GLEN RUZICKA ANNE DOWNEY ROLF KAT ANNA YATES KRAIN

A Yemenite Taj: A Case History in Cooperative Book Conservation

INTRODUCTION

In 1991 the Annenberg Research Institute* asked the Conservation Center for Art and Historic Artifacts to prepare a condition report and treatment proposal concerning a manuscript book, a Yemenite Taj (fig. 1). The main objective for treatment at that time was to make the book more accessible to researchers. Little information accompanied the book. It was believed to be a nineteenth century printed bible containing the first five books of Moses. The book was rebound in the beginning of the twentieth century in a quarter leather and cloth hard cover. The hardcover was partly detached from the textblock and the spine was glued up heavily with animal glue. Most leaves had suffered water damage along the gutter leaving the paper without strength and very pulpy (fig. 2). Some pages were also loose. It was hard to open the textblock without doing damage and creating losses to the leaves. The initial treatment called for disbinding and non-aqueous deacidification, with an option for either foldering and boxing the leaves, or encapsulation of the leaves and then post binding.

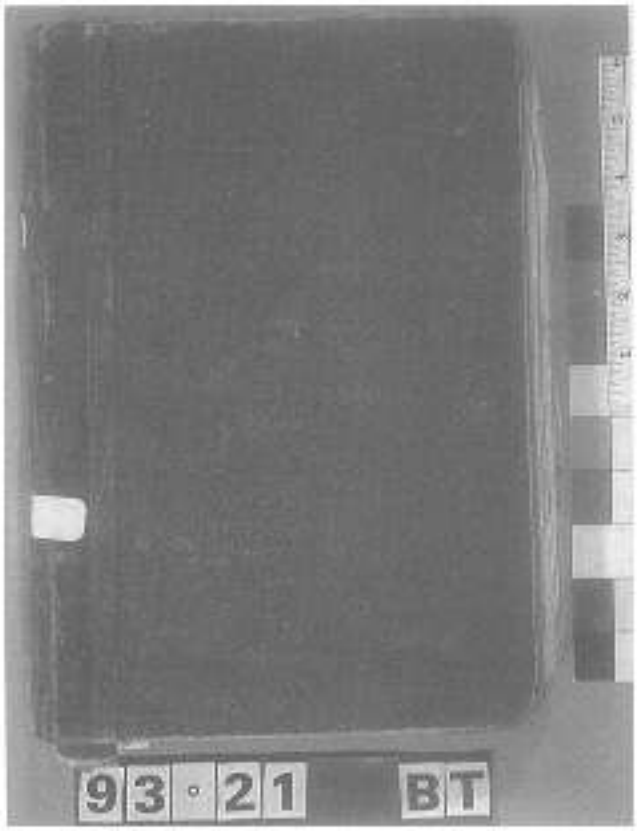

Fig. 1.

The book returned with the condition report and treatment proposal to the Annenberg Center. The next year (1992) an Annenberg researcher identified the book as one of the world's most important specimens of late medieval South Arabian Hebrew manuscript writing. Among its distinctive features are the "peh-lefufah", the characteristic feature of the Ben Asher school of Masoretes, the scribal tradition of the bible which was maintained intact in Yemen even after it had been lost in Europe. The colophon bears the date of 1509 and is signed by the scribe, David ben Banayah ben Saadiah, of the famous Benayah family of Yemenite scribes. The text is also intricately decorated.

The client chose the encapsulation option and the book was returned to the Conservation Center in the spring of 1993.

In light of the 1992 research a re-examination of the object was warranted. The knowledge of its importance changed our perspective of what kind of treatment this manuscript should receive. After testing, it was decided that encapsulation was not a good solution for the manuscript and it should be conserved to the fullest extent possible. This would mean to strengthen and repair the leaves and rebind the manuscript in a new soft board leather binding.

DISMANTLING THE TEXT—ROLF KAT

The first step in the conservation was the removal of the hard cover binding followed by the separation of the sig-

Fig. 2.

natures and subsequently the leaves. As mentioned before, the leaves were severely damaged along the gutter. Turning leaves back and forth to find evidence of sewing or of signatures would have done irreparable damage to the felty paper. In book conservation, when dismantling a textblock, it is common practice to cut the sewing thread and then to soften up the adhesive layer on the spine using a poultice of methyl cellulose or starch paste. When the adhesive has softened sufficiently the excess adhesive is removed, usually by scraping. The signatures are then carefully separated. On this textblock, however, the animal glue on the spine was quite thick (up to an 1/8 inch) in places. Signatures could not be identified due to the felty paper in the gutter. It was therefore decided to remove the adhesive layer dry by cutting the glue off using a scalpel. If the adhesive could be cut as close to the glue as possible without too much paper fiber loss, there would be a chance that some evidence of the original structure of the signatures could be saved. This would be helpful in recreating the original book structure.

During the adhesive removal it was found that the book was "repaired" with a common book binders method. Three slots had been sawn into the spine of the textblock and hot animal glue was spread over the spine and cords were inserted into the slots. After the adhesive was removed the text was much more accessible and the textblock could be opened much further than before. Two places were identified near the beginning of the textblock that showed evidence of folded folios. From these two findings it was calculated that each signature consisted of five folded folios.

It was now important to find the middle of each signature because there would be most evidence of a fold with minimal loss of paper caused by the adhesive removal. One might even find sewing thread. Every time the calculated middle of a signature was opened there were signs of fully folded leaves and sometimes even some evidence of underlaying leaves partly connected. After all the signatures were separated the signatures were folded closed and laid down in sequence. What was striking now was that each signature was marked in the upper right corner with Hebrew characters. These Hebrew characters turned out to be Hebrew numbers (fig. 3). The fact that the numbering of the signatures was discovered after dismantling and not before (in part due to our inability to leaf through the book more easily) would not have altered the adhesive removal procedure due to the spongy gutter and the end result would have been precisely the same.

PAPER ANALYSIS AND TREATMENT PLAN—ANNE DOWNEY

As previously mentioned, the treatment for the Taj textblock originally called for non-aqueous deacidification and encapsulation of the text leaves. Closer examination and rigorous testing revealed that a more aesthetically sympathetic and chemically stable treatment could be achieved.

Initial examination of the text block was conducted. The text paper was hand made, had rounded corners, and was burnished with a moderate degree of sheen. The paper was unevenly formed throughout the body, but was generally

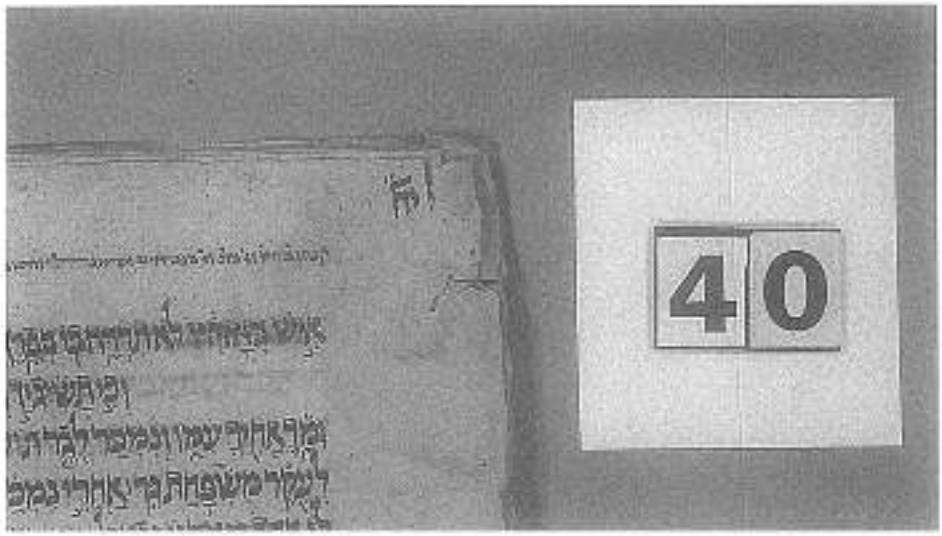

Fig. 3.

about 4 mils thick. The leaves of the text were severely degraded and pulpy along the gutter, with significant loss. The paper was weak, limp, and had a very soft and spongy hand. There was also severe discoloration and overall staining. Microscopic examination yielded some clues to the manufacture of the paper. In addition to the burnishing that is typical of Middle Eastern papers, fine raised striations, or laid lines, were apparent, suggesting that the paper could have been formed on a fine grass screen. Chain lines were not visible. Examination of the fibers with a polarizing light microscope revealed that the paper was composed of very long and fine flax fibers. The fibers were not at all macerated, suggesting that linen rags were retted or fermented, and not stamped or beaten, to produce discrete papermaking fibers. Traditionally, Middle Eastern paper fibers were stamped after retting. This fibrillation process increases the inter-fiber bonding, and ultimately achieves hardness and strength over the full sheet. Fermentation alone, as found in the Taj paper fibers, created less inter-fiber bonding, yielding a soft paper that was almost felt-like to the touch. As there is little source material on the manufacture of Middle Eastern papers, the rationale for the historic need and use of this soft paper remains a mystery.

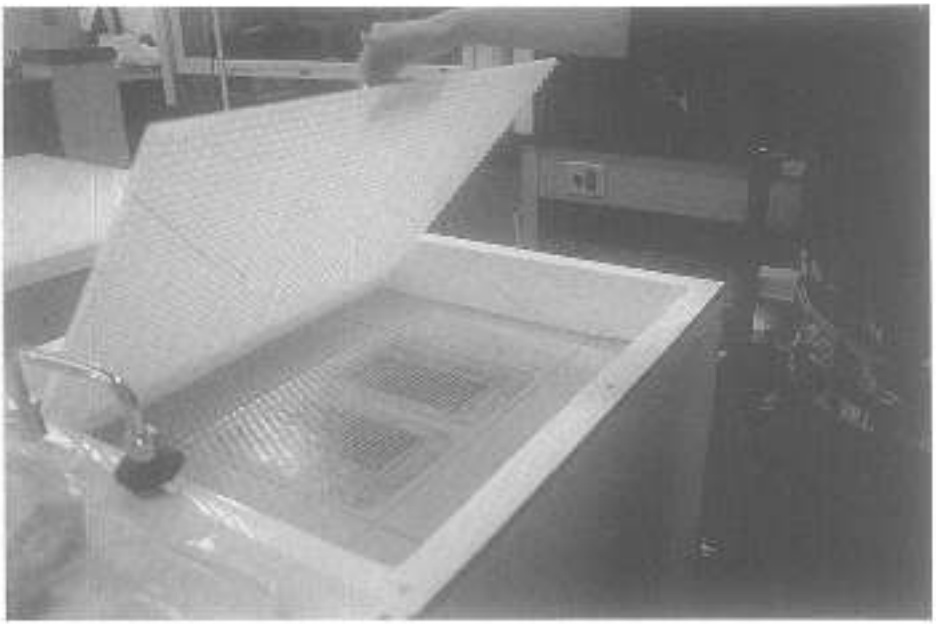

Fig. 4.

The Taj text appeared to be carbon black ink. An unusual white crystalline deposit was clearly visible on most of the ink surface. The deposits detracted visually from the elegant script. Although visually disturbing, it was important to determine whether these deposits were an integral component of the ink. If so, complete removal of these deposits during treatment would destroy historic evidence significant to this rare text.

In reformulating the treatment plan, washing was considered a preferred stabilization system over non-aqueous deacidification. The paper and ink were carefully tested to determine if this would be an appropriate treatment step. Initial spot testing of the paper support indicated that the burnished sheen and the screen impression would not be diminished by water immersion. Further full leaf testing indicated that drying against a tightly-spun polyester web support would effectively retain the sheen without disrupting the screen impression.

Testing the ink for immersion washing also presented a complex problem, in part due to the presence of the white crystalline deposits. Initial testing indicated that water, ethanol, and mixtures of the two would visually reduce the appearance of the deposits. Although this reduction would be desirable from an aesthetic standpoint, as mentioned earlier, removal of the deposits could be considered detrimental to the historic integrity of the ink. Using the x-ray detector of a scanning electron microscope, the components of the ink sample were evaluated before and after washing. It was concluded from this analysis that water immersion would yield an insignificant and acceptable weight change in all elemental components of the ink.

Testing, as well as consultations with colleagues, brought us to the conclusion that a full immersion washing of the text leaves would be desirable. The next challenge was to find a suitable method of filling the very pulpy gutter. Inserts were rejected as too time consuming; multiple layers of new paper would have to be built up on every leaf in these thinned areas. It was decided that leafcasting would be the most appropriate method for filling the loses to the paper. This method would achieve the dual effect of depositing pulp where there was a complete loss and also where the gutter was thin and pulpy. Abaca half-stuff, or partially beaten Abaca pulp, was chosen for the new fiber. Abaca is a bast fiber, like the linen rag of the Taj, yet would produce a softer paper than commercially available linen half-stuff. It was important to remember that the paper of the Taj was solely retted, a process that produced a distinctly soft paper. We wanted to match this soft quality with the new infills, and to produce a sound full sheet.

PAPER TREATMENT—LEAFCASTING—ANNA YATES KRAIN

In theory leafcasting could be likened to a Chinese stir-fry: turn on the heat, throw in all the ingredients, toss until done and serve immediately. Preparation prior to cooking or casting is the key to success. First a sample of pulp was cast to determine the slurry concentration. A working solution of 4 grams of dry pulp to 1,000 liters of water was determined. These calculations along with the calibrated thickness of a page were entered into a video digitizer computer program. Each folio was then scanned to find its missing mass. After this fig. was calculated, the amount of pulp needed was cut, weighed, and hydrated. We were working with dry sheets of half beaten Abaca that were soaked overnight and further beaten in a blender. At this point the bucket of soaking pulp turned into a garbage pail of floating fiber ready for color. Water dispersed pigments were used with a retention agent to tone the fibers. Eventually the "Taj color" achieved its final rinse and the bulk of the pre-casting preparations were done.

The folios were sprayed with water and humidified between sheets of Mylar before going into their calcium enriched bath. The immersion was no longer then 30 minutes prior to casting. A tremendous amount of discoloration was released so a quick soak in a second bath was needed just before transferring the object onto a Remay support. The casting tank was bottom filled to about an inch above the grid support, which consisted of a metal egg crate covered by two screens. The object was laid on top of a Mylar window which masked out the area to be filled (figure 4). Another Mylar template, which outlined the final dimension, was placed over this to help position the folio according to its placement within the signature. At this point the small amount of water used to maneuver the object was removed by briefly turning on the suction, then a rubber brayer was used to expel any air from inside the casting area. The Mylar template was taken away and any bubbles remaining in the borders were pounded out with a vegetable brush similar to a nail scrubber. This is a very important step because bubbles can prevent the deposit of fibers, leaving holes instead. A plastic egg crate was laid on top of the object and the tank was top-filled. Bottles of water were used to weight down the crate. A beaker was placed under the faucet to temper the water flow. When the level of water was at least 3 inches above the crate it was time to cast. The prescribed amount of slurry was measured and blended again with additional water. The weights were then removed. Keeping one hand on the crate, the slurry was poured into the tank and agitated with the other hand. After a few seconds the suction was turned on, the crate was lifted and all you could do was hold your breath and watch it work.

A successful cast will look full and fluffy (fig. 5). The pulp will be higher than its host until a series of gentle pressure and slow drying techniques bring it into equilibrium. A wet sheet of Remay was carefully couched onto the fresh cast. A rubber brayer was lightly drawn across the

Fig. 5.

border easing the fibers towards the object and dispersing excess water. The brayer was also gently run down the gutter to secure the bond between cast and host. The manuscript was sized with a dilute solution of 5% methyl cellulose (400 cps) that was generously brushed across the Remay with the suction left on to help draw the size into the object. The Remay sandwich was slowly lifted and placed between blotters under a thick sheet of Plexiglas for the duration of time needed to cast another folio. The first cast was then moved from the blotters into a bed of thin felts, weighted and covered with plastic for a slow dry.

The folios were trimmed and mended in places where the border-fills had pulled away while most of the gutters stayed intact. A vinyl eraser was used to remove any unwanted fiber that was covering text. The pages were then humidified and a sheet of 5 mil Mylar was used inside each

folio as a folding aid to prevent the soft Abaca from creasing irregularly. The signatures were put into the press for an overnight stay and then they were ready for binding.

After leafcasting the 78 folios for the Taj, we were better equipped to formulate an estimate for any future project of this size.

We'd like to offer the following suggestions for anyone considering a large leafcasting project:

- plan on spending at least a half hour per folio for bathing, casting and drying.
- working with the video digitizer averaged out to half an hour per 20 folios.

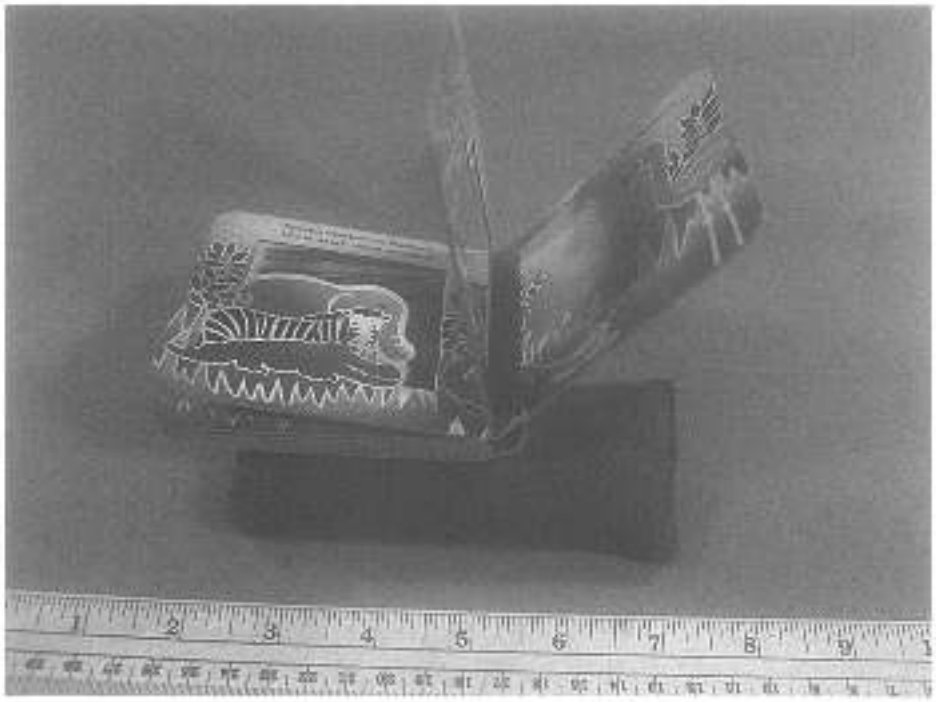

Fig. 6.

- instead of dry sheets of half-beaten pulp, consider ordering fully beaten pulp in its wet state to be toned in house.
- the set up and breakdown required at least an hour each day.
- finally (and not to be underestimated), is the two to three hours needed to thoroughly clean the leaf caster when the job is finally done.

REBINDING—GLEN RUZICKA

In every professional conservation subspecialty the conservator's task is to preserve the original. The conservator accomplishes this by making additions and alterations that are subtle, stabilizing enhancements to a vulnerable artifact. Ideally this is a nearly invisible function. Conservation bookbinding frequently steps far beyond this subtle ideal.

Professionally, the book conservator is a hybrid of the bookbinder and the conservator. The bookbinder's job is to create a durable and functional vehicle for the textural artifact. In performance of this task the bookbinder makes major additions and emendations to the core text, adding new pages, sewing and structural support, and a prominent new covering. In sum these binder's conventions, viewed from the perspective of artifact conservation, have altered the entire aspect of the original. The conserved and rebound book looks, feels, and works differently than before. What remains of the original is now the kernel, the conserved text, enclosed in this new object.

In part as a corrective to the radical remake of the original that a new binding and all its elements represents is the book conservator's reliance on historical binding styles. The limp vellum binding of the Italian Renaissance, the eighteenth century German paper case, the medieval beveled board binding, and other traditional styles and structures are imitated in efforts to furnish the artifact with a structure which is "sympathetic to the original text." The conservation binding of the Yemenite Taj was designed to be sympathetic with Middle Eastern binding styles, but also durable and functional. That no remnants of the original binding or sewing were extant was an advantage in this case. There were no fragments that would tempt one to imitate a previous structure or binding.

Middle Eastern bookbindings, it is safe to say, are typically structurally weak. The weak points in the classic form include the sewing (sometimes using silk thread, and no sewing supports), a flexible spine (using a single lining of cloth), and weak connections to the cover. Covers were usually made as a case, that is made separately from the textblock. For the Yemenite Taj an effort was made to incorporate aesthetic elements of the classical Middle Eastern binding. These included a thin flexible leather cover, and a square back. A key feature to be maintained was a page that was flat not creased by any sort of backing, and a opening that flexed to the spine.

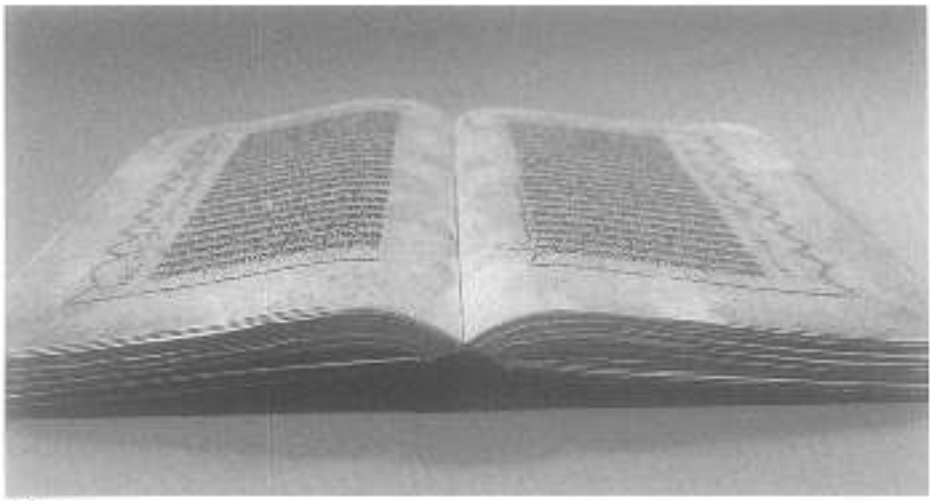

Fig 7.

Structurally, the means to attain this type of opening is referred to here as a "hinged hollow", for want of a better name. Gary Frost has previously referred to this construction, facetiously, we presume, as a Mexican hollow. A similar spine hollow structure is probably most familiar on children's board books (fig. 6). There are other examples in trade publications. Recently a new paper back binding design was introduced called the "lay flat binding" that is based on the hinged hollow idea.

The traditional hollow tube hinges at two spots at the ends of the spine, or at the peak of the shoulders of the backed book. When a book with a hollow tube is opened these two hinging points act as pivot points for the hollow which arches the spine of the volume in one direction and the spine of the cover in the other. The hollow of book lying open does tend to a round tube shape. The hinged hollow, in comparison, by wrapping around the spine and onto the sides of the book, replaces the two hinges of the hollow tube with six hinging points (plus the hinge of the opening at the spine). The comparison of these two similar structures can be instructive in understanding the opening of texts and hinging. It is the common experience of preservation librarians that the two hinges of the hollow tube are the weak points of the structure. In the binding of the Yemenite Taj the hinged hollow was chosen with the idea of distributing the stress of hinging among the multiple hinges including the hinge of the opening.

The binding of the Yemenite Taj incorporated the hinged hollow into the structure of the volume (figs. 7 & 8). This design is intended to hold the square shape of the spine and allow a flexible opening. The hollow was constructed from the endpaper (fig. 9) rather than applied to the text. The text was sewn onto three linen tapes and a continuous concertina guard of thin Gampi paper using Irish linen thread. The concertina guard acts as a barrier for adhesive separating the text from paste in the binding process. The endpaper is a double folio with a 2" wide strip of linen attached to the middle folio. The outer sheet of the endpaper becomes the hollow. The square back was lined with Kozo and Western handmade paper. These linings were extended onto the endpaper to stiffen the hollow. The endsheets were then folded back over the spine and adhered overlapping to make the "off" part of the hollow.

After the hollow was made the cover board was attached to the hollow and the linen hinge (fig. 10). The cover board is a laminate of two pieces of 2-ply mat board. The upper board of the laminate is shorter than the lower to accommodate the hollow and an extra 1/16" gap to allow the covering leather to hinge without a sharp crease. In covering for aesthetics it was necessary to cover the inside edge of the hollow. This disguises, somewhat, the unconventional structure. The linen hinge of the endpaper was adhered to the inside of the cover and added strength to that hinge. The binding was completed with a leather doublure in imitation of Middle Eastern binding conventions. The cover was decorated with a simple design of blind lines that mirrored the unique calligraphic design of the text (figs. 11 & 12).

Fig. 8.

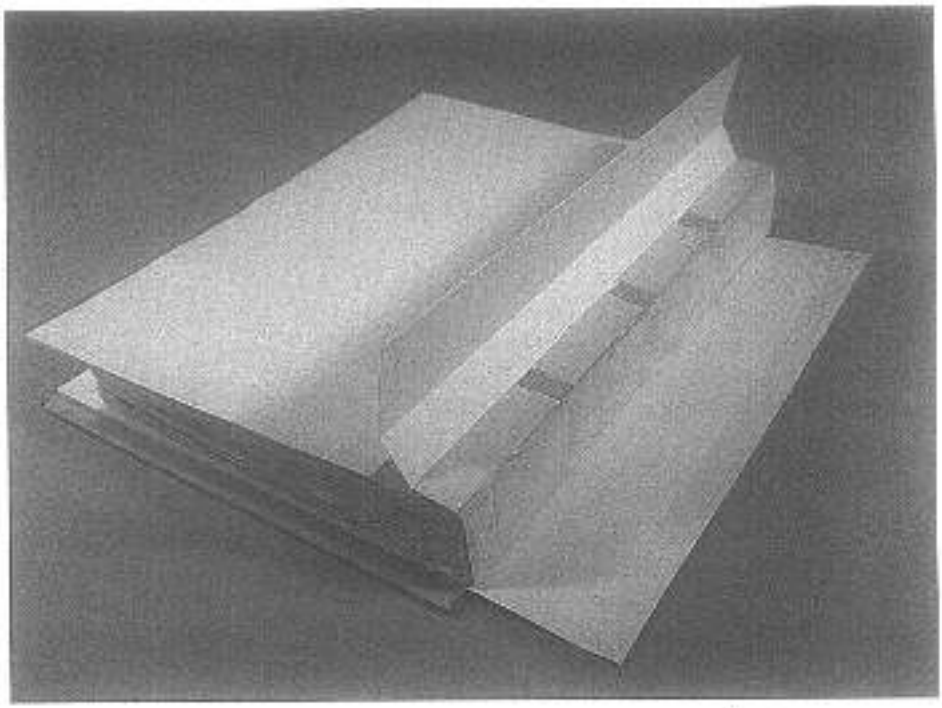

Fig. 9.

The finished cover and hollow acts to lift and turn the text as it opens. It is interesting how the cover and hollow shifts as the book is opened through the text. The long term durability of this design is, of course, something that can only be accessed by time.

CONCLUSION

Many conservation treatments proceed along familiar pathways of routine practice. In fact, the efficiency and effectiveness of conservators is founded upon establishing appropriate responses to typical problems. The treatment of the Yemenite Taj, in contrast, represented a complex object with unique elements and challenges: in reconstructing the text, planning paper conservation treatment, text repair, and rebinding. Such an object demanded treatment innovation in a number of stages of treatment. The team approach proved in this project to be a constructive means to develop new ideas and successful approaches to many treatment steps.

NOTES

†The Annenberg Research Institute in Philadelphia is modeled after the Institute for Advanced Study in Princeton and similar postdoctoral research centers. Under the guidance of Einstein and his colleagues the Institute at Princeton made enormous contributions to our understanding of the physical world. The Annenberg Institute aims to expand the knowledge of our historical and cultural worlds as it strives to understand the development of Western history and culture with special emphasis on the Near East.

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