

Using Klucel G to consolidate and repair mould damaged documents

Klucel G was introduced into the conservation field in the early 1980s. The G grade of the cellulose ether, also known as hydroxypropyl cellulose (HPC) is favoured by conservators due to its solubility in both water and polar solvents to form a clear liquid or gel. Applied to fragile and mould damaged paper, Klucel G in a 1-2% solution with propan-2-ol will cohere loose fibres, add strength and facilitate further repair (after testing media for solubility).

But thicker gels can also be used to simultaneously apply tissue support, an application found particularly useful during preparation and stabilisation of early 19th century paper land-tax documents for digitisation. A 3% solution applied through a thin tissue such as 5gsm or less, consolidated the paper and adhered a tissue support. Extremely fragmented paper is anchored by the tissue while the gel is applied with a brush, reducing loss and disruption; indeed a very fine tinted tissue such as 2.5gsm can appear almost invisible. Once fully dried in the fume cupboard, the paper can be released from the non-stick surface used such as PTFE cloth, with a flexible spatula.

There are some disadvantages to bear in mind. The necessity for solvent extraction creates capacity and work flow issues while the drying items occupy the fume cupboard. Flammability of the vapour should be also considered in risk assessments. The gel can leave a sheen if applied too thickly - swabbing with the solvent used will reduce this but it can be difficult to remove completely. Finally, subsequent aqueous treatment could re-swell the adhesive and potentially create a slimy surface which may be difficult to handle.

However, Klucel's main advantage here is that it can be applied to fragmented paper which is very difficult to handle otherwise. Indeed, it is not always possible to effectively clean such fragile material completely of mould spores in advance of repair, in which case the gel can help secure them; plus the solvent has a denaturing effect through dehydration. Klucel G can also be used to help separate mould-fused paper layers using the gel to aid working with a thin spatula, applying tissue to the layers as they are lifted.

In all, Klucel G is a useful for stabilising mould damaged documents to enable production of surrogates.

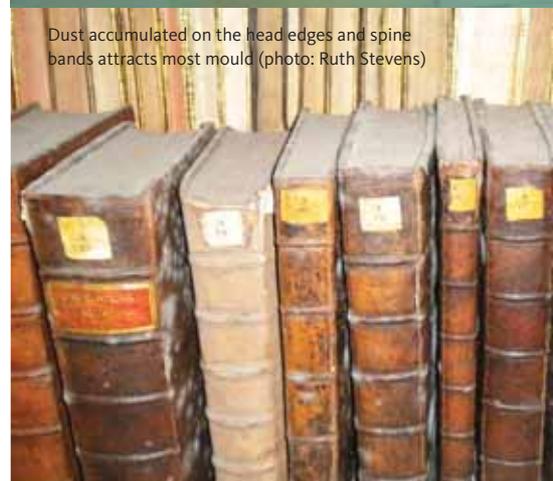
Shirley Jones

Local Strengthening of Mould-damaged Manuscripts; Aurelie Martin et al; Journal of Paper Conservation, Vol. 12 (2011), No. 1.

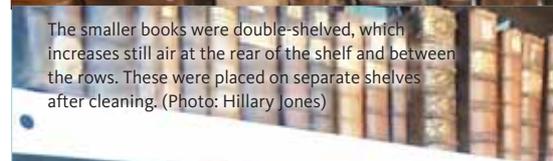
Evaluation of Cellulose Ethers for Conservation; R. L. Feller & M. Wilt; 1990; http://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/ethers.pdf [information about flexibility and long term stability]



Rectorial Library in the wine cellar, before the cleaning project (photo: Ruth Stevens)



Dust accumulated on the head edges and spine bands attracts most mould (photo: Ruth Stevens)



The smaller books were double-shelved, which increases still air at the rear of the shelf and between the rows. These were placed on separate shelves after cleaning. (Photo: Hillary Jones)





Volunteer team (from l to r); David Rigley, Richard Goodenough, Maggie Cameron, Tony Pragnell, Elizabeth McAdams and Roz Waller (photo: Ruth Stevens)

Mould Attacks!

On a rainy day in April 2013 and by invitation of Crundale Parochial Church Council (Crundale PCC), Ian Watson and I were invited to a room, formally used as a wine cellar, in Kent to see their Rectorial Library. It is a gem of a collection collected by the Rev Richard Foster (rector of Crundale 1698-1729) containing theological material, works on church history, European history, medical topics, geography and science. Not that it looked like a gem at the time. The harsh lighting illuminated two metal shelving units, holding a collection of books covered in mould. We had been warned – but still, it was a shocking sight.

From datalogger charts tracking the environmental conditions over a few years the relative humidity (RH) had been over 65% for months at a time, helping to create a conducive atmosphere for mould to establish a colony. This was exacerbated by an unwitting blockage of an air vent into the cellar, resulting in still air conditions. The bindings and a fair amount of dust and debris provided the ideal place for mould spores to settle and thrive.

As we inspected the books we began to realise the scope of the project ahead. Mould hyphae were flourishing on the spines, sides and head edges of the majority of books. We also noticed that some of the smaller books had started to expand at the fore-edge, an indication of high humidity in the paper and with a potential to cause permanent damage.

By the time of our visit the air flow in the wine cellar had been restored, and we were encouraged to see a small amount of dieback in areas of mould most exposed to the air flow. For us to be able to remove the mould successfully the hyphae needed to be dead (dry and dusty, with an uneven appearance) and good air flow would be one method of achieving this. More fans were recommended to increase the air flow further and a deep clean of the area and exposed shelving was suggested as a way of reducing potential food and resting places for the mould spores.

Ideally we would have liked some humidistat controlled radiators installed on a temporary basis



Conservation students Hillary Jones (l) and Nicole Devereux (r) at the book cleaning station (photo: Ruth Stevens)



Two views of Rectorial collection after the removal of the mould outbreak (photos: Ruth Stevens)

to address the high humidity levels, but this was not possible. Based on readings taken on the day, which were below dangerous levels, and the improved air flow we left with some planning to do. Clearly the collection would have to be relocated in the long term, but for now the main concern was to remove the mould from the books as soon as it was practical to do so.

Fortunately we had a couple of months while the hyphae were drying out to organise the cleaning project and for the custodians to raise the funds needed. We were conscious of the problems the Crundale PCC might have in raising funds quickly, being a small village parish. Aware of the high costs of labour in this type of project and the short timescale involved we worked together to bring the costs down to an affordable level. The parish had already established contact with West Dean College near Chichester, so we were able to draft in the fantastic resource of students on the Book and Library Materials course, as well as volunteers from the local area. Accommodation costs were vastly reduced by the generous hospitality of Richard Goodenough and his wife Roz, who put up the student team and me for the duration of the project. The college subsidised the students' food bill, so all in all the cost was minimised to the materials and the labour of one conservator project manager for four days.

Mould spores (containing mycotoxins) may cause ill health, so full personal protective equipment (PPE) was used to reduce this risk. The mould was removed by using HEPA-filtered variable suction vacuum cleaners fitted with soft goat's hair brushes and then the books were cleaned further using smoke sponges and lint-free cloths. The metal shelves were vacuumed, wiped with a mix of water and industrial methylated spirit (IMS) then air dried before replacing the books.

It took three and a half days to clean approximately 950 books, with a student team of five conservators



and seven volunteers. This included photographing each title page to form a digital catalogue of the collection and checking each book against a written catalogue. Some minor conservation work was also achieved at the end of the project to stabilise some of the bindings.

We left the library looking a lot better and more stable than we found it, but concerned about its future. Recently we have learnt the Crundale Rectorial Library has been accepted as a long term loan into the Canterbury Cathedral Library. Although it is a shame that the library will no longer be resident in Crundale, we couldn't wish for a happier ending to the project.

Ruth Stevens ACR

Book conservator and director of
Sussex Conservation Consortium Ltd

Acknowledgements

SCC is grateful to Richard Goodenough and Jeremy Robson for taking on the deep clean of the cellar and the continuing monitoring of the situation; volunteers Roz Waller, Elizabeth McAdams, Tony Pragnell, David Rigley, Maggie Cameron, and the student team of Hillary Jones, Rachael Seculer-Faber, Nicole Devereux, Rachel Day and Ben Pointer, organised by Su Fullwood and David Dorning of West Dean College. For more information about the project please visit www.sussexconservationconsortium.co.uk