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Mould Treatment in Book Conservation – Three Case Studies

Introduction

The treatment of mould damaged books is often challenging due to their three dimensional layered structures and their use as artefacts in collections. Determining the level of cleaning or intervention required for user safety is paramount. As such, conservation treatment can range from simple cleaning with a HEPA vacuum and brush to more in-depth remediation and creative housing.

This poster describes three mould remediation case studies at the Canadian Conservation Institute. The goal of each treatment was end user safety. Appropriate biosafety measures were used throughout. [1] All three books were first cleaned with a HEPA vacuum and brush to remove loose mould fragments and spores from the pages. [2] Any further remediation processes are noted in the individual case studies.

Determining if the artefact was adequately cleaned was based on CCI rapid adenosine bioluminescent swab test protocol of the time. [3] Mould remediation for each book was resolved through differing strategies. All decisions related to treatment were informed by the severity of the damage and the effectiveness of surface cleaning which was balanced with the significance of the original material and its intended use.

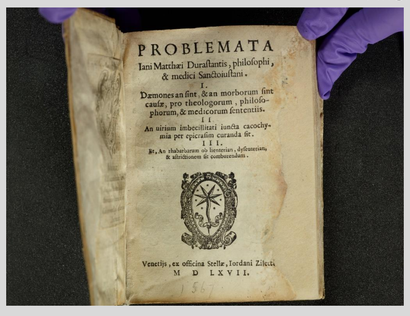
Livre Ancien – Small limp parchment binding with mid-level mould damage

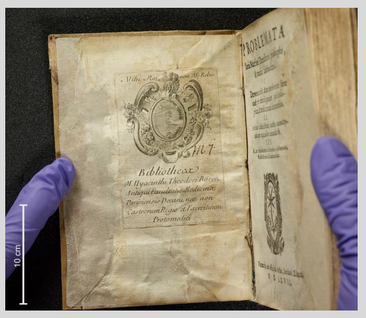
Rapid adenosine swab testing showed minimal surface mould residues after cleaning, which informed the remaining treatment choices.

As a precaution, an additional disinfection step was included by sizing the soft mould damaged paper with 1% Klucel G hydroxypropylcellulose swelled in 70:30 ethanol/water. Et/OH is a common disinfectant for mould remediation of paper substrates. Dwell time affects its ability to kill mould, so it is only fungistatic when applied as described. Due to the multiple remediation methods, it was determined treatment could proceed normally with minimal risks to users. Common binding repairs (paper and cover infill, structural repairs) were carried out.

Before Treatment

After Treatment





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Martyr's Mirror – Large wooden board binding with severe mould damage

This full leather binding with wooden boards and metal furnishings had significant water damage and a heavy carpet of mould. Testing done by Paracell Laboratories indicated viable spores of Penicillium chyrosgenum and Aspergillus ochareus. Disbinding after HEPA remediation was driven by the extent of the mould, the amount of structural repairs, and the cultural significance of this rare volume to the Canadian Mennonite community.

The textblock was washed in an immersion bath of 70:30 ethanol and reverse osmosis water in the CCI spray booth by conservators wearing full PPE. The folios remained in the bath for 15 minutes, were air dried overnight and washed again in an alkaline bath to remove discolouration. [4] Extensively damaged pages were repaired using a leafcaster. The textblock was then resewn and reattached to the original covers.

Before Treatment

During Treatment

After Treatment

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Mine Chief Engineer's Notebook - Small modern clip binder with severe mould damage

Rapid adenosine swab testing showed significant surface mould remained after dry cleaning. The end goal for the client was for the content to be accessible, the structure was deemed of secondary importance and the original binding was made of degraded cellulose nitrate. These two factors informed the remaining treatment choices.

The pages were too degraded to clean thoroughly and fugitive media prevented aqueous or solvent based treatment, preventing remediation of mould beyond dry methods. Tears were repaired using light weight remoistenable tissue prepared with 2% methylcellulose A4M.

A completely new structure was created to facilitate the desired use of this book. The pages were individually encapsulated in polyester (Mylar®), containing any remaining mould fragments and spores. These were bound into a new post binding that allowed handling and display without PPE. [5] [6]

Before Treatment

After Treatment

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Conclusion

Each of these three books posed different challenges for the conservators who had to balance varying levels of mould severity and deterioration with the aims of the client and the ultimate goal of end user safety. Treatment decisions were informed by the use and significance of the books within their particular context

Although thorough cleaning is desirable, complete elimination of mould through dry cleaning is not always a realistic goal. Through this poster, three methods have been demonstrated to show a range of possibilities and the creativity often required when dealing with affected collection items.

With thanks to all other conservators who contributed to these projects including Sherry Guild, Greg Hill, Crystal Maitland, Marie-Lou Beauchamp, Laura Hashimoto, Jayme Vallieres, Emily Leonoff, Katherine Le, Julie Niven, Sachi Hirono, and Jessica Régimbald.

Footnotes:

(1) How Do We Assess Mould Levels? Part II- Conceptual tools to help decide "how clean is clean enough"?, CAC-ACCR 46th Annual Conference and Workshops, 25 May – 27 May, 2021, Halifax, CA. [Presentation]

(2) Sherry Guild, Maureen MacDonald, and Tom Strang, 'Technical Bulletin No. 26 - Mould Prevention and Collection Recovery: Guidelines for Heritage Collections', Canadian Conservation Institute Technical Bulletins, rev. ed. (2019); De Carvalho et al., 'Fungal Contamination'; Aktas et al., 'Indoor Mould Testing'; WHO, WHO Guidelines; Prezant et al., Recognition, Evaluation, & Control.

(3) "How Do We Assess Mould? Testing the parameters of Rapid Adenylate Bioluminescent Swabs in conservation settings.", CAC-ACCR 45th Annual Conference and Workshops, May 29 – Jun 1,2019, Halifax, CA. [Poster]

[4] Washing protocol created under the direction of Sherry Guild

(5) Schlefer, Elaine Reidy. "One-piece Post Binding with Interior Hinges" *The Book and Paper Group Annual.* Vol. 13, 1994. https://cool.culturalheritage.org/coolaic/sg/bpg/annual/v13/bp13-09.html

(6) Meier-James, Barbara. "Modifications of a Basic Polyester Post Binding" *The Book and Paper Group Annual.* Vol. 2, 1983. https://cool.culturalheritage.org/coolaic/sg/bpg/annual/v02/bp02-07.html

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