CONSUELA METZGER, DEBORAH HOWE, & GILLIAN BOAL, MODERATORS

Use of Adhesives on Leather Discussion

Presentations and written contributions by:
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Bibliography by:
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ABSTRACT

This summary of the leather and adhesives discussion group covers the four presentations given, as well as the discussion points. A working bibliography on skin and hide follows the summary as appendix 1. Book conservation concerns were emphasized, but the topic brought together conservators from many specialty groups. Major topics addressed included: combination adhesive systems made from starch paste and synthetic adhesives; Lascaux 498HV and Lascaux 360HV; alcohol-remoistenable mending strips; and unmixed starch pastes. Also included are discussions of working methods for preparing and applying adhesives to new and deteriorated leather and mending strips. Many of the presentations and questions included the interrelated topics of leather consolidation and leather coatings, also of concern to a variety of conservation specialties.

TOBY RAPHAEL: MIXTURES OF PASTE AND ACRYLIC ADHESIVES

Toby Raphael, an ethnographic conservator, started off his talk on adhesives for leather and skin products with a quote from his friend Richard Beauchamp, whose motto was "Choose a simple adhesive and get to know it well."

As it turns out, starch paste applications (an obvious choice for adhesive) are not always strong enough for bonding heavier skin products or joints under stress. Toby has pioneered the controlled use of simple multi-component or combination adhesive systems. By mixing synthetic resins with paste you potentially get a variety of effects: a stronger bond, slower drying time, more plasticity, more resistance to biological organisms, better aging properties, and excellent reversibility—all with less wetting of the substrate. These combination adhesives can be mixtures of wheat starch pastes and polyvinyl acetate (PVA) or polyvinyl alcohol, or wheat starch paste and acrylic dispersions. Formulas that are most useful typically contain 5%, 10%, 20%, and 50% resin to paste. By changing their proportions, these mixtures have a wide range of characteristics useful to conservation practitioners. These mixtures can be useful for bonding untanned , semi-tanned, mineral-tanned, and vegetable-tanned skins. The key to the combination adhesive is that its strength is controllable and therefore can be matched to the materials and objectives of each treatment. Toby repeated Anne Clapp's criteria for a good adhesive: it works for the job at hand, is easy to prepare, has a reasonable shelf life, remains readily soluble, is not subject to insects or discoloration, retains sufficient bond performance and function, and remains acid-free (though this factor may not be as important when we are working with acidic materials to begin with).

An example of a combination adhesive in use since the 1960s is the "mix": a blend of paste and PVA. The idea is thought to have come from England and was pioneered in the U.S. by Bill Minter. Bill originally used a 50/50 CMC (sodium carboxymethylcellulose) and PVA. Since 1978 his "mix" has consisted of 50% PVA, 25% CMC, and 25% wheat paste.

Norbert Baer did a study on a paste and PVA mixture in 1975, with positive results. The U.S. National Park Service (NPS) had the Canadian Conservation Institute (CCI) test the resin/paste mixture using Dura Tech, a PVA equivalent of JADE 403, chosen by Jane Down. Various percentages of the mixes of these resins and pastes were tested for swelling, dissolvability, and reversibility. There was no alteration of dissolvability compared to unmixed

This open discussion took place on June 9, 2003, during the AIC 31st Annual Meeting, June 5–10, 2003, Arlington, Virginia. The moderators organized and led the discussion and recorded notes. Readers are reminded that the moderators do not necessarily endorse all the comments recorded and that although every effort was made to record proceedings accurately, further evaluation or research is advised before putting treatment observations into practice.

wheat starch paste in the 5-50% resin to paste formulas. In general Toby is happy with the function of these mixture adhesives and hopes to have more long-term aging tests done in the future.

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ALAN PUGLIA AND PRISCILLA ANDERSON: SOLVENT-SET MENDING STRIPS

Alan and Priscilla's complete Book and Paper Group talk and step-by-step instructions may be consulted elsewhere in this *BPG Annual* [pp. 3–8] and will not be reprinted here. The abstract prepared for the discussion group is below. Alan and Priscilla restated their formal talk for the discussion group participants and focused on working methods and supplies used. The mechanics of this repair technique for leather-bound books may be usefully compared with the Japanese paper hinge repair detailed in the 2001 *BPG Annual* Board Attachment Discussion, pp. 82–86. Alan and Priscilla distributed a handout and samples of the repair strips to interested participants.

In response to a backlog of items in need of repair, many requiring minimal or simple structural repairs, standard book repair techniques were reviewed for suitability as quick, on-site repairs.

Japanese tissue repair techniques using paste require long drying times, risk permanent darkening and hardening of the leather, and are difficult to reverse without placing the leather at further risk from moisture. Tissue repairs with PVA reduce the risk to the leather and dry quickly, but are irreversible without damaging the leather surface.

This paper presents the development and techniques for use of a custom-toned, alcohol-remoistenable, repair tissue using an acrylic adhesive, Lascaux 498HV. Consolidating the leather with a solution of Lascaux 498HV in alcohol, instead of other less effective consolidants, prepares the leather surface for improved adhesion. The Lascaux-coated tissue allows for quick repairs, generally less than forty-five minutes, which are more readily reversible without endangering the leather. The repair technique is simple enough that it can be performed on site. Although designed for quick, simple repairs, the material and techniques may be applied successfully to more complex treatments undertaken in a laboratory setting.

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OLIVIA PRIMANIS: ADHESIVES AND REUSING DETERIORATED LEATHER

Olivia focused her comments on the effect of an adhesive on the overall structure, function, and color of leather. We may know about an adhesive in its pure state, but specific details about what is happening to a leather coated with an adhesive are not always easy to find. Olivia compared slides of both new and deteriorated leather under magnification and discussed how to evaluate the state of the leather fibers before a treatment begins.

She commented that in recent conversations with Glen Ruzicka at the Conservation Center for Art and Historic Artifacts (CCAHA), she found that book conservators there are saving and reusing old leather on boards and spines much more often than they used to. This means they are reusing aging and/or damaged leather fibers and need to understand the effect different adhesives have on those fibers.

Olivia suggested we take an organoleptic approach, using all our senses as we watch what an adhesive and/or consolidant does to leather, both in color and handling. While Olivia's training and preference in book conservation was to use starch paste on leather, she began experimenting with the acrylic adhesives when they became more prevalent. When a conservator needs to reuse leather in an area where the material will need to move, like the spine or joint of a book, the final flexibility of that leather is key. This flexibility is clearly maintained, in one degree or another, by an adhesive like Lascaux 498HV or 360HV, whereas paste may lead to a stiffening of the leather, in her experience.

While the discussion group examined a slide illustrating the physical role tannins play in vegetable tanned leather, she reminded the audience that water is "the universal solvent." Given that tannins maintain spaces between the fibers of vegetable-tanned leather so it can flex, she worries about what water and water-based adhesives might be doing to already degraded and powdery leather fibers.

Could it be washing out tannins as well as shortening the fibers?

Finally, on the topic of consolidating a leather surface, Olivia has had good luck using Klucel G diluted 2% or less, applying several coats as needed.

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MATT JOHNSON: ADHESION OF NEW LEATHER AS DISCUSSED WITH DON ETHERINGTON

Matt stood in for Don Etherington, who was unable to attend the AIC annual meeting this year. Matt shared Don's answers to a set of questions he and Gillian Boal created. Below are the prepared notes for Matt's presentation. Don's responses to the questions follow.

Q. What have you found to be the most effective adhesive for leather?

A. Rice starch paste

Q. What differences do you find in the use of synthetic versus naturally derived adhesives?

A. Synthetics or mix do not penetrate leather, which causes the leather to be unyielding; you cannot manipulate it well. They also dry too quickly; you cannot work corners the same as with paste. The pulling of boards is less than when using paste.

Q. How (if at all) does your adhesion technique differ with conservation binding as opposed to fine/design bindings?

A. Conservation bindings: If using linen over boards for attachment purposes, I would use a mix, as paste alone does not stick well over Irish linen. Design binding: I paste twice when I need to manipulate over raised areas or with sunken areas. Also, I tend to spend more time on covering design bindings.

Q. What leather preparation techniques/processes affect your adhesive choice, i.e. highly thinned, full thickness, pale toned, calf versus goat, etc.

A. For calf bindings with a smooth spine, I would use a mix of Jade 403 and rice starch or methyl cellulose and rice starch. The important thing is to wet the outside evenly. For goat, I would use paste alone, but on raised bands I will coat the spine first with Jade 403 to get good adhesion close to the bands.

Q. Dampening the leather is generally part of the leather binding process, aiding primarily in the workability of the skin and extending the working time of the adhesive. Are there circumstances where the combination of dampening and the use of certain adhesives is not desirable?

A. Alum-tawed skins should only be lightly dampened on the outside. I generally would dampen the inside of the skin.

Q. Has your approach to leather adhesives changed over your career? If so, how?

A. No.

Q. Outline any humorous and/or insightful anecdotes about leather binding from your career.

A. Always check inside the boards for bone folders before pressing or placing a newly covered book under weights. I did this once on a new binding as I was coming up.

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SUMMARY OF QUESTIONS AND GENERAL DISCUSSION

Testing on Adhesives

A clarification was made as to the adhesives tested by CCI for the National Park Service in 1998: they were paste and the mixture of paste with an acrylic adhesive.

Solvent-Set Tissue Strips Coated with Lascaux 498HV

A clarification was made as to the transparent nature of the paper chosen for the Lascaux board hinging technique. Alan and Priscilla deliberately chose a transparent, smooth, and long-fibered paper, which will be even more transparent after being coated with the Lascaux. They also noted that grain direction was not an overriding concern for the repair paper, since the adhesive inhibits all grain expansion and contraction. They do not typically use heat to activate the adhesive, out of concern for damaging the leather. Sometimes when they are having trouble getting the strips to stick around the bands they do use a tacking iron. There is a Lascaux adhesive (360HV) that activates at a lower heat than the 498HV, but they have not used it, out of concerns that the permanently tacky adhesive might seep out the edges of the exposed mend.

Lascaux 360HV

One discussion participant had used Lascaux 360HV to adhere a Japanese paper lining to the inside of a leather spine and found it remained very flexible. In this treatment context, the potential movement of adhesive would not be of concern.

SC6000

There was concern that the recipe for SC6000 (an acrylic wax sold by the Leather Conservation Centre in England) had changed recently. Participants noted they sometimes mixed this wax with either ethanol or Klucel G to create a thinner leather coating/consolidant. Both Bill Minter and representatives of CCAHA noted using a thinned mixture of SC6000. There has been nothing published on this so far. After the meeting Bill Minter provided a note from his forthcoming (in *JAIC*) review of *Surface Coatings for Leather Bindings* by Betty Haines:

> . . . the old formula SC6000 was replaced by SC7400 in 1996 to meet British Health and Safety Standards. Since then, this new formulation has been supplied under the originial name—SC6000. The new/modified formulation has not been thoroughly and scientifically evaluated. Some practical tests on the new formula were conducted and the results were essentially similar to those determined in the 1979–80 British Library trials using the product having the old name SC6000.

Starch Paste

One participant noted that the two problems associated with starch paste—water and stiffness—could be controlled though proper preparation and use of the paste. Diluting paste with water after cooking was not recommended, as the added water would then not be fully absorbed into the starch. It was recommended that paste be prepared with the desired final viscosity in mind and used undiluted. The member noted that shattering the dried layer mechanically, with stiff brushes or some other implement, could alleviate the final stiffness of a paste film. This will not generally affect the adhesive bond created. Applying a thin coat of thick paste to leather as a size and letting that dry can provide a barrier layer against unwanted wicking of starch adhesive used later.

Relationship of Traditional Bookbinding to Choice of Adhesives on Leather in Book Conservation

Some participants noted that paste was traditionally used on leather in bookbinding to facilitate traditional gold tooling techniques. When tooling is eliminated as a goal, other adhesives serve well to adhere the leather covering to boards and spine. Animal glue was mentioned as a good adhesive for leather when no traditional gold tooling was planned.

Working Methods

A participant noted that in ethnographic work it is recommended that a barrier layer be placed on the material before any adhesive, and that a mechanical treatment solution be considered over an adhesive one. In terms of covering a book in leather, it was mentioned that in a new leather binding or reback, coating both the leather and the book-board surface with paste while working could improve adhesion. When working with alum-tawed skin, moistening the flesh side before using it to cover a book could keep the moisture in the paste from wicking too far into the skin.

Research on Leather and Adhesives

While many book conservators commented on the lack of research in some areas of leather and adhesives, one objects conservator noted that there was a great deal of information to be found in publications dealing with natural history collections. The Step Project in Europe was mentioned as analyzing amino acids in deteriorated leather, but not the effect of leather dressings or consolidants on deteriorated leather. A 2002 study by Betty Haines discusses new leathers and how they react to various coatings, but many of these commercial coatings, like shoe polish, were not ones typically used in conservation. Participants noted that there are research centers for leather conservation in England and in Amsterdam. In addition, there is a group of leather chemists in Cincinnati who have a testing lab for leather research. The AIC group Research and Technical Services (RATS) was mentioned as a good place to take proposed research questions.

Final Thoughts

The discussion group ended with a call for further research on this topic, in order to help conservators make informed choices about adhesives when working with leather. Fortunately, this research need will begin to be addressed at a symposium on leather and adhesives in late September 2003 sponsored by the Folger Shakespeare Library and the Library of Congress. In addition, AIC is sponsoring a leather conservation workshop at the Conservation Center for Art and Historic Artifacts (CCAHA) in November 2003.

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APPENDIX 1: SKIN AND HIDE: A WORKING SELECTED BIBLIOGRAPHY

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