

Adhesives for Parchment Repair

an exploration.

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Before Treatment



Account Ledger
London: 1770-1784
Barings Bank Archive, London.

For my final project I worked on three stationery bindings, one from the Christ's Hospital Museum and two from the Barings Bank Archive. This poster will focus on the research and conservation treatment of a late 18th century Account Ledger from the Barings Archive

There was severe damage to the head edge of the spine as well as the front joint due to consistent wear and tear of the binding. There were losses to the parchment covering of the spine at the head, which extended down the joint to the third sewing support. All three leather panels had sheared on the front joint with some loss of leather, and all were missing tackets. The parchment on the tail edge of the spine was scuffed and torn, and there was a split forming along tail edge of the front and back joints. The boards were still attached but had damaged corners. There was evidence of previous repairs to the board lamination and there is adhesive residue on the parchment at the tail edge of the spine. Internally the textblock was sound, and it was decided that no repairs were necessary, as the binding was not used often.

Survey and Results

To inform the treatment of the Account Ledger, research was undertaken in the form of a survey. This was advertised through the Cons DistList and created using SurveyMonkey. The survey was advertised as anonymous to provide a neutral platform for participants. 45 people filled in the questionnaire leaving 43 usable results; as two of the results were left blank.

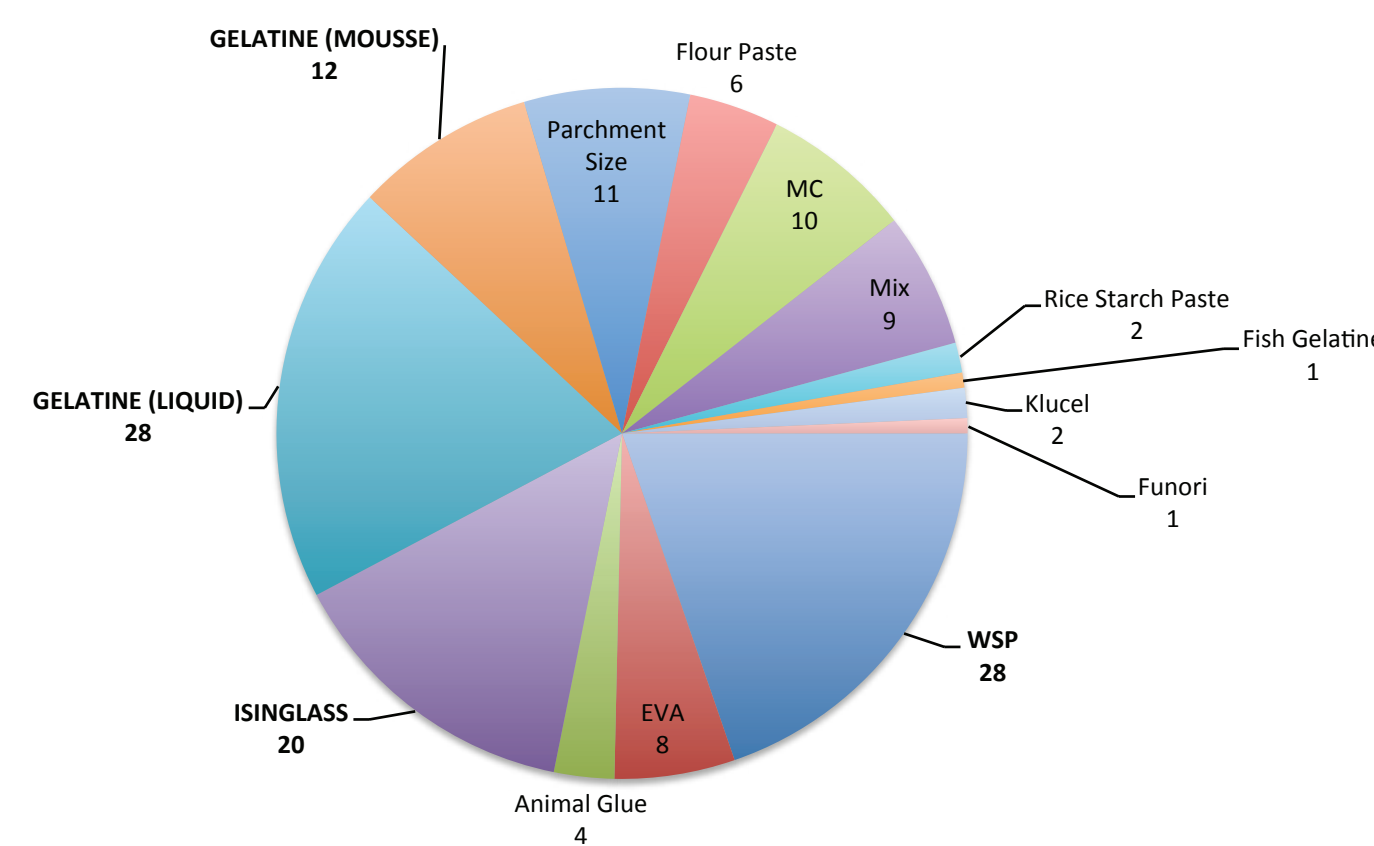
An outline of the survey is available on request. The survey consisted of 15 questions, asking about where and when the participant had first encountered parchment repair, and specific preferences for materials, treatments and adhesives, giving options to add more information where necessary.

The completed answers were collated and inserted into charts some of which can be seen below, they provided me with clear preferences in treatment, materials and adhesives for parchment repair.

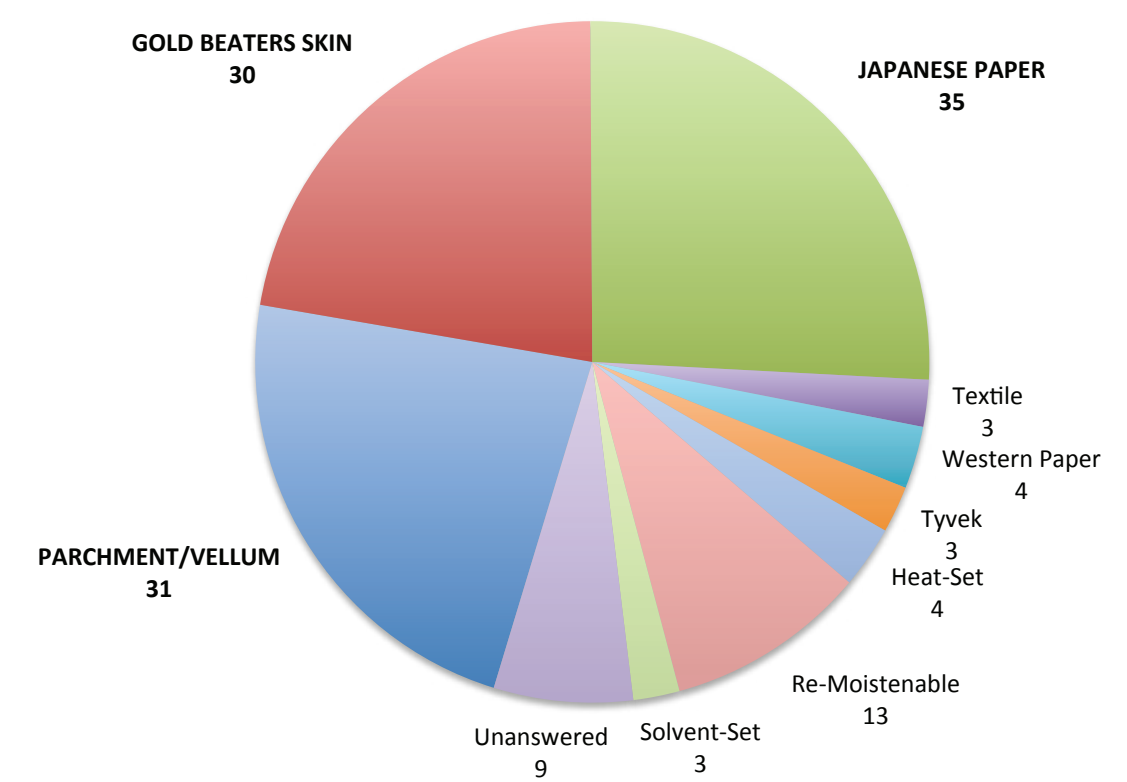
The chart below left shows the most popular adhesives for parchment repair. With WSP and liquid gelatine being the most popular, isinglass then gelatine mousse. Unfortunately the large majority of answers did not specify percentages of the adhesives, so when it came to testing them, supplementary research was done to discover their advisable strengths.

The chart below right shows the most popular repair materials. With unspecified Japanese paper as the most popular followed by Gold Beaters skin and parchment. The fourth most popular repair material was re-moistenable tissue, but as the adhesives weren't specified, a different repair material was chosen. I had been doing some previous research into the use of caecum as a parchment repair material, and was surprised that this wasn't mentioned as an answer in the survey.

Which adhesives have been used for parchment repair?



Which materials have been used to repair parchment?



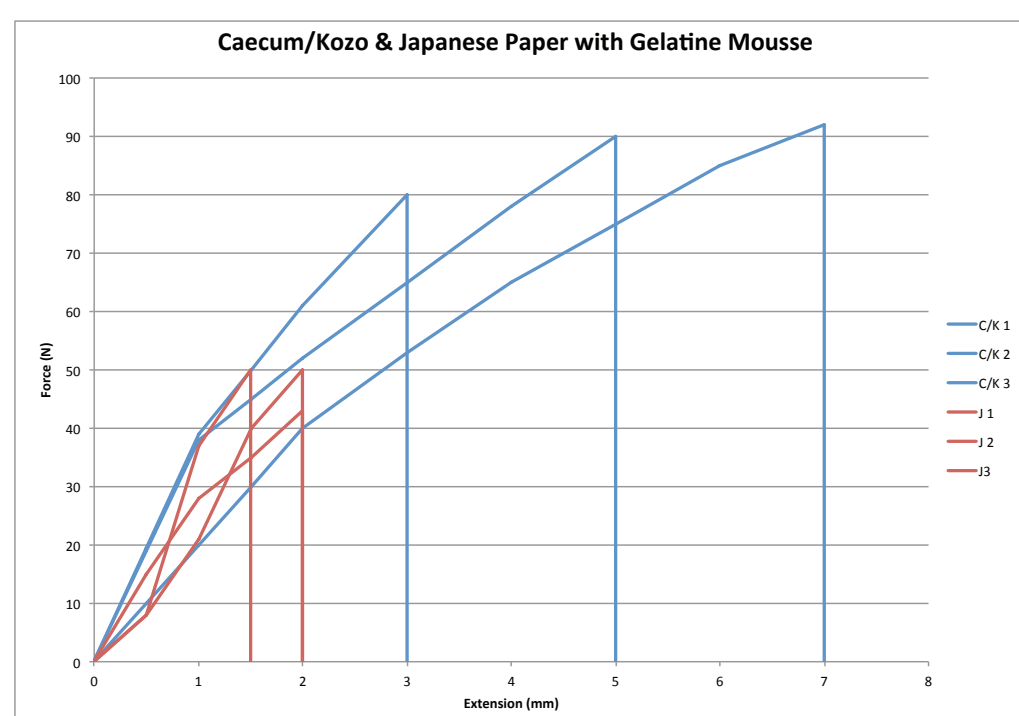
Adh	Sample	Extension (mm)			Average mm			Load (N)			Average N			Breaking Point		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
WSP	Parchment	SIC	2	SIC	2	SIC	60	SIC	60	SIC	60	SIC	60	Adhesive	SIC	SIC
	Caecum/Kozo	4	4	1.5	3.16	95	87	60	80.6	Material	Material	Material	Material	Material	Material	Material
	Caecum	6	8	4	6	57	63	43	54.3	Adhe/Split	Adhe/Split	Material	Material	Material	Material	Material
Gel. Liq.	Japanese Paper	1	SIC	1	1	60	SIC	50	55	Material	SIC	Material	Material	Material	Material	Material
	Parchment	2	SIC	2	2	95	SIC	90	92.5	Adhesive	SIC	Adhesive	SIC	Adhesive	SIC	Adhesive
	Caecum/Kozo	5	3	4	4	85	55	87	75.6	Adhesive	Adhesive	Adhe/Split	Adhe/Split	Adhesive	Adhe/Split	Adhesive
Gel. Mou.	Caecum	7	7	8	7.3	40	40	55	45	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive
	Japanese Paper	2	2	2	2	50	47	30	42.3	Material	Material	Material	Material	Material	Material	Material
	Parchment	2	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC
Isinglass	Caecum/Kozo	5	3	7	5	90	80	92	87.3	Adhesive	Adhesive	Material	Material	Material	Material	Material
	Caecum	3	5	5	4.3	28	40	45	37.6	Material	Adhesive	Material	Material	Material	Material	Material
	Japanese Paper	2	1.5	2	1.8	50	50	43	47.6	Material	Material	Material	Material	Material	Material	Material
Unanswered	Parchment	1	1	2	1.3	80	106	74	86.6	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive
	Caecum/Kozo	5	4	4	4.3	83	70	80	77.6	Adhesive	Material	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive
	Caecum	4	8	7	6.3	40	40	46	42	Material	Material	Material	Material	Material	Material	Material
SIC	Japanese Paper	1	2	SIC	1	43	35	SIC	39	Material	Adhesive	SIC	SIC	SIC	SIC	SIC

Split whilst tightening clamps (at adhesive)
Highest Average
Lowest Average

Results

The graph below shows the tensile strengths of Japanese paper in comparison to caecum lined with kozo, with the repair adhesive as a 5% gelatine mousse; the Atsukuchi is in red and the caecum/kozo is in blue. It highlights the force required to break the sample and how much the sample extended before it broke.

The chart above shows the extension of the samples (and the average), the force it took before the sample broke (and the average) and a description of the breaking point for each sample. SIC = sheared in clamps before any tension was applied.



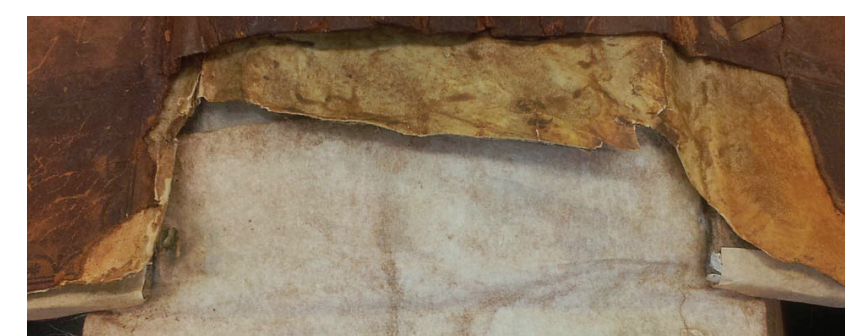
After collating and analysing the results, the combination seen as the most effective was caecum lined with Kozo with a 5% gelatine mousse.

This combination offered a small amount of stretch which is useful for joint repair, and other flexible parts of the binding, but not too much as to lose its shape. The gelatine mousse was the strongest adhesive for bonding the lined caecum to aged parchment.

Treatment was carried out using materials I had not encountered before. During a discussion with the bookbinder Maureen Duke it was suggested that Jute tissue should be used to repair the leather bands across the spine, as it was very similar in its properties to Japanese tissue, but was much thicker and stronger. It also dyed very well, creating a good match to the original leather. These leather bands were repaired first; supported with the dyed jute, then losses were infilled with Akbar paper from Griffen Mill, and then they were finally covered with the dyed jute tissue again.

To repair the parchment losses, paper templates were made first and then the lined caecum which had been successfully pre-dyed using Sellaset dyes, was cut to the correct size and adhered to the underside of the original parchment using the 5% gelatine mousse. Care was taken to ensure that the repairs were adhered only to the parchment and not to the spine. The lined and dyed caecum was also used to repair the corners of the boards.

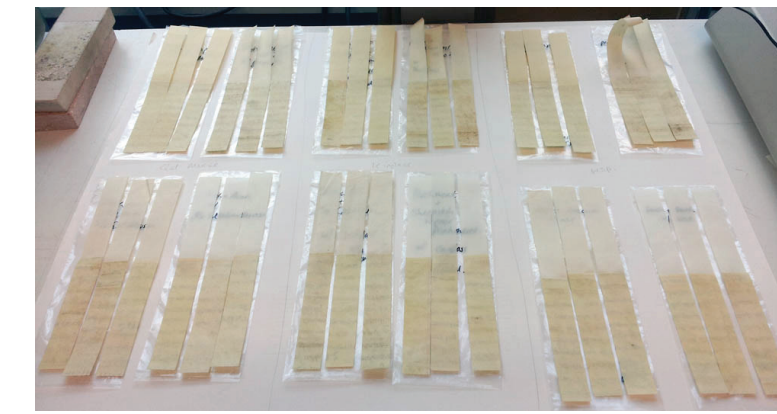
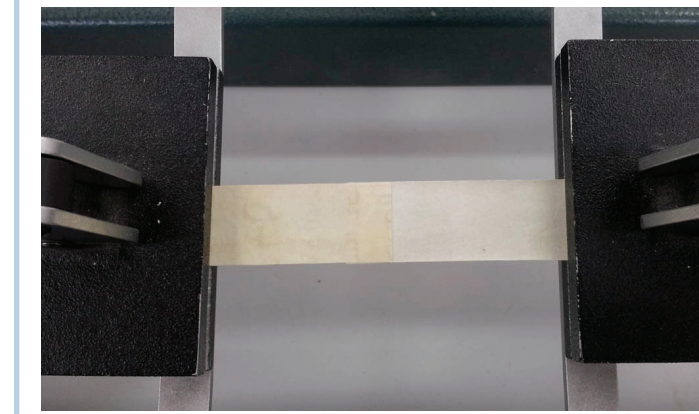
During Treatment



Headcaps (below)

The head and tail endcaps were worked in reverse, from the inside out, in a 4-stage process.

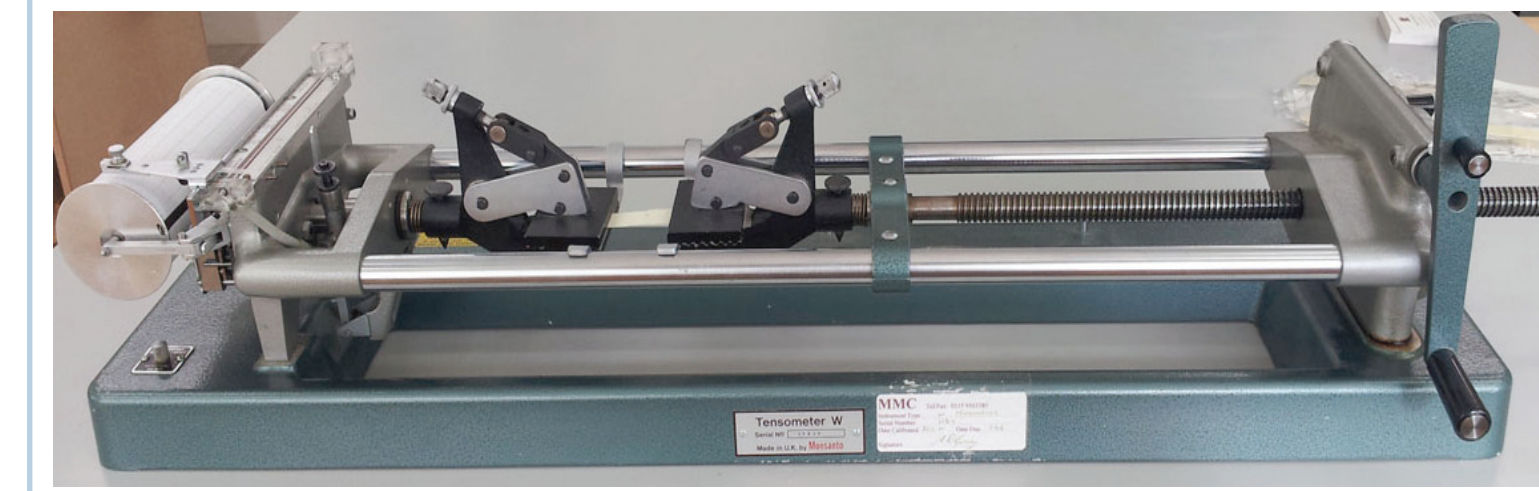
The inside was adhered to the original parchment using the gelatine mousse and this was left to dry. Holes were then cut into the caecum to allow for the endband slips, and a core of linen cord was affixed to the caecum using a WSP/EVA mix; this was used to form the endcaps. Then the outside of the endcap was positioned underneath the original parchment and adhered to itself with a WSP/EVA mix, this too was left to dry. The final step was to adhere the original parchment to the repair, again using the gelatine mousse.



Materials Testing

Mechanical tests were carried out based on the results from the completed survey. After the results were collated, the top four preferences for materials and adhesives were looked at in more detail. Samples were created for a basic tensile strength testing to determine whether the repair materials were weaker than the original parchment, and that the adhesives had a strong enough adhesion to attach the repair material to the parchment. The following materials were used: A three layer caecum, buffed sheepskin repair parchment, Atsukuchi; a 57gsm kozo based Japanese paper (70% kozo fibres and 30% wood pulp) and a three layer caecum lined with kozo 23gsm using Jin Shofu paste.

The adhesives tested were: 10% (w/w) Jin Shofu paste, 5% (w/w) Gelatine liquid, 5% (w/w) gelatine mousse and 4% (w/w) isinglass. All adhesives were made with distilled water. Three samples per combination were prepared giving 42 samples to be tested; strips measuring 100mm by 20mm were cut of both the repair materials and of an appropriate piece of aged parchment. The repair materials were then pared at one end, and adhered using the specific adhesive in an area measuring 20mmx10mm. These samples were then left under boards and weights for two hours, and then removed and stored in specimen bags until the tests began. The samples were placed into a manual Tensometer, tested and the results collated into a table out of which comparative graphs were produced.



After Treatment

The parchment repair survey created for this project has yielded useful results, not only for this project but also possibly as a basis for further research. Due to the way in which the survey was written, some desired outcomes were not achieved, for instance: it was hoped that a correlation between the place and date of education and preferred treatment would appear, but this was not the case, as the survey was not completed by large enough pool of people.

The relatively undocumented use of caecum as a parchment repair material is a surprise. This material lends itself incredibly well for repairs, and can be worked and manipulated with ease, without tearing or stretching. It is as simple to use as Japanese paper but has the added advantage of being a like-for-like material. It has been very effective as a repair material for this project, strong enough to support the more fragile areas of the spine, and flexible enough to move easily with the opening characteristics of the binding.



ACKNOWLEDGEMENTS

I would like to thank the following for their help and support throughout the project:

- Jocelyn Cuming - MA Course Leader, [Camberwell College of Art](#)
- Alan Buchanan, Vincent Daniels, Alan Elwell, David Garnet, Eleni Katsiani, Mark Sandy, Richard Weedon, Mike Yanni - Conservation Department, [Camberwell College of Art](#)
- Christopher Harvey, Becky Tabram, Vicky West - Conservation Department, [College of Arms](#)
- Lara Webb - Archivist, [Barings Bank Archives](#)
- David Dorning, Maureen Duke - Conservation Department, [West Dean College](#)
- All those who completed my anonymous survey
- My classmates at Camberwell
- The AHRC