Condition Assessment and Treatment Report

conservator	Stephanie Gibbs
owner	Chichester Cathedral Library

item bibliographical data

Thesavrvs Litaniarvm Ac Orationvm Sacer
P. Thomae Saillii
Societatis Iesv Presbyteri
Anno MDC

Liturgical Thesaurus compiled by Thomas Salie[?], The Jesus Presbyterian Society, 1600.

additional item data

inscribed on ownership plate, inner front wrapper
R.2.A.16
KB.02.16
2.B.16
1143

bibliographic importance and notes

The limp vellum binding structure is presumed to have originated as a temporary or less expensive binding (the forerunner of the paperback) during the late Gothic period, and to then have developed into the formal account and ledger books of later years.

The limp vellum binding has in recent years been viewed by conservators as a solution to the need for a durable binding which uses very little adhesive. This view came about in large part from examinations of items which survived the floods in Florence, and the comparative lack of damage to limp vellum structures. Binders in recent years have experimented with modifications to the limp vellum binding, and it continues to have a reputation as a technique with many merits.

However, very little literature has been published pertaining to the conservation requirements of limp vellum bindings. Several points of weakness are inherently present in this structure, which, while not damaging to the textblock, nonetheless impede the use of the item. These weaknesses incorporate four aspects:

1. the lacing in of the alum tawed thongs at the joint, as the leather must be pared down very thinly to fit through the lacing holes
2. the brittleness of the vellum along the joint edge, which is exposed to changes in temperature, humidity, and light while on the shelf, and then forced to flex 90 to 180 degrees while in use
3. wear to the vellum wrapper along the fold lines, especially at the head and tail
4. reactions of the vellum wrapper to humidity and light resulting in disfiguration and warping of the wrapper

The conservation literature at present addresses only the concerns of working on vellum and parchment as flat objects, and provides detailed guidelines for experimental and accepted practices as relate to flattening and working upon archival documents. I have yet to locate any articles which detail the methods or concerns of the failings of limp vellum bindings, especially as regards materials for use in the repair of the brittle joint areas.

structure and appearance

Limp vellum wrapper with yapp edges; textblock attached to wrapper with three vellum laces; two vellum foredge ties.
Dimensions:
10.2 cm x 16 cm (height at foredge) x 3.9 cm
spine (height)15.4 cm
yapp edges (foredge only) .65 cm wide

Diagram of wrapper with tie and lace locations, measured from tail
lace a, 2 to 2.4 cm
lace b, 7.4 to 7.8 cm
lace c, 12.4 to 12.7 cm
tie d, 3.5 to 3.9 cm
tie e, 12.2 to 12.6 cm
The head turn-in is 1 cm wide, the tail turn-in is 1 cm wide, the front foredge turn-in is 2.2 cm wide, and the back foredge turn-in is 2 cm wide.

Textblock sewn onto three alum tawed thongs, probably calf. A hemp (probably) cord formed the inner support: the thongs were wrapped around the cord prior to sewing. These thongs formed the laces by which the textblock was laced into the wrapper.

The sewing structure for the textblock is 2-on; the first two sections are sewn all-along.

The endpapers consist of four blank sheets of laid paper, which is similar in texture and colour to the text paper, but having more distinct laid lines.
The first two and last two pages of the endpapers were trimmed short and pasted together to form a flange 2.6 cm wide at the front and back of the textblock. This flange was pasted onto the vellum wrapper over the tails of the laces.

Ex libris label with Chichester Cathedral seal and shelf marks, added at an unknown date.

condition assessment

Remnants of all ties and laces in wrapper [figures 1, 2, 3, 4]

- Laces attaching textblock to wrapper broken at joint, causing separation of textblock from wrapper.
  This break occurred where the hemp cord structural support ended and the thongs were pared down to form the laces.
- Foredge ties broken off level with wrapper
- Lace tips still extant in wrapper

<u>Wrapper</u>

Slight staining and cockling to vellum.
Vellum is quite stiff and hard.
Discoloration along edges and spine, both interior and exterior.
Glue or paste residue heavily present on interior spine.

Textblock

The textblock is free of extensive paper damage, although some wormhole damage (head, front and back) and water staining (tail, back) is present.

The front flange is still attached to the textblock, as it had been lifted from the inner front wrapper when the ex libris label was inserted.
The back flange had become separated from the textblock by tearing along the fold line, and is attached to the inner back wrapper. It has wormholes at the head, water staining at the tail, and remnants of adhesive along the spine. [figure 4]

The back endpapers are incomplete:
with textblock
loose (unattached)
missing
attached to back cover
They are currently present as three loose sheets.

The back flyleaf is loose, water stained, creased, and has one corner missing. It is discoloured from the wrapper except where it was protected by the flange, the area under which appears lighter.

The spine of the textblock has animal glue along the entirety, and pieces of fabric (possibly linen) between the sewing thongs. [figures 5, 6]

The textblock is slightly concave at the head.

treatment proposal

Remove adhesive residue from the wrapper using small amounts of warm water on either a cotton bud or brush.
Lift back flange from wrapper (1) dry or (2) using ultrasonic vaporizer or (3) using damp blotters.
Remake hinge for front cover, using parchment, aero linen, or aero cotton. Attach the hinge using EVA or gelatine. Precise materials to be determined during treatment.
Remove original laces from wrapper to reattach textblock using existing holes.
Clean spine of textblock, removing adhesive residue and fabric.
Reattach loose leaves and perform paper repairs as needed.
Sew new lacing thongs around the existing thongs.
Replace textblock into original wrapper.
Do not replace foredge ties, as deemed unnecessarily invasive, and likely to be quickly damaged one returned to the library.

additional treatment notes

When restructuring the wrapper, it was necessary to determine which materials and adhesives would be used in the final repair. As I had no prior experience working with this structure nor could useful conservation literature be located answering certain structural questions addressed

above, two experimental constructions were made.

The first experiment was on sample strips of vellum approximately 5 cm long and 2 cm wide, and the attachment methods for hinges with regards to strength, flexibility, and appropriateness.
Fabrics tested: vellum, linen, cotton
Adhesives tested: EVA, animal glue (thick gelatine)

Animal glue (here used as purified gelatine) and vellum would be the most sympathetic and appropriate historically to the binding structure. However, gelatine or animal glues are very brittle and can cause strike through and transparency when applied either too hot or too wet. EVA is a modern polymer adhesive and is quite dry in nature, while offering greater flexibility than gelatine.
EVA used in conjunction with linen created a very strong but very inflexible joint; the use of cotton provided more movement than the linen. EVA used in conjunction with vellum was such a strong bond that the vellum delaminated before the adhesive gave.

Wheat starch paste was neither considered nor tested as it is not considered compatible with the protein nature of the vellum. While gelatine (15% w/v, brought up to 100˚ C and allowed to cool to 70˚ C) is recommended for work upon vellum due to its compatibility and reversibility, it does not provide the strength required to support an area of such tension as exists along the joint edge. For this reason EVA was chosen as the adhesive to use.

The second of these experiments was the construction of two model limp vellum bindings precisely to scale of the item under treatment. The first of these was left as a complete model demonstrating the item in 'new' condition. The second model structure was likewise made, but was then damaged to emulate the damage which occurred to the conservation item, so that sewing methods and vellum repair techniques could be tested prior to being used on the actual item.

Several aspects of these model bindings are at odds with the original, the most noticeable and important being that a much thinner and more flexible vellum was used for the wrapper. This decision was primarily made so that the process of working upon the model structures would focus on variations in the attachment methods, and it seemed most expedient to limit the amount of 'fighting' with a hard vellum. While constructing the model structures, some time was spent going through stores of alum tawed leather, trying to locate a soft leather which would pare down thinly without becoming brittle or cracking. After several trials with both alum tawed calf and pigskin, a calf was located of the necessary strength and softness.

Hinge repairs were then undertaken on the model binding:

1. gelatine 15% w/v with vellum, over entirety of spine and joint area
2. gelatine 15% w/v with vellum, over joint area
3. EVA with vellum, over joint area
4. EVA with aero cotton, over joint area

The gelatine reacted as before, the brittleness of the adhesive causing the patches to peel away when placed under the stress of joint movement. This led to the choice of EVA for the flexibility it permitted. The comparison between vellum and aero cotton led to the

conclusions that vellum was more aesthetically in keeping with the wrapper, but the aero cotton provided a greater amount of flexibility. It was determined to first use EVA and vellum as patches along the joint in the item.

When deciding which materials to use as an overlay on the outer joints on the wrapper, there were three choices: wheat starch paste and tinted Japanese paper; EVA or gelatine and pared vellum; or gelatine and goldbeater's skin.

The combination of wheat starch paste and Japanese paper was rejected as this type of patch is composed of vegetable starches, which react quite differently to changes in moisture than do the protein molecules which form vellum. Additionally, the use of wheat starch paste adds a significant amount of moisture to the repair area, which, as this vellum was already significantly warped, would have possibly resulted in further stress away from the inside patch. Japanese papers, which quite strong for their weight, are not strong enough for the amount of tension which is in this area of the binding.

The use of thinly pared vellum was rejected due to aesthetic concerns, as it would be difficulty to apply inconspicuously; it would also increase the stiffness of the joint area.

Goldbeater's skin, which is processed in the same manner as vellum, and gelatine size, a protein based adhesive, were chosen because of their molecular affinity to vellum, similar reaction to moisture fluctuations, and the inconspicuous nature of repairs made using this skin, which is exceedingly strong and flexible.

final treatment

The spine of the textblock was cleaned using a poultice of 2% w/v SCMC.
All pages were dry-cleaned using a chemical sponge, brush, and, where necessary, white eraser.
Page repairs and losses (infills) were done using Japanese tissue to the flanges and endsheets at both the front and the back.
Worm hole damage was supported using RK-0 (spider tissue) but was not infilled.
Iron gall ink damage on the title page was supported using RK-0.
The back flange was removed using damp blotters and washed in deionised water. This washing was necessary to remove the lacing thongs from the back wrapper which remained adhered to the flange.
The back flange was guarded to the back endsheets.
The back endsheets were overlaid with RK-0 (fully on the verso and partially on the recto. Each endsheet was guarded to the textblock, as they had become loose or detached.

The repaired textblock was placed into a finishing press and the extant thongs were oversewn using alum tawed calf skin over linen braid. The sewing used 40/3 thread, packed around the thongs. [figures 7, 8]

The spine was lined with wheat starch paste and Japanese paper (PO15).

The wrapper was dry cleaned using a chemical sponge and then cleaned using damp cotton buds to remove the black adhesive residue. This work concentrated along the head, tail, and foredge

folds, where the blackening was heaviest. The parchment began to show signs of weakening after a certain amount of removal, at which point the cleaning ceased.

The wrapper was humidified in the humidity chamber at 75% RH and 20° C for 3 hours to remove cockling from the spine area, permitting repairs and lacing in. Pieces of millboard and blotter were cut to size for the front and back wrapper, and for the spine piece (the yapp edges were not weighted). After humidification, the wrapper was weighted between blotters and allowed to dry. This first humidification treatment was not successful in loosening the tightness of the vellum along the joints, and, after allowing the vellum to resume a normal internal humidity and resting for a few weeks, it was rehumidified at 80% RH for 6 hours. At the end of this second humidification, the vellum was workable and once again placed under pieces of blotter and weights to relax into a flatter shape. [figure 9]

The repairs of the joint were undertaken after the vellum had rested for a few days to resume equilibrium in its internal moisture content. The patches of vellum and EVA (as discussed above) were first applied as one long strip along the joint, with the edges pared thinly and feathered so as to not provide a line of weakness. Unfortunately, the differences in the nature between the vellum used for the model wrapper and the vellum in the actual item meant that this repair method was not malleable enough for the nature of the materials involved. The vellum patch was not capable of flexing around the cockling which remained in the wrapper, and so a strong bond between them could not be formed. Had gelatine size been used, this would have softened the vellum patch so that it could be more easily moulded around the variations in the wrapper, but, once again, the gelatine repairs were too brittle to permit regular flexing at the joint. Given the hard and inflexible nature of the vellum on the wrapper, it was determined that aero cotton would permit a greater bond between the new and the old. However, for small patch repairs on the flat areas of the spine (where the vellum had tear running perpendicular to the joint), vellum, pared thinly along the edges, was used. [figures 10, 11]

The next difficulty was that the surface of the vellum was unable to accept the EVA adhesive, and merely provided a smooth surface from which the EVA delaminated. This was treated by the application of acetone using cotton buds along the area of the patches to be applied, followed by a very gentle roughening of the surface texture using a fine grade sandpaper. The aero cotton strips were glued out using EVA, and left to set under weights until the adhesive had dried thoroughly. [figure 12, 13]

After the inner joints were reinforced, the textblock was laced into the wrapper. The thongs were trimmed to the size of the original lacing thongs. A needle was used to bring the thongs and braids through the original lacing holes and back into the inside of the wrapper, where the braids were frayed out. The addition of the thickness of the new lacing thongs, braid, and thread caused the spine to assume a greater depth than required originally. This resulted in the textblock taking up the space in the wrapper which had been used for the yapp edges; the foredge of the wrapper is now flush with the foredge of the text. [figure 16]

The vellum at the location of the holes and along the entire joint area was extremely hard and brittle. The lacing in of the thongs and braids created a great amount of tension on the joint, necessitating the use of an outer reinforcement material. This material also served to consolidate

the broken edges of the vellum, which tend to peel away from the inner supporting fabric at the point where the vellum ends abut. [figure 14]

This overlay was formed of 15% gelatine size used in conjunction with goldbeaters skin. The goldbeaters skin was wiped with acetone to degrease, then cut into strips the length of the wrapper between each set of lacing holes and wide enough to extend onto the spine edge and beyond the line of weakness created by the lacing holes: approximately 3 cm long by 1.5 cm wide. These strips were cut in such a manner as to extend beyond the lacing holes at either end.

A layer of goldbeaters skin was also adhered over the section of the spine at the head, above the top lacing holes. This was added due to the weakness of the vellum in this region. Throughout the attachment of the goldbeaters skin, the gelatine size was kept at a temperature between 75 and 80 degrees C, and adhered quite well to the vellum. [figure 15]

bibliography

Haines, Betty. Parchment. The physical and chemical properties of parchment and the materials used in its conservation. Northampton: The Leather Conservation Centre, 1999.

Lindsay, Jen. "A Limp Vellum Binding Sewn on Alum-tawed Thongs," *The New Bookbinder*, 1991: vol 11 (pp 3-19).

Szirmai, J. A. *Chapter 10. Limp Bindings*. The Archaeology of Medieval Bookbinding., Aldershot: Ashgate, 1999.

Woods, Chris. "Conservation Treatments for Parchment Documents," *The Journal of the Society of Archivists*, 1995: vol 16, no 2 (pp 221-238).