

Water Damaged Books: Washing Intact and Air Drying—A Novel (?) Approach

ABSTRACT

In 1995 the University of Maryland suffered a small water disaster that resulted in 250 rare books being soaked. The books were frozen and, eventually, vacuum freeze-dried, but many of the eighteenth- and early nineteenth-century volumes were left with stained and unusually brittle leaves. The proposed treatment was to wash the books to remove the stains and return the leaves to their pre-disaster flexibility. Usually a book in this condition would be disbound, treated, mended, and re sewn. However, since the sewing in many of these volumes was intact, I reinvestigated a treatment I had used many years before—washing a book intact. The books were submerged in recalcified water while being suspended from a thin metal strip. The water was changed a number of times and there was a final wash with magnesium bicarbonated water to buffer the paper. The book was drained, pressed by hand, and gently reshaped. The book was then dried using a modified interleaving technique. Groups of pages were carefully opened and an interleaving material made from polypropylene and cellulose fiber was inserted. The book was then set up in a “wind tunnel”: a window fan drew air through the flutes of the corrugated board that surrounded the text block and dispersed the moisture as it wicked out through the interleaving material. The results were excellent and the time spent on each was minimal, compared to the time required for the usual procedure of pulling, treating, mending, and re sewing.

When this paper was being discussed for presentation at the Annual Meeting session for the Book and Paper Group in 1999, I do not recall why we called it ‘Novel?’ I guess it

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was because as conservators, we are always looking for new and different ways to deal with problems that we encounter. The idea of washing a bound book is not new—a few other binders, as well as myself, have tried this. A water disaster at the University of Maryland gave me an opportunity to further investigate the idea of washing and deacidifying a bound book. This paper will discuss the techniques that were used and offer some additional suggestions.

My first such treatment of a bound volume took place in 1988 when I was confronted with a darkly stained, yet solidly bound Norwegian Bible. At the time, I felt that the book needed a bath, as well as deacidification. The thought of washing a bound volume did not seem that unusual as books are, unfortunately, caught in floods. Obviously, if a book can survive a flood in the first place, it can certainly handle a controlled water immersion.

In my first treatment of a bound volume, the damaged cover was removed. Also removed were any loose sheets at the front and back of the text block—these were treated separately. The text block was suspended on five strips of thin aluminum (0.020 in. x 1.5 in. wide) that were held with thread from a wooden dowel. The whole assembly was then placed in a five-gallon bucket of water. After numerous changes of water and a final bath in magnesium bicarbonated water, the book was removed. As the book was being pressed by hand, it was gently reshaped (rounded). The book was then taken to a facility where it was frozen and then vacuum freeze-dried. The dried text block was then treated in the normal manner and placed back in the original cover.

In 1997 I received a call from the University of Maryland to examine about 250 eighteenth- and nineteenth-century leather-covered books that had been damaged by a burst water pipe. When the disaster was found, the wet books had been immediately boxed and placed in the university’s freezer. Some months later, the books were sent to a vacuum freeze-dry facility. Upon their return, the staff found some typical damage; howev-

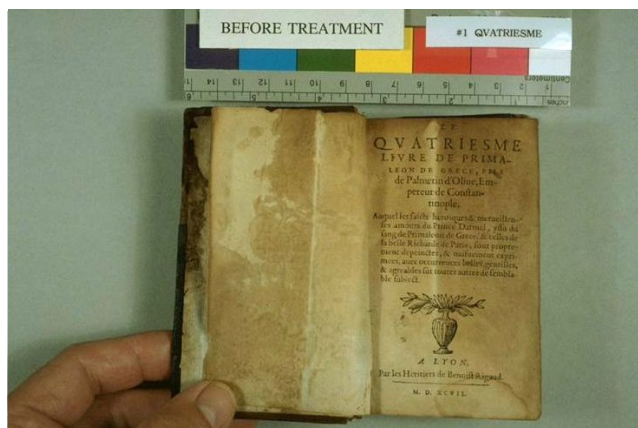


Fig. 1. Tidelines and brown stains in water-damaged book following freezing and vacuum freeze-drying

er, they also found multiple tidelines and severe brown stains, many of which seemed to be scorch-like in appearance (fig. 1). Since the leather covers were brittle, cracked, and chipped, I was asked to wash the books and rebind them. Of course, this would normally entail disbinding to wash the individual sheets, mending and guarding, as well as resewing before covering. However, since the sewing was intact on a majority of those books, I felt that this would be a good opportunity to reexamine washing a bound book. After discussing the concept, I suggested taking one volume for a trial test.

The basic procedure was to remove the covers and any loose leaves. The spine was cleaned using wheat paste and methyl cellulose. A hanger was made from a thin strip of stainless steel, .020 in. thick by 1/2 in. wide, that was suspended from a wooden dowel by stainless steel wire. The text block was opened to the center where it was hung on the strip. The text block was then slowly and carefully submerged in recalcified, deionized water. Upon immersion, the text block would wet and immediately began to fan out (fig 2). After a period of time, the water was drained and refreshed. Occasionally, the text block was gently lifted from the water to assist in the washing (fig. 3). When I felt that washing was complete, the water was replaced with magnesium bicarbonated water. After a half-hour bath in magnesium bicarbonate, the text block was removed from the hanger. It was then placed between two sheets of binder's board and reshaped, as well as pressed to remove the excess water. More water was removed by placing it in a lying press.

When the test book was being treated, the interesting part came when it was time to dry the book. Since I am now living in rural Pennsylvania, I did not have immediate access to a vacuum freeze-dry facility. Therefore, as they say, "Necessity is the Mother of Invention," and I realized that I could try a technique that Carolyn Horton had used for the Corning Museum flood in the 1970s. She had



Fig. 2. Sewn text block fans out when suspended in the water bath

interleaved the wet books with long strips of paper. As the paper became wet on one end, it was shifted; hence, the dry end was inside. Fans were used to speed evaporation. My idea, with an added twist, was to use a material, such as a blotter or something equally absorbent, that would extend beyond the head and tail of the volume.

As I tried various materials to wick the water out of the book, I came to realize that certain requirements would be needed: (1) the material had to remove the water as easily as possible; (2) the material had to be thin, as I would want to insert numerous pieces into the text block (I did not want to endanger the binding); (3) the material had to be easy to handle, as one hand would be required to hold open the wet text block, while the other hand inserted the material; and (4) the material had to remain flat and not cockle excessively. Therefore, the ideal material had to be absorbent, thin like paper, somewhat rigid, and remain flat even though it was wet in only one area. Thin blotters, such as those that are .010 in., were too thick; paper towels were too bulky, and paper itself was not sufficiently



Fig. 3. Text block is gently lifted from the water bath

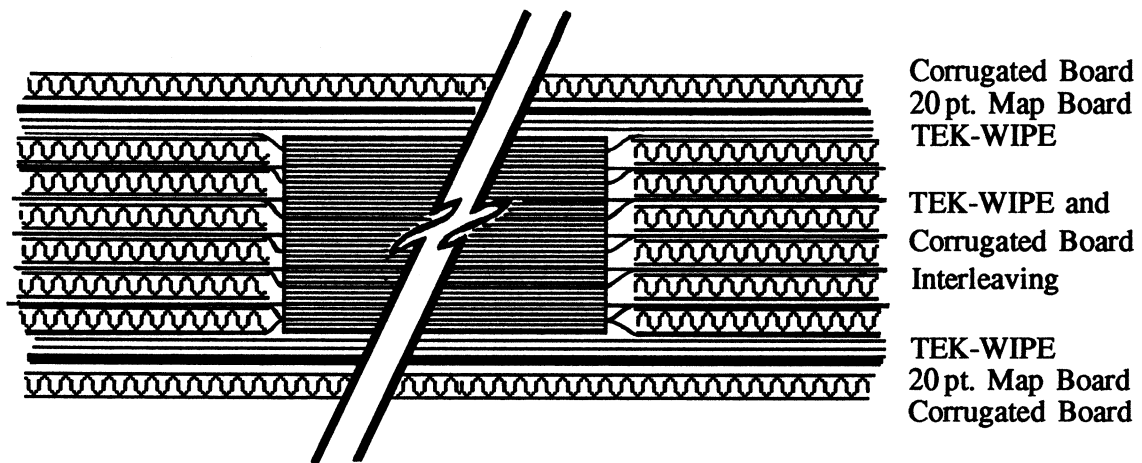


Fig. 4. Schematic of the drying stack (as viewed fore edge on). Flutes of the corrugated board all run perpendicular to the spine of the text block.

absorbent. Other materials such as those used for chemical spills were tried, but there were some concerns with dyes.

With the help of Museum Services Inc., we found a towel that is used in the computer industry, called TEK-WIPE. White and residue-free, absorbent, it is strong and somewhat rigid; it retains its shape when wet in one area, and above all, it is thin—only .005 in. thick. It is made of entangled cellulose and polyester fiber. Another nice thing about this material is that it is relatively inexpensive. TEK-WIPE is available in a variety of sizes from 9 in. x 9 in., 16 in. x 16 in., and up; it is also available in rolls by special order.

The books from the University were typically 5 in. x 8 in. in size, so the TEK-WIPE was cut to 8 in. x 16 in. A piece of this material was then inserted into the wet text block at intervals of about every eighth inch. The size of the material allowed for an overhang at the head and tail of about four inches. Some of the material also extended beyond the fore edge. Two extra pieces of TEK-WIPE were placed at the front and back of the text block. The fully interleaved text block was laid on a piece of 20-pt. map folder stock, as well as on an 8-in. by 16-in. piece of acid-free corrugated board with the flutes of corrugated board running perpendicular to the spine of the text block. With the text block interleaved, smaller pieces of corrugated board were inserted between the various extensions of the TEK-WIPE. At this point it needs to be emphasized that all of the flutes of the corrugated board are running perpendicular to the spine (fig. 4). One needs to use some judgment at this point because the corrugated tends to be thicker than the spacing of the interleaving. In other words, one piece of corrugated might be placed between two sheets of the TEK-WIPE (note: sometimes, we

removed the upper surface of the corrugated to assist with airflow, see figure 5). When the spaces are filled, another sheet of 20-pt. map folder and 8 in. x 16 in. corrugated were laid on top. The completed stack was now uniform in thickness. Since the spine was the most exposed portion of this block, I decided to add a moistened pad of cotton batting cut to size along that area. It was held in place by another piece of TEK-WIPE that was wrapped around the spine.

Then the whole assemblage was placed in a sort of wind tunnel. This was constructed of corrugated board with a standard box-style window fan set into the end (fig. 6). The other end was somewhat smaller where the text block would be placed. The window fan was arranged to 'pull' the air through the tunnel and the corrugations, rather than trying to push the air. The fully interleaved text block was laid at the smaller end of the wind tunnel; a heavy

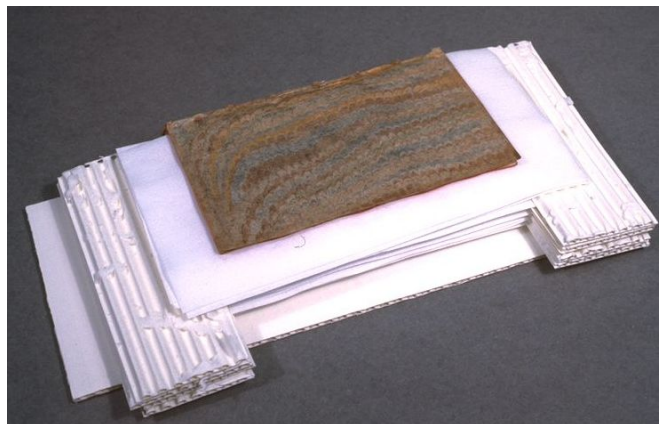


Fig. 5. Drying stack: the upper surface of the corrugated board has been removed to facilitate air flow



Fig. 6. Wind tunnel for drying the interleaved book. Box fan at the back is turned to *pull* air through.

weight about the size of the book was placed on top. Voids were stuffed with a soft, closed-cell foam and a sheet of polyethylene sheeting was used to seal the tunnel except where there was corrugated board (fig. 7). With the fan set on 'medium,' the text block would stay there until it was dry.

According to records, most of the books returned to their normal 7% moisture content within five days. This was determined with a moisture meter, as well as by weighing the volume before and after treatment. However, the weight was less of a factor because of the removal of the junk from the paper. When dry, all the text blocks were nicely clean and deacidified. Most of the paper was acceptably flat; however, there were a few books that required a little extra persuasion. This was done with thin sheets of .020-in. thick stainless steel wrapped with a TEK-WIPE. These were randomly inserted throughout the text block and it was placed in a nipping press.



Fig. 7. Polythene sheeting and close-celled foam seal the wind tunnel around the book

Some other ideas that were tried involved a pre-wash with 50/50 alcohol/water to speed the wetting. This was done on as few of the twenty-five books that were treated. We also tried a similar 50/50 solution as a post-wash. It is interesting to note that the book would dry within forty-eight hours.

Another idea was to try to resize the paper, either with a 1% solution of 15C methyl cellulose, or with Klucel G in alcohol. This was not tried on the client's books. However, we did try this idea on a discarded book that had similar characteristics, and the results were satisfactory.

To finish the books, we extended the existing cords with linen thread and new endsheets of handmade paper were sewn-on. Japanese paper and unbleached cotton muslin were attached to the spine. New boards were prepared and these were temporarily attached to the muslin. The book was then covered with a specially prepared cotton muslin. This fabric was sized with a 50/50 mixture of methyl cellulose and wheat paste, to which liquid acrylic artists' paints

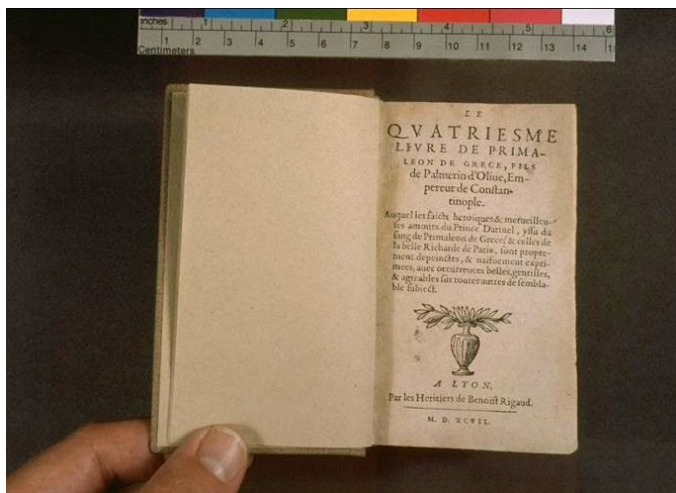


Fig. 8. Water-damaged book after treatment

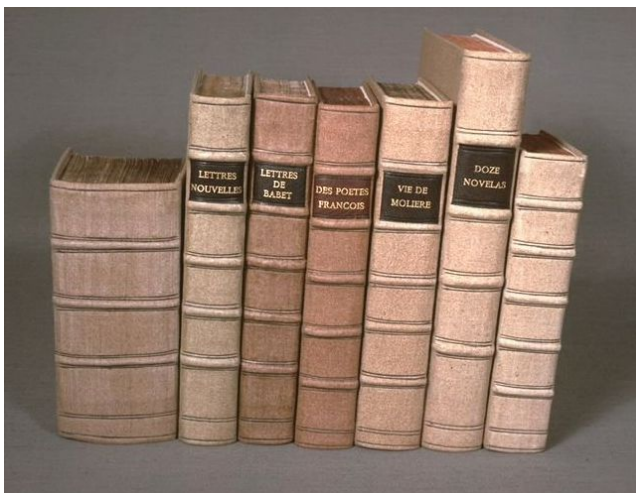


Fig. 9. Treated volumes rebound in cotton muslin

had been added. This special cloth was easily molded over the raised bands. Upon completion, a gold stamped leather label was attached to the spine between the raised bands, and blind tooled lines were added. To enhance the appearance of the raised bands, black carbon-paper lines were tooled along the sides of the raised bands.

Due to cost and time constraints, only twenty-five of the more than 250 volumes were treated in this manner. The end result was a series of aesthetically pleasing books that were clean, stable, and useable, and bore minimal traces of their disastrous water damage (fig. 8). While these books were covered in cloth, they will be quite compatible with the leather bound volumes in the collection for the University of Maryland (fig. 9).

MATERIALS

TEK-WIPE (actual name: Hi-Tek Wipers, item: HTW-DT)

TEK Products

800-783-4944

<www.tekproducts.com>

Stainless Steel Strips and Wire (strips: the actual material is a “feeler” gauge, cat no. 2083A34)

McMaster-Carr Industrial Supply

<www.mcmaster.com>

BILL MINTER

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