among conservators.

Sarah Reidell: There has been a lot of great research about the effects of consolidants in AIC posters recently (Mahony and Pearlstein 2014; Knight 2016). SC6000 has waxy components that don't age well. Cellugel is at least hydroxypropylcellulose but contains an added fragrance. I suggest just making it yourself, rather than purchasing it.

Q: I have some naturally aged skins in my personal collection and some are terribly degraded. Do you think that is due to the tannage used? Or other factors? Also, do you have naturally aged skins at Hewit's?

Lanning: Dye can obscure evidence of the type of tannage used. With an undyed skin, you can often see discoloration along the edges from oxidation, if the skin has been tanned with catechol (poor quality) tans. Hewit's has some naturally aged skins at least 80 years old.

Q: Have there been changes in the processing or manufacture of alum-tawed skins in the last 30 years? Some older skins that we have in our lab tear very easily.

Lanning: There shouldn't have been a significant change in manufacturing, but alum-tawed skins do need to be conditioned if it is very dry in your space. You may want to humidify them a bit and see if there is a change.

David Lanning, Hewit & Sons, Ltd

DAWN WALUS
A BRIEF HISTORY OF (A) TIME: REFLECTIONS ON 53 YEARS OF LEATHER CONSERVATION AT THE BOSTON ATHENAEUM

Founded in 1807, the Boston Athenaeum is one of the oldest independent libraries and cultural institutions in the United States. The collection contains books, paintings, sculpture, works on paper, and decorative arts. The history of conservation at the institution can be described in two major periods: 1807–1962, "before conservation," and 1963–present. Before the establishment of a conservation program, many books were sent to commercial binders for binding and rebinding, often in half or quarter leather with decorative paper over boards. The building did not see proper environmental controls until the last renovation in 2003, so the collections were regularly exposed to excessive heat, air pollution, and coal dust from the heating system, which probably contributed to the deterioration of collections.

In the 1950s, a former elevator operator was put to work applying a product called Liquick Leather to damaged or deteriorated leather bindings. Liquick Leather is a scientifically formulated plastic designed to retain its flexibility for many years. The instructions suggest cleaning the binding before application with carbon tetrachloride, a substance with known toxic effects. The product was applied to leather-bound books, as well as parchment and cloth bindings. It was usually applied only to the spine and was sometimes toned. Today, the coating is often brittle and occasionally adjacent Liquick-treated books stick together. Images of books with Liquick Leather coatings from the circulating and special collections were shown.

The first conservator at Athenæum, George M. Cunha, made major changes. Discrete collections were prioritized for treatment with a new emphasis on more thoughtful repairs. One of the first priorities was the King's Chapel collection. It is the oldest colonial library in Boston and features 17th-century theological works bound in leather. An image of the only incunabula in the collection was shown. It had been rebound in 1821 in a style more appropriate for the 19th century than the 15th century, and rebacked sometime prior to 1963. Of the treatment, Cunha writes, "I have never seen a better example of butchery on such a costly book." This serves as evidence of a shift from rebinding as repair to a more intentional approach, with consideration of the binding and its significance. For the highest value materials, Cunha tipped descriptions of the treatment inside the back of the book. A common treatment of the time was to clean and treat leather bindings with castile soap, potassium lactate, and British Museum leather dressing. Cunha experimented with accelerated decay testing of leathers available at the time, and those samples still exist.

In the modern era, treatment decisions are made more selectively. During the presentation, several recent treatments, including rebacking in leather, rebacking with toned Japanese or Korean tissues, and full rebinding in leather were discussed.

Former von Clemm Fellow Lauren Calcote conducted research on the identification and removal of Liquick Leather. Using FTIR, the product was identified as polyvinyl acetate (PVA) and was successfully reversed with acetone, except in cases where the leather was severely deteriorated (Calcote 2016). Associate Conservator Evan Knight compared the visual effects of Klucel-G in various solvents at various concentrations as well as application by brush and by spray (Knight 2016). A solution of Klucel-G in isopropanol is the current protocol for leather consolidation.

A recent shelf-cleaning project on a collection of large leather volumes was also described. The bindings were covered in dust and soot and the leather was flaking and powdery. The cleaning was undertaken after learning of a staff member's allergies, which worsened after working in close proximity to the collections. Since treatment, the staff member reported that the allergy symptoms have not returned. This serves as a reminder that the materials we work with can cause harm and that small-scale efforts can make a difference.

Q: Is Liquick Leather still produced?

Walus: Yes, but under different names.

Q: Did Captain Cunha record notes in all or most of the books treated during his tenure?

Walus: No, he just concentrated on the highest priority and valuable collections. There are lots of notes in those books, but most of it is very generic information. There are no specific notations about the source of materials, for example.

Dawn Walus, Boston Athenaeum

WILLIAM MINTER, KATIE WAGNER, KRISTI WRIGHT, HOLLY HERRO, LAURA MCNULTY
UNDERSTANDING THE MATERIAL PROPERTIES OF LEATHER, OLD AND NEW

Leather is an ideal material for covering books and members of the book trade have been discussing the quality of leather since the early 19th century. A bookbinder determines quality from training, experience, and interaction with the product, but how do you identify the quality of the tannage? There is an anecdote that T. J. Cobden-Sanderson actually tasted leather to judge the acidity. For the modern conservator, however, simple testing may be possible using the equipment available in a standard conservation lab. A leather discussion group, consisting of the members of this panel, was formed 2 years ago to investigate questions about leather quality and use within the bookbinding and conservation community.

Historical tanning processes, from ancient to medieval, were described in the presentation, comparing the methods and materials used to the ones described in David Lanning's presentation. Also included was an overview of scientific research into the mechanisms of leather degradation beginning in the 1800s, proceeding through the Printing Industries Research Association (PIRA) test (Plenderleith 1967), and followed by the establishment of production standards. Binders disliked the working properties of the early leathers produced adhering to the standards and, thus, the more recent STEP, Environment, and CRAFT Projects emerged in Europe, which aimed to improve those properties (Larsen, Vest, and Kejser 1994; Larsen 1996; Barlee 2014).

Members of the panel have been conducting an ongoing survey on how bookbinders and conservators interact with leather. An email questionnaire was developed to ask how individuals select leather for purchase, what qualities they think contribute to longevity or workability, their preferred type of tanning, and if they have noticed changes in the quality of products available on the market. Some early results were described. Many survey participants select skins by color, grain, thickness, and workability. Binders would prefer to purchase leather made with specific tanning agents but would like samples of the material before buying. Responses from tanners indicated that they would be open to changing production methods if there were sufficient demand.

The group has been performing tests in an attempt to correlate skin stability with the tanning process used. A number of modern and historic leather samples have been collected and are currently being tested for moldability, wettability, shrinkage temperature, pH, and response to a modified PIRA test. Additional testing efforts currently underway at the Smithsonian were also described, including how proteins are altered during tanning and insight into protein degradation over time.

There are many other avenues of cross-disciplinary leather research with zoo archeologists or archaeological conservators, particularly since the breeding and diet of livestock has significant effects on the quality and thickness of the animal skin. The composition of herds and agricultural practices have changed significantly since colonial times.

Q: What size of sample is required for testing of the leather?

Minter: A set of five 2″ × 2″ squares has been required for our testing, but most labs that will do testing just need one square that size. Bigger sample sizes and a larger quantity of samples is of course better.

Q: Why are American conservators so "behind the ball" on research into leather?

Minter: Good question! It may be because, without naming names, a lot of institutions who have the resources to conduct research aren't using leather in their treatments.

Herro: The results from the questionnaires and discussions with longtime book conservators in the US suggest that there is little awareness of European efforts in testing and discussion of production standards.

Audience comment: Maybe research isn't happening because there isn't much of a leather trade in the US, and thus no need to preserve industry jobs. CCI has lost a number of scientists focused on proteinaceous materials in the last few years, but hopefully that will be turning around soon.

William Minter, Pennsylvania State University Libraries
Katie Wagner, Smithsonian Libraries
Kristi Wright, National Library of Medicine
Holly Herro, National Library of Medicine
Laura McNulty, National Library of Medicine

JAMES REID-CUNNINGHAM
LOVE IT OR HATE IT: TANNED LEATHER IN INSTITUTIONAL CONSERVATION PROGRAMS COMPARED TO PRIVATE PRACTICE

Trends in the choice of material used to repair leather bindings have shifted in conservation labs serving cultural institutions. Leather was once the primary material used but, over time, library conservators began using Japanese paper almost exclusively as a repair material. Comparing private practice to working in an institution, very few clients are interested in minimal intervention; no one wants to just put their broken binding in a box. While the "less is more" approach is acceptable in a lab serving a research library, a client will typically adopt the opposite view. The private practice conservator must balance what the book needs and what the client wants, and often what the client wants is leather.

A great deal of the presentation focused on reversibility. The full method of preparing a leather-bound book for rebacking with new leather has many steps. The process is difficult and can be quite invasive to the original binding; however, one must ask the question, "Invasive compared to what?" Adding a Japanese paper repair adhered over the leather tends to fail by shearing off the grain layer of the original leather. While PVA is commonly stigmatized due to nonreversibility, even water-soluble adhesives are nearly impossible to reverse without affecting the original leather, simply because of the amount of moisture required. In reality, few repairs to a leather binding are actually reversible.

Many of the leather rebacks that we encounter as conservators were completed by skilled binders apprenticed in the book trade, but some were done quickly to avoid the high cost of rebinding in leather. As a result, poor repairs were executed. But conservation professionals should not give up on a repair technique just because it was executed poorly in the past. Great care can be taken to add structural components under the leather reback, including board reattachment or reinforcement through strong textile extended linings, rebuilding broken sewing supports, or board tacketing.

Many books may have no binding left or require a new binding. In those cases, rebinding in a period style requires using tanned leather because it was the most common covering material during many historical periods.

Models of training for professionals in the field have also dramatically changed. The historical model of training bookbinders included apprenticeships for many years. At present, book conservators have to learn many skills in a short period of time and, as a result, less time is spent on craft. Basic skills handling traditional materials appear to be on the decline. It may be that program-trained conservators tend to end up in institutional labs, while bench-trained conservators end up in private practice.

Q: A lot of design bindings and artists' books are bound with chrome-tanned leather. Should chrome-tanned leather be used to repair those bindings?

Reid-Cunningham: I'm not sure if there is a reason that a repair requires vegetable-tanned leather. It's just easier to pare. The appearance of colors and surfaces of mineral-tanned skins are often very different than vegetable-tanned skins, so it could be appropriate to use in those cases.

Q: How do you manage the client's expectations about how the finished treatment will look when repairing with an alternative material like Japanese paper?

Reid-Cunningham: I keep samples on hand to demonstrate how the repair will blend with the appearance of the original. Conservator Christian Scheidemann once said that the goal of conservation isn't to make the object look new, the goal is to make it look like a healthy 40-year-old.

Q: Have you noticed a correlation between the better quality archival leathers and the difficulty of paring?

Reid-Cunningham: Newer archival skins are much easier to pare, cover, and tool than they used to be. The first aluminum-retanned leathers produced in the 1980s were very stretchy.

James Reid-Cunningham, Cambridge, Massachusetts

EMILIE DEMERS
MATERIALS USED FOR THE APPLICATION OF JAPANESE PAPER REPAIRS IN THE CONSERVATION OF LEATHER BOUND BOOKS

Books have historical importance both in the text and the materials used for their construction. A binding can provide a great deal of information about the context of its production, such as the geographical location, the socioeconomic status of the owner, the bookbinder's skill, and common binding practices for the period. Skills in preparing leather for bookbinding allow for a better comprehension of the materials and how they behave under various conditions, which is crucial in book conservation. Although the art of bookbinding and leather preparation is important and still considered in conservation, the large numbers of books in need of conservation treatment have spurred development of many new techniques to create strong and stable repairs that do not require the use of leather. Japanese paper, which is both cost effective and time efficient, has proved to be an effective substitute. As part of its use in a leather binding repair, Japanese paper may be coated with various materials to change the color, surface texture, or sheen. The effects that these coatings have on the physical strength of Japanese paper are unknown.

To investigate this question, a selection of materials were tested on Kurotani #3 Japanese paper from the Japanese Paper Place: Burnt Sienna Golden acrylic paint, Cellugel (hydroxypropylcellulose and isopropanol), SC6000 an emulsion of mixed waxes and acrylic polymers in aqueous isopropanol, and Jade 403 polyvinyl acetate. Samples were made with up to four of these layered coatings, applied by brush.

To observe how these materials affect the physical strength of Japanese paper, a fold endurance test was performed. To test the viability of these coatings over time, two-thirds of the samples underwent up to two rounds of accelerated aging prior to fold endurance testing. One hundred twenty samples were adhered to board with Lascaux 498 adhesive and an ESPEC humidity cabinet LHL-112 was used to age them at 30°C and 65%RH for 18 days. Sixty of those samples were aged again at 35°C and 65%RH for 21 days. A Tinius Olsen model 4C012A tester was used to conduct the fold endurance test.

The results from the fold endurance testing show that, without accelerated aging, each of these coatings increases fold endurance. After one round of aging, the strength of toned Japanese paper without additional coatings was increased, while the fold endurance of all other samples was reduced. After two rounds of aging, all the samples decrease in strength; however, the toned Japanese paper coated with Cellugel and SC6000 had close to the same strength as the unaged sample with the same coatings applied.

Emilie Demers, Graduate, Queen's University

SARAH REIDELL
REPLICATING ORIGINAL LEATHER SURFACES WITH TEXTURED REPAIRS

Sarah Reidell and Grace Owen-Weiss co-created and published a technique for creating textured repair materials in the 2010 Library Collections Conservation Discussion Group (Haun and Beenk 2010, Owen and Reidell 2011). Now referred to as "textured fills," these materials are composed of a thin layer of acrylic media and a repair substrate cast on a silicone mold bearing the negative pattern of a leather or textile surface that matches the original. This method has been successfully employed in the conservation treatment of bound volumes, cased photographs, and objects with leather or other textured components.

Traditional treatment techniques for leather bindings, such as the leather reback, are often invasive. The degradation of modern leather can be influenced by a number of variables outside the conservator's control, such as delays in the supply chain, manufacturing secrets, and changing formulas. Repairs with toned paper are not as durable and can be more difficult to aesthetically integrate with the original leather covering. Textured infill techniques developed for objects and paintings can be very successful, but often require the mold to be made directly on the object; this is not possible on degraded leather bindings.

Commercially available, nontoxic, mold-making kits (such as Smooth-On Rebound 25 platinum-cure silicone rubber) can be used to create a negative grain pattern on leather surfaces. Sacrificial surrogate surfaces are recommended for creating the textured silicone rubber mold to avoid depositing oily residues on original objects. Molds of textures that match materials in your collection can be made and then reused repeatedly in your lab.

To create a textured fill, a mixture of acrylic paints and mediums, matched to the color and gloss of the original object, are cast onto the mold. A support layer of thin mulberry paper or similar repair substrate may be added to the back of the acrylic media. When dry, the newly combined acrylic and paper layer can be removed from the mold. This material can be made at low cost and with little training. It does not require hazardous solvents and is more flexible than texturing techniques using BEVA resin.

Before applying a textured fill to a leather-bound volume, the book must be prepared by surface cleaning, consolidating

degraded leather, and completing any internal structural repairs to stabilize the board attachment. The textured fill is an aesthetic compensation that can complement other primary stabilizing repairs. With this method, like many methods relying on paper or textile, the internal repair materials should be doing the work.

When the book is ready to receive the textured fill, repairs can be prepared in a number of ways. The repair can be shaped by needle puncturing, tearing, cutting, or using a scalpel. Bulky edges can be sanded or pared from the verso to remove excess material and bevel the paper. Repairs can be adhered with either direct wet adhesives or indirect heat- or solvent-reactivated adhesives (Anderson and Reidell 2009). Indirect adhesive methods allow repair materials to be attached in stages, such as adhering over the boards and joints and then going back to complete the turn-ins.

Matching color, sheen, and texture is important for creating a seamless repair; however, matching just two of those criteria can result in a successful aesthetic integration. Careful selection of transparency ratings on the acrylics allow layering of different colors on the silicone mold to create more vibrant and natural colors. Examples of textured fills on a sample binding and boards were distributed to the audience to demonstrate the effectiveness of different combinations that met only two of the criteria (color and sheen, color and texture, etc.) using the "3-ft. rule" of aesthetic compensation, according to which, a repair material matches the original when held at arm's length but is acceptably visible at close distance.

Textured fills are a fast and relatively simple substitute for leather as a surface integration layer for effective structural repairs in bound volumes. They can and should be a part of the wide variety of techniques conservators use to repair bound volumes and other objects with textured surfaces. They don't replace more traditional leather techniques but give conservators a better ability to simply and quickly replicate complicated textures.

Q: Is it possible to cast the mold directly on the book?

Reidell: Yes, but it's very risky! In our experiments, we were unhappy with an oily residue sometimes leftover from the silicone rubber. Caution suggests that surrogates are the best option for now.

Audience comment: I have used a textured fill for a full reback, and experimented with textured fills on different supports, such as Aero Linen and Tyvek. I was able to apply it successfully, but it was stiffer than expected. In future attempts, I would make it thinner and more flexible, and change the number and layers of spine lining.

Sarah Reidell, University of Pennsylvania Libraries

SÉGOLÈNE GIRARD
SINTEVA CUIRS: AN ALTERNATIVE TO CURRENT MATERIALS FOR LEATHER LOSS INFILLS

The disciplines of conservator and craftsperson are intertwined and difficult to separate, as the first restorers of leather bindings were bookbinders. There are many difficulties in working with leather, including unknown materials used in the tanning process, dye bleeding during wetting and covering, hydrolysis and oxidation of the leather, as well as the irreversibility and invasiveness of the traditional method of the leather reback. European conservators are often more likely to choose alum-tawed skin or Japanese paper as a repair material than tanned leather.

BEVA 371 is often used for the conservation of ethnographic materials, developed as an alternative for wax consolidants. Analysis of BEVA has been conducted by the Canadian Conservation Institute (Down et al. 1996) and reassessment of repairs to leather with BEVA have shown positive results (Kronthal et al. 2003). However, BEVA can not be safely applied to a leather binding with heat, as it activates at a higher temperature than the skin denatures.

SINTEVA is a new alternative to leather in development, composed of BEVA 371, glass microspheres, and pigment. A multistep process is used to create thin, textured material. The solution is heated and brushed onto both a sacrificial leather surface and a stretched canvas. The stretched canvas is pressed onto the leather, sandwiching the BEVA mixture between leather and textile, and heat is applied to the verso of the canvas to fully join the two layers. When the mixture has dried and cured, it can be peeled away from each support. This method captures a negative impression of the leather surface, but the texture is easily visually integrated with leather. The material can be cut to shape and pared like leather. Experiments are currently ongoing to evaluate the addition of glass microspheres as a bulking agent and to broaden the range of compatible adhesives.

Tensile-strength testing of SINTEVA has been conducted, comparing unbacked SINTEVA to Tengujo (30 gsm) Japanese paper. Strips of SINTEVA and Japanese paper were adhered to the face of a leather-covered board. The SINTEVA strips failed under less force than the Japanese paper (16 newtons average) but did not break at the site of adhesion. By comparison, the Japanese paper failed at 56 newtons (on average) but tended to tear away the grain layer of the leather. Under tensile double-fold endurance testing, SINTEVA outperformed Japanese paper by approximately 10 to 1, on average.

Creating a leather alternative from BEVA is difficult and can be hazardous for conservators outside of a lab setting. Commercial production of SINTEVA is currently being pursued to offer the finished material for sale. Samples of SINTEVA are available upon request.

Q: Can you clarify the reason for using microsphere fillers with the BEVA? Are the microspheres also functioning as a bulking agent? Are they able to flex across the joint?

Girard: Yes, the microspheres are for bulk and adhesion. The BEVA will not stick with paste, so you need to add fillers in order for it to adhere with the usual rice or wheat starch adhesives. I've just been using them for areas of infill on the board. They are quite stiff, so maybe they are not useful in repairs across the joint.

Q: Have you considered using cellulose powder as a bulking agent?

Girard: Not yet, but it definitely sounds like an idea worth investigating.

Ségolène Girard, Versailles, France

KATHERINE KELLY, DAN PATERSON, SHELLY SMITH
THE FULL TOOLKIT APPROACH TO LEATHER REPAIR AT THE LIBRARY OF CONGRESS

The questions posed in the call for papers for this symposium were provocative. Why should conservators need to choose between leather and alternatives like Japanese paper? Why not use both? There is no perfect treatment; options can be chosen to prioritize cost, time, or other factors. This panel discussed a full toolkit through case studies of past treatments. They described the thought process behind the treatment decisions and evaluated the success of the repair after several decades of aging and use.

Dan Paterson surveyed items from the Thomas Jefferson Library, a collection that was started with a purchase by the Library of Congress in 1815. Thirty volumes that had been treated since the early 1980s were selected for review. After this initial survey, a second round of 22 volumes from non-Jefferson rare collections were reviewed, also consisting of treatments from the same period. Each book was evaluated and assigned a grade of one through five, with one representing a failed repair and five indicating that no other intervention was needed. Included in the sample were treatments completed using leather, Japanese paper, Tyvek, and linen.

Treatments in which the book was fully rebound or rebacked in leather appear to be functioning well, with an average rating of 4.2. Common problems observed include discoloration on the pastedowns at the turn-ins, discoloration of the leather along the spine from light damage, and minor cracking along the joints. Some of the treatments included in this set have smaller, supplementary repairs with textured fills or toned Japanese paper. The textured fills were cast using the same leather and toned to match, and are still functioning well. Some of the Japanese paper repairs have lifted.

Repairs completed with Japanese paper average a 3.4 on the scale. Treatments in which the Japanese paper is adhered over the leather have a higher rate of failure. The repair material may be lifting the grain layer of the leather and is often tenuously attached. Many of the case studies in this group included additional mechanical board attachment methods, such as board tackets, and were also boxed. The rate of failure could be an acceptable trade-off for the time and cost efficiency of the repair. At the current level of use for many of the books in this group, the Japanese paper repair could remain functional for another 100 years.

The last group of historic repairs examined used Tyvek and linen across the joint and scored quite high. The method for application of this repair is similar to board slotting, necessitating the lifting of the original spine. The laminated Tyvek and linen are adhered over the joint, as well as to the thickness of the board edge, and under the pastedown. These repairs are less visually integrated than others, due to smooth surface texture and flaking of acrylic from the Tyvek, but are still functioning well.

Successful case studies using Japanese paper as the primary repair material include cased photographs where the hinge was repaired with toned kozo, and an ongoing project in which hundreds of thin bindings have been repaired using board slotting and laser printing title information and color directly on kozo paper. Recent evaluation shows that the repair is holding up well and the project will continue.

The panel concluded by stating that conservators at the Library of Congress use a great deal of leather in their repairs. The conservation program at the library has a long history, and staff tend to work at the institution for many years. This means that new staff are trained in the standard workflows, and treatment approaches have remained very consistent over time. This does not mean, however, that they are not experimenting with new materials. It is necessary to be curious, take risks, and experience failure to push innovation.

Q: For books rebound in new leather, is the staining around the pastedowns caused by acidic degradation or by migration and oxidation of oil?

Paterson: We haven't done analysis on those volumes to know for sure. But that would be a good question for further research.

Audience comment: Everyone should be labeling the skins as they receive them from the supplier, including the date of purchase. It can be difficult to keep track as you cut the skin apart, but it's important for us to document.

Paterson: The staff at Library of Congress label the skins and keep a sample book of all the leathers to help keep track.

Smith: This is also a good opportunity to make a plug for good documentation practices. We saw a lot of older documentation that did not adhere to good record-keeping practices. For example, a lot of reports just had initials of the conservator on them and did not list suppliers. The more detailed your reports, the more they can inform you later on.

Audience comment: It's nice to see that the training model at Library of Congress is working out. Another technique that was not mentioned is adhering Japanese paper to Ultrasuede to recreate the bulk of leather.

Audience comment: It's interesting that Japanese paper adhered over leather appears to be lifting more than when adhered underneath. We often adhere it over the top to keep the leather from lifting or to make it look nicer.

Smith: We are also sending leather out to be split so that we don't have to pare it as much.

David Lanning: To what thickness are you splitting it? Doesn't that totally take away any strength from the leather?

Paterson: I can't tell you a number off the top of my head, but since there is additional board attachment underneath, we aren't relying on the leather as much for strength.

Katherine Kelly, Library of Congress
Dan Paterson, Library of Congress
Shelly Smith, Library of Congress

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FURTHER READING

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