The Conservation of Books: Prescription for Collectors

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbals: The <em>Vade Mecum</em> of the Sixteenth and Seventeenth Centuries</td>
<td>William G. Peacher, M.D.</td>
<td>3</td>
</tr>
<tr>
<td>Four Bachrachs</td>
<td>Bradford Bachrach</td>
<td>14</td>
</tr>
<tr>
<td>The Liechtenstein Music Archive on Microfilm at Syracuse</td>
<td>Don L. Smithers</td>
<td>37</td>
</tr>
<tr>
<td>The Conservation of Books: Prescription for Collectors</td>
<td>Susan Rainey</td>
<td>48</td>
</tr>
<tr>
<td>Open for Research . . . Notes on Collections</td>
<td></td>
<td>59</td>
</tr>
<tr>
<td>News of the Library and Library Associates</td>
<td></td>
<td>62</td>
</tr>
</tbody>
</table>
The Conservation of Books: Prescription for Collectors

by Susan Rainey

When I left for Chicago in mid-July to attend Paul Banks' class on Conservation of Research Library Materials at the Newberry Library, conservation practices in the Rare Book Department were minimal. We had our jugs of British Museum Leather Dressing, a starch paste for applying bookplates, and little more. We didn't even use the leather dressing as regularly as we should have because the crowded conditions in the Rare Book Department and the long drying time needed made this difficult.

The simplicity of pre-Chicago days was demanded by our ignorance of what it was safe to do, both for the books and for ourselves. I had read that a mixture of the organic solvents toluene and hexane would remove most scotch tape, but hazy impressions of the dangers of such solvents precluded using them without more information. We didn't know how to mend torn pages, although we knew we must not use scotch tape, and we could only sigh at deteriorating dust jackets.

My month in Chicago changed all this considerably by increasing my knowledge of book and non-book materials. There we discussed the nature of these materials, criteria for excellence both singly and in combination with each other, and approaches to restoration and prevention of further deterioration. Book conservation is a relatively recent development in the larger field of conservation, but the problem of deterioration is as old as the earliest papyrus. As it applies to materials of our own time, it is related to the

All photographs by Richard Feury.

1 Miss Rainey, Rare Book Cataloger, studied book conservation at the Newberry Library, Chicago, under sponsorship of Syracuse University Libraries during the summer of 1971. The course was presented by the University of Illinois at Chicago Circle and the Newberry Library. Paul Banks, the instructor of the course, has worked as a book designer for the Viking Press, studied bookbinding with Gerhard and Laura Gerlach, worked with Caroline Horton and operated his own binding practice. He was involved in the rescue work following the Florence flood. Mr. Banks is now Conservator at the Newberry Library.

Miss Rainey brought back to Syracuse a knowledge of the methods and procedures described, which are being put to use by the Rare Book Department.
three major physical elements of the book: its paper, its cover and its structure.

Most paper in the incunabular period was slightly alkaline because small amounts of lime were left in the finished paper after manufacture, and a gelatin size was applied to the finished sheets of paper for crispness. Incunabular paper possesses other virtues. Linen rags, the raw materials from which paper was made, were pounded mechanically until they became fibrous masses; the pounding did not break down the fibers but kept them long. These long fibers formed a strong network during papermaking.

All the processes which have been invented since then to increase the output of papermaking and to feed busy presses have not worked for permanence or durability of paper. The reduction of rags to fibers was hastened when a machine with revolving knives was created to break them up by cutting and scraping. This necessarily affects fiber length and paper durability. A method of sizing the fibers even before they became paper was found; however, this procedure was effective only in an acid solution. But the worst was yet to come. When processes were finally found to reduce wood chips to fibers, these processes were so haphazardly used that no two batches were alike. Chemical residues remaining in the pulp from incomplete washing affected the life of the end product as much as did overprocessing which produced a very short fiber and a very brittle paper. When it was discovered

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1. Acidity has caused the image of the portrait to be transferred to the title page. A barrier sheet, not shown, has been inserted to halt further migration of harmful acids.
that paper could be made with a large percentage of unchemically treated groundwood pulp, the nadir of bookpaper quality was reached.

Many different measurements can be made of paper strength. One of the most important for books is the number of times a sheet of paper can be folded and refolded before tearing. Accelerated aging tests can give some indication of the longevities of papers. The harmful effects of indiscriminate bleaching on cellulose fibers, the major component of paper, are known. In the Rare Book Department, a very simple test of the pH of materials showed us that the manila envelopes in which we were storing pamphlets are very acid and should be replaced.² A check on the acidity of all the kinds of paper we scribble notes on proved that they too are highly acid, with the result that we have become less tempted to slip notes on these papers into books and more critical of enclosures we find in books. These we now xerox onto acid-free paper, keeping the originals in envelopes in the file, or enclose in acid-free paper to prevent further transfer of the harmful acids to neighboring pages. Excess acid in paper produces brittleness and a decrease in folding strength even to the point where a page breaks as you are turning it.

Bookbinders have for years washed and bleached the leaves of a book before rebinding, but this was done without precise controls over the processes and without more than word-of-mouth information on the effects of the processes used. Now the long arm of science is reaching out, and washing is accompanied by pH testing and usually by deacidification.

Paper such as newsprint made from groundwood pulp darkens on exposure to light and, being highly acid, becomes brittle quickly. When used as a foundation for coated papers, it is more stable because it is protected from light and acidity by the alkaline clay coatings applied to the surfaces of the paper. The problem is not that wood pulp paper is automatically inferior to rag paper, but that the permanence and durability of both kinds of paper are affected by the chemicals remaining in them as well as by their fibers. The advent of the use of wood pulp only coincidentally resulted in papers that now crumble at a touch—papers whose aging, it must be admitted, is accelerated in our well-heated homes and libraries. (British libraries have not yet experienced the brittle book syndrome, and this may be because their temperatures are about 10° cooler than those of American libraries.)

There is no quick cure for deteriorated papers. Deacidification, at present a complicated process, is essential and sometimes sufficiently effective in restoring utility. A book must be disbound and the leaves soaked in water solutions of chemicals which precipitate minute amounts of alkaline solids around the fibers of the paper until a satisfactory pH is reached.³ Then the book is dried and reassembled. Because of the amount of material needing deacidification, processes are being sought which can be applied to a bound book, but no wholly successful one has been discovered as yet.

²pH indicates the scale of acidity to alkalinity running from 1 to 14, 7 being neutral.
³This is a much abbreviated summary of the Barrow process.
Following deacidification, extreme cases of brittleness may then require lamination of the leaf between sheets of cellulose acetate. Sometimes sheets of Japanese tissue are placed on either side of the leaf to provide additional folding strength. Lamination increases the size of a book so that it cannot be returned to its original binding. Neither deacidification nor lamination are processes for amateurs, and the use of home lamination kits should be avoided for treating material with permanent value.

A few general words about transparent plastics, which may also be encountered as wrappers around books, may be helpful. Mylar, polyethylene and cellulose acetate in the form of Lumarith-822 all appear to be stable. Cellulose nitrate, polyvinyl chloride (as in shower curtains) and Saran wrap are unstable and even highly destructive because they liberate damaging compounds. An easy test for determining the presence of cellulose nitrate may be made by igniting a small piece of the suspected material: if it continues to burn with a yellow flame after the match is removed, the substance is cellulose nitrate and should be discarded immediately.

We no longer treat leather bookbindings in the Rare Book Department with British Museum Leather Dressing, which is a combination of oils and wax in hexane. Instead, we use a combination of neatsfoot oil and lanolin which is simpler and more pleasant to use. It is impossible to apply too much of the oil mixture to the leather (although on half- and quarter-leather bindings the oil may bleed onto the non-leather parts of the binding and prove very difficult to remove); any excess can be wiped off when polishing after 48 hours. The wax in the British Museum Leather Dressing, if applied in any excess, not difficult to do, often takes a week or more to dry before it can be polished and the book shelved without danger of sticking to its neighbors. Furthermore, working with hexane fumes is a health and safety hazard.

Before applying the oils, the leather is dabbed with a solution of potassium lactate. This is even more important than oiling because it prevents the chemical destruction of the leather, which absorbs sulfur dioxide from the air and converts it to sulfuric acid, a phenomenon called red rot, manifested by a red powder appearing first at the areas of wear such as headcaps and joints. Caroline Horton’s book, Cleaning and Preserving Bindings and Related Materials (Library Technology Program Publication No. 16, American Library Association, 2nd ed., 1969) gives formulas, suppliers and excellent directions for the treatment of bindings, and cannot be too highly recommended.

One of the most permanent and durable of all bindings is vellum. Limp vellum bindings require no special care, although vellum over boards needs a stable humidity to prevent permanent warping of the boards as the vellum stretches and shrinks with changes in humidity. Cleaning by rubbing with a Pink Pearl eraser is occasionally necessary. Water and water solutions should be avoided.
2. Early stages of red rot: cracks in the hinge area.

3. Wiping a leather binding with a solution of potassium lactate.

4. Oiling a volume.
5. After 48 hours of oiling, the upper half of this volume has been polished.

6. Cleaning a vellum binding by rubbing with a Pink Pearl eraser. It is very important to be sure that all eraser crumbs are removed when cleaning is completed.

7. A half-cleaned vellum binding. The dots along the spine are the thongs to which the signatures are sewn and which are laced through the cover.
Binding structures are very important to the permanence and durability of a book. First, only materials known to be permanent and durable should be used. Last, the resultant binding should relate stylistically to the book it protects, both in structure and historical period. In the middle come all the decisions about the value of the present binding. If the current binding is to be restored, then even though all the parts must be removed and strengthened or replaced, no major adjustment of the structure can be made. If the spine of the book was originally sewn on three horizontal cords, it cannot be resewn on two, or on tapes. In many cases, the binding will not be worth the work of restoration, and the old binding should then be analyzed for its successes and failures in protecting the book. If the front cover is detached, the book may need to be sewn on more and stronger cords or tapes. The choice of cords, tapes or alum-tawed thongs and of the way the thread sewing the gatherings together is wrapped around the cords, tapes or thongs results in greater or lesser support of the spine as it bends and thus is critical to the success of a binding. These choices are best made by an experienced binder. Sometimes grooves are sawed into the spine so that the cords are recessed and do not protrude. This practice is often found on books sewn on too few cords; the leather may not be attached to the spine and hence does not add resilience to it. Books with recessed cords need not be weak, but the necessity to cut into the spine seems to violate the integrity of the book.

The case binding is the one encountered most frequently, and it tends to be flimsy. The main connection between the book and its binding is a strip of thin cloth called super which is glued to the spine and to the inside of the covers. The endpapers pasted over it help to hold it in place. A book bound in this way tends to sag out of its binding and to become loose. Sagging and looseness can be remedied easily by delicately inserting a knitting needle dipped in polyvinyl acetate adhesive Jade #403 into the joint area, withdrawing it and clamping the book in a press. Too much adhesive on the needle will glue down the spine which is not good unless it was originally planned that way. Mrs. Horton gives very clear instructions for this procedure in her book.
Little work has yet been done on the relative merits of various structures. The earliest bindings tend to be the most durable and more recent ones increasingly less so. Perhaps the low point of modern bindings is the Class A library binding, in which the book is trimmed at the spine so that no folds remain. Then the leaves are fed in small batches into an oversewing machine which stabs them as much as 3/8" into the gutter. The resultant binding is quite durable, and especially satisfactory when inner margins are wide, but when it breaks down as all bindings eventually do, all that remains is a pile of loose leaves fit for nothing. The Class A binding is as murderous as any that can be inflicted on a book.

9. The book on the left was printed in 1548 and bound soon after. The book on the right, printed in 1850, has a Class A library binding. Note the difference in the ways the books lie open.

One of the most interesting results of the Florence flood of 1966 is a developing concept of a conservation binding. It was discovered that the books which were least damaged in the flood were bound in limp vellum. There seem to be two reasons for this. First, the alkalinity of the vellum protected the paper. Second, very little glue is needed in the preparation of a vellum binding. Thus a fundamental source of deterioration is avoided, as it is the removal of old glue from the spine of a book which makes necessary much mending of the leaves before rebinding can proceed. Should the old cover become worn, a new one can be prepared in about ten minutes and the book simply unlaced from its old cover and relaced into its new one. It is also economical because the major investment is in the structure of the spine; however, it is not esthetically suited to all books.

Perhaps the single most important factor in prolonging the longevity of books is the creation of a favorable environment for them. This includes storing them at the lowest temperature comfortable to the user, removing from the air those gases which combine with the moisture inherent in book materials to form acids, and filtering ultraviolet rays from sunlight and fluorescent light.
10. The covers of the bottom volume, 25 inches tall, are both detached. The book was sewn on five recessed cords no thicker than the cords of the top volume, which are inadequate for the weight of the larger volume. The next pictures show details of these three volumes.

11. A closer view of the spine of the top volume in Illustration 10, showing how the sewing thread is wrapped around the cord. The covers are still firmly attached although the covering of the spine has fallen off.
12. The middle volume in Illustration 10 is sewn on split alum-tawed thongs. The double welts on the outside of the spine thus reflect this inner structure.

13. The bottom volume in Illustration 10, showing the disintegration of binding structure and materials. Both covers are detached because the cords holding them to the book were inadequate. The leather has deteriorated into red powder and fallen away in areas of abrasion, such as over the fake bands. The headcap also is detached.
The conservation of books becomes increasingly complex as investigations into the structure of their materials proceed. The collector need not concern himself with these investigations directly, but should take advantage of them by finding binders and conservators in the forefront of their profession. Membership in the International Institute for Conservation of Historic and Artistic Works is one indication of commitment to the advancement of knowledge in book conservation; publication in its journals is a better one. Binders interested only in the craft aspects of binding should be avoided; craftsmanship is essential, but not more so than a thorough understanding of all the aspects of the materials used.