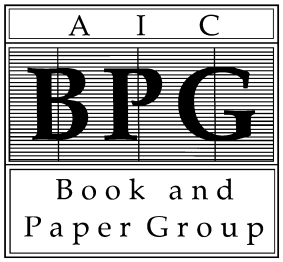

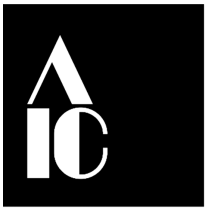

american
institute for
conservation

Preserving Cultural Heritage

Article: Conserving the Australian Characeae Collection
Authors: Katy Glen, Briony Pemberton, and Josephine Milne
Source: Book and Paper Group Annual 40, 2021
Pages: 8-14
Editors: Kimberly Kwan, Managing Editor, and Roger S. Williams, Assistant Editor
Editorial Office: bpgannual@gmail.com
ISSN: 0887-8978

The *Book and Paper Group Annual* is published once each year in print format by the Book and Paper Group (BPG), a specialty group of the American Institute for Conservation (AIC).

The *Annual* is distributed as a benefit o f membership to those who were members of the BPG in the date year of the issue. Additional copies or back issues are available from AIC. All correspondence concerning subscriptions, memberships, back issues, and address changes should be addressed to:

American Institute for Conservation
727 15th Street NW, Suite 500
Washington, DC 20005
info@culturalheritage.org www.culturalheritage.org

KATY GLEN, BRIONY PEMBERTON, AND JOSEPHINE MILNE

Conserving the Australian Characeae Collection

INTRODUCTION

In 2007, Dr. Josephine Milne, co-author of this article and collections manager for the Royal Botanic Gardens Victoria, engaged conservators from Grimwade Conservation Services (GCS) to undertake a condition assessment of the Australian Characeae Collection. This is a significant collection of fire-damaged botanical specimens and their accompanying annotations on paper labels. The collection is held in the National Herbarium of Victoria (NHV), situated within the Royal Botanic Gardens in Melbourne. An initial assessment led to a treatment proposal, then a testing phase involving mock-ups, and finally the conservation treatment of around 70 items. The specimens and labels were found to be badly charred, making them virtually impossible to handle without causing loss. Stabilization of the collection was required to render the specimens and their labels accessible for cataloging and research.

BACKGROUND

The Australian Characeae Collection comprises charophyte specimens collected during the 19th century by the earliest collectors and explorers in Australia. Charophytes are aquatic green algae in the family Characeae, found in freshwater habitats (e.g., wetlands, lakes, and riverine habitats). When material was collected, it was first sent to Ferdinand von Mueller, who was the first government botanist at NHV from 1853 to 1896. Mueller then sent the material to experts in Europe for identification. Some of the specimens were retained in herbaria in Europe, notably Berlin and Kew, whereas others were incorporated into private herbaria, such as that of Otto Sonder. Sonder was a German pharmacist and botanist whose vast collection, including the Australian Characeae Collection, was purchased in 1883 by NHV and incorporated into the collection held within the Royal Botanic Gardens in Melbourne.

Papers presented during the Book and Paper Group Session, AIC's 49th Virtual Annual Meeting, May 10-June 25, 2021

The Australian Characeae Collection is of great historic and scientific significance, as it contains many "type" specimens that are the definitive example of a species (Roberts 2009). Historic handwritten labels from the collecting botanists and annotations from later researchers accompany the specimens. The labels are an important primary source for researchers, as they contain valuable information about the specimens by several different botanists. Many of the labels have been annotated over subsequent decades, forming a highly significant and irreplaceable record. The annotations document the location and focus of many important botanists at particular times. Handwritten data by early Australian botanists including Ferdinand von Mueller are included in the labels. The significance of the collection was increased when early collections of Australian Characeae that had been incorporated into herbaria in Europe were destroyed during World War II bombings, including type specimens. Therefore, the collection of Australian Characeae at NHV is of great historic and scientific significance, as it contains many type specimens and, for some species, possibly the only existing example.

In 1958, the Australian Characeae Collection was damaged in a fire while on loan to the Botany Department within the University of New England in Armidale, New South Wales. Although many significant items were lost, 139 specimens of the collection miraculously survived and suffered relatively minor charring and water damage (Wood and Williams 1967). Now known as the Burnt Collection, these surviving specimens were too fragile to be accessed by researchers, with charred edges and fine particles of soot and loose charred fragments over the paper surface. Herbarium collections exist primarily as a scientific resource. Researchers, artists, and historians require access to the original material, as subtle details and nuances may be lost or omitted if facsimiles are relied upon. The fragility of the collection prevented it from being accessed both on-site and at other research locations in Australia and overseas, which has inhibited the cataloging work undertaken by Herbarium staff. Conservation intervention was required to stabilize the samples and reduce the risk of damage when handled for research purposes.

DESCRIPTION AND CONDITION

Each item consists of the algae specimen mounted onto paper, plus up to five labels identifying the name of the specimen, the date and place of collection, and the name of the collector. Later labels and annotations were added by researchers. These sometimes included indications, with dates and initials, of original specimen material that was removed for testing. The labels are of various sizes, all smaller than foolscap. Some are printed, whereas others are handwritten, and many are annotated in ink, pencil, and crayon. Several labels have specimen plant material attached. Small paper envelopes containing loose fragments accompany some of the specimens (fig. 1).

A grant from the Royal Botanic Gardens supported the conservation treatment of an initial 20 specimens from the Australian Characeae Collection as a pilot project. Included in this group were the most significant type specimens, as well as the most damaged and vulnerable material. The first batch of 20 prioritized items arrived at GCS in 2008, with a second batch of 50 items in 2012 when further funding was obtained. Each mounted specimen was supported on a piece of card, contained in a paper folder and then in a rigid card box. The mounted specimens and labels exhibited charring, embrittlement, and water damage sustained several decades previously in the fire. Some fragments were in cellophane bags, which had become brittle and discolored with heat from the fire. As individual labels were not identified, a tracking system was introduced to prevent the labels from becoming disassociated from their specimen, losing their relevance.

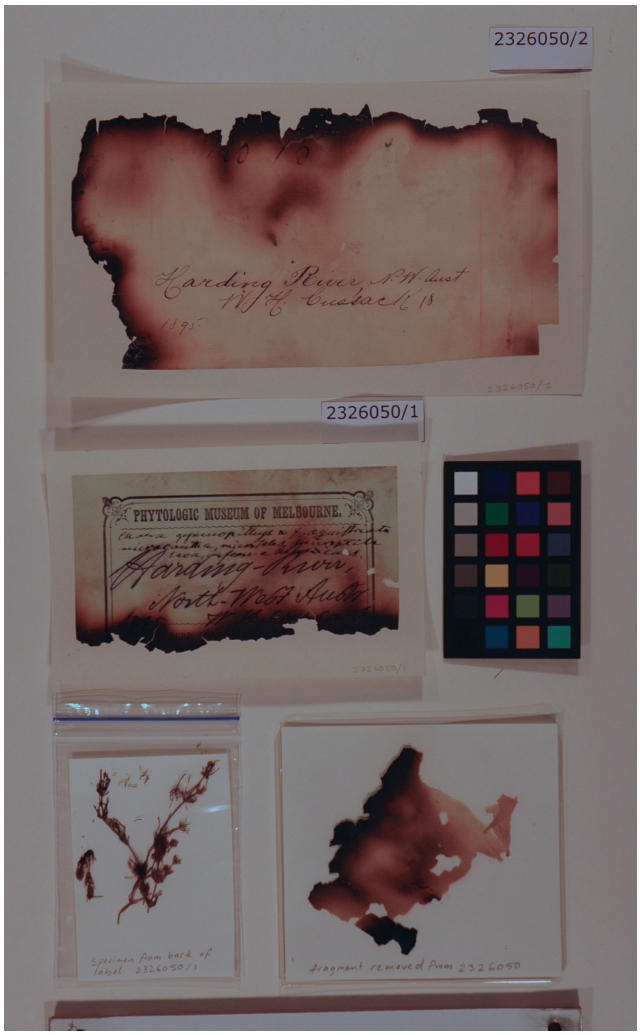

Fig. 1. Labels and fragments relating to MEL 2326050.

TREATMENT CONSIDERATIONS

Local repairs were considered as a treatment option, targeting each tear or fracture with an individual paper repair strip on the verso. It was believed, however, that local repairs would leave the edges of the specimens and labels susceptible to further damage and loss due to the fragility caused by the widespread charring sustained in the fire.

Encapsulation in polyester film was also considered as an alternative to more interventive treatment. Polyester film is a transparent, sturdy plastic and is chemically inert. It has many uses in conservation and is especially useful for providing a clear, protective enclosure that enables viewing and safe handling of an item. This option was not considered suitable, as it was feared that the static charge of the polyester film might dislodge the specimens and fragments of brittle paper. In addition, there would be the potential for damage to the fragile areas of the items if they needed to be removed from the enclosure. The polyester film might also impede proper examination of the specimens.

Lining of the specimens and labels was considered necessary to make them accessible once again and stable enough to withstand handling. A guiding factor was that the collection had to be given adequate physical stability to allow original material to be sent to researchers internationally. This dictated a level of intervention that would ensure a robust result. A more rigid than usual lining paper would be necessary and with a wider margin than is customary. This would prevent flexing of the brittle support and also provide some protection against handling and impact. The need for wide margins meant that the aesthetic value of the chosen lining paper rose in importance. The fragile nature of the charred paper and the inclusion of specimen plant material further complicated the lining process.

Lining can obscure details in the paper such as watermarks, chain lines, and laid lines, as well as any information that may be on the reverse. Lining can also cause an alteration to subtle characteristics of the paper, such as transparency and texture. Furthermore, the introduction of moisture and adhesive used during a lining procedure can result in a tendency for lined objects to curl. When choosing to line an object, conservators

must carefully consider the risks and determine whether the benefits are justified. The method of lining and choice of adhesive and support paper are all based on several determining factors, such as the weight of the object, the solubility of the media, and the intended use of the lined object. In this case, the intervention required by lining and the subtle change this treatment would cause to the original paper characteristics were considered justified given the overarching need for accessibility and long-term preservation of the items (Owen et al. 1988; McAusland and Stevens 1979).

LINING METHOD

The choice of lining method needed to take into consideration the role of the specimens and their labels as both a scientific and historical resource. Algae specimens were often mounted without adhesive, and instead a bond was created simply by pressing the wet specimen onto the paper so that the internal mucilage of the specimen adheres it to the paper (Queensland Herbarium 2016). The treatment proposal therefore had to factor in the risk of specimens dislodging with the application of moisture. Another consideration was that no adhesive could be added to secure a specimen, as sometimes researchers remove parts of a specimen for microscopic examination and analysis. It was important not to contaminate the specimen in the event it would undergo scientific analysis in the future.

The following parameters were considered important when devising the lining method:

1. The lining process should not place the specimens or labels at risk.
2. The lining process should not obscure any inscriptions on the verso.
3. The lining paper must be sympathetic to the original material in terms of tone, texture, and fiber.
4. The lining paper must be both archival and robust, with wide borders to allow for handling.
5. The adhesive must not interfere with the integrity of the specimens as scientific samples.
6. The adhesive used for lining must be archival and reversible, in theory.

Professional conservators in Australia must adhere to the Code of Ethics of the Australian Institute for the Conservation of Cultural Materials (AICCM 2002). Under this code, any intervention must be governed by an informed respect for the unique character and significance of an object. as well as its physical, historic, esthetic, and cultural integrity. The principle of reversibility also guides modern conservation practice. Techniques that involve the use of materials whose future removal could endanger the physical safety of the object should be avoided. There are, however, "degrees of reversibility" (Applebaum 1987). In theory, all the materials and techniques proposed in this treatment are reversible. In practice, removal of the lining papers and adhesive would be risky due to the fragility of the original material. Lining papers can usually be removed after extended humidification. This could potentially pose a risk to specimens held merely by their mucilage. Although linings and repairs should be easily removable, the ease of their undoing requires them to be less durable than some objects require. As important as the concept of reversibility is in conservation, in this case durability was a more important consideration. Conservators have an obligation to ensure to the best of their ability that the condition of an object remains unchanged long after treatment is completed. This includes an understanding of how these objects will respond and cope with their intended future use (Owen et al. 1988).

The most common method of lining currently practiced among paper conservators is the Japanese technique adopted from traditional scroll mounting. The object to be lined is humidified and placed face down on a flat surface. Paste is applied to a sheet of Japanese tissue that is then gently laid down onto the verso of the object, using a traditional Japanese Nazebake brush to smooth out wrinkles and encourage the bond. The lined object is then pressed under weight or adhered to a karibari board for drying. Although this method produces very good results, it was not appropriate for the Characeae Collection, as the items needed to be observed carefully during treatment. Many were too fragile to place face down, especially those containing specimens. Brushing the verso with a Nazebake brush could damage the charred edges of the paper and the specimen if present. Thus, early experiments focused on keeping the items face-up during lining and using the suction table to adhere the lining paper. An article by Sandra Grantham describing the latter was used as a starting point (Grantham 1994).

The problem often encountered when lining using a paper of heavier weight than the object is the tendency of the object to curl once dry. This is usually caused by internal tensions from the creation of a composite object (i.e., an adhesive plus two papers with different expansion and contraction characteristics). The tendency to curl can be minimized by using a dilute paste and a lightweight lining tissue, matching the papers as accurately as possible in terms of fiber type and grain direction and controlling the drying process (Nielsen and Priest 1997; McAusland and Stevens 1979; Donnithorne 1995). Matching the grain direction was not feasible, as the Characeae papers were so fragile that they could not be flexed to determine the grain direction. For reasons already discussed, a lightweight tissue was not appropriate in this situation. However, using a dilute paste was an easy strategy to adopt, and tweaking the drying process was certainly something that could be explored. Several lining and drying methods were trialled to ascertain the appropriate method. Experiments were carried out with different styles of tension drying, including a modified version of the Terylene lining as described in the *Paper Conservation Catalog* (Owen et al. 1988).

TESTING

A series of mock-ups was produced using charred paper to mimic the Characeae items. A selection of high-quality lining papers was acquired from Griffen Mill in Ireland, which were suitably rigid and tonally sympathetic to the labels. Several lining and drying methods were trialed to ascertain the appropriate method. The lined mock-ups were assessed with regard to satisfactory adhesion and degree of curling following lining and drying, as described in figure 2. Curling occurred when the sample was lined using low suction and then removed and pressed beneath weight. This improved slightly when the sample was left to dry on the suction table. Taping the lining paper to glass and leaving the lined sample to dry under this tension saw improvements in the curling, but the adhesion was not satisfactory.

Following the testing and review, three proposed lining techniques were identified. The attachment and drying processes varied slightly, all using wheat starch paste as the adhesive.

No.	Lining Technique	Drying Technique	Result	Conclusion
1	Lining paper pasted out and placed on dry blotter on low suction. Mock-up placed on lining paper with Mylar over the top for first 2 minutes, suction a further 6 minutes.	Traditional pressing	Curling	Unsuitable
2	Lining paper pasted out and placed on dry blotter on low suction. Humidified mock-up placed on lining paper with Mylar on top.	Left on suction table for 1 hour until dry	Slight curling and poor adhesion	Unsuitable
3	Mock-up and lining humidified. Lining paper pasted out and placed on dry blotter on low suction. Mock-up placed on lining paper with polyethylene over the top 10 minutes.	Tension drying with tape	Good	**Suitable for items with specimen attached**
4	Lining paper pasted out and taped to glass with gummed paper tape. Mock-up placed on lining, smoothed with gentle bone folder.	Tension drying with tape	Adhesion failed	Unsuitable
5	Mock-up and lining paper humidified. Lining paper pasted out. Mock-up placed on lining, smoothed with gentle bone folder.	Pressed between felts; changed after 5 minutes, then 10 minutes	Good, slight curling	Suitable for labels
6	Mock-up and lining paper humidified. Bondina pasted to glass with starch; lining pasted to Bondina with MC; lining pasted with starch. Mock-up placed on lining and smoothed with gentle bone folder.	Tension drying with Bondina	Good	**Preferred option for labels**

Fig. 2. Lining tests on mock-up objects.

The first method, modified tension drying, was used for labels with no specimen. In this method, the label and lining paper were humidified through Gore-Tex. Bondina (non-woven polyester) was pasted with wheat starch paste and secured to a sheet of glass. The lining paper was attached to the Bondina with 2% A4C methyl cellulose. The lining paper was pasted out with wheat starch paste and the label placed on top and pressed firmly through Bondina with a flexible spatula or a bone folder. The lined label was left to dry on the glass for three days. The Bondina was then removed from the glass using a spatula (fig. 3). The lined label was inverted and the Bondina peeled from the back of the lining paper.

The second method added an extra step to modified tension drying and was employed when the lined label was curling after removal from the glass. The lined label was humidified and then secured again to a sheet of glass using gummed paper tape and left to dry for three days.

The third method, suction table lining, was used for items with a specimen attached. After humidification through Gore-Tex, the lining paper was brushed with dilute wheat starch paste. The mounted specimen was placed on the lining paper and gently pressed into place. The package was placed on the suction table and the suction started on low to initiate contact. A sheet of polyethylene was placed over the package and suction maintained for one minute. The lined specimen was then transferred to glass and edges secured with gummed paper tape (fig. 4). A piece of felt was placed on top for a few hours. After three days, the label was removed from the glass.

TREATMENT

All items were photographed before treatment and after treatment (figs. 5, 6) and assigned a number for tracking purposes that was inscribed in pencil on the verso lower edge of the lining paper. Each label or specimen was assessed individually,

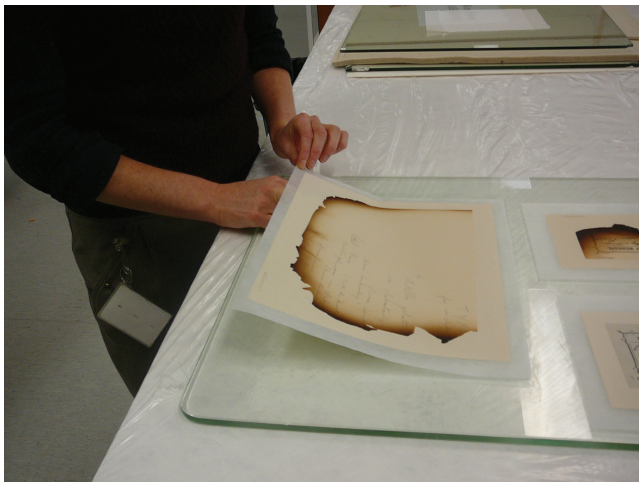

Fig. 3. Removal of a lined label from glass.

Fig. 4. Drying method following suction table lining for a specimen sample MEL 2326054.

Fig. 5. Before treatment, MEL 2355121.

Fig. 6. After treatment, MEL 2355121.

which involved recording the condition on a spreadsheet and testing the media for solubility. On the basis of this assessment, each item was assigned an appropriate lining technique. Linings were carried out as proposed or modified during treatment if required. The results of the lining process were recorded on a spreadsheet. All linings were trimmed to leave a wide border to protect the brittle damaged edges and allow for safer handling. One label with a numbered inscription on the verso had a small opening cut into the lining paper to reveal the inscription. Loose specimen or label fragments were collected in a polyethylene bag and retained with the labels.

CONCLUSION

The surviving specimens and labels of the Burnt Collection have immense historical and taxonomic significance. Michelle Casanova, a phycologist at the Royal Botanic Gardens, states, "Every specimen in this collection has a story to tell about the botanical exploration of Australia and the relationships between botanists at the time. Each specimen gives an indication, not only of where those people were, and what they were doing . . . but also what the environment and water resources were like" (Roberts 2009). This conservation project has ensured that the Burnt Collection will continue to survive and be accessible to researchers, and more widely available as digitized images online via the Australasian Virtual Herbarium.

ACKNOWLEDGMENTS

The authors would like to acknowledge the support of Royal Botanic Gardens Victoria and GCS, part of the University of Melbourne. They would also like to thank members of the paper conservation team at GCS who provided valuable assistance at various stages of the project.

REFERENCES

Australian Institute for the Conservation of Cultural Material (AICCM). 2002. Code of Ethics and Code of Practice. https://aiccm.org.au/wp-content/uploads/2021/02/CODE-OF-ETHICS-AND-CODE-OF-PRACTICE-Australian-Institute-for-Conservation-of-Cultural-Material.pdf.

Applebaum, Barbara. 1987. "Criteria for Treatment: Reversibility." *Journal of the American Institute of Conservation* 26 (2): 65–73.

Donnithorne, A. 1995. "Paper Lining: An Overview." *Lining and Backing: The Support of Paintings, Paper and Textiles: Papers Delivered at the UKIC Conference November 7-8, 1995*: 14-20.

Grantham, S. 1994. "A Suction Table/Capillary Matting 'Dry' Lining Technique." *Paper Conservation News* 71: 6–7.

McAusland, J., and P. Stevens. 1979. "Techniques of Lining for the Support of Fragile Works of Art on Paper." *The Paper Conservator* 4: 33–44.

Nielsen, I., and D. Priest. 1997. "Dimensional Stability of Paper in Relation to Lining and Drying Procedures." *The Paper Conservator* 21 (1): 26–36.

Owen, A., T. Barrett, B. Fiske, L. Kruth, K. Nicholson, T.J. McClintock, S. Rodgers, and P. Volent. 1988. "Lining." In *Paper Conservation Catalog*. 5th ed. Washington, DC: AIC. https://cool.culturalheritage.org/coolaic/sg/bpg/pcc/29_lining.pdf.

Queensland Herbarium. 2016. *Collection and Preserving Plant Specimens, a Manual*. 2nd ed. Department of Science, Information Technology and Innovation, Brisbane, Australia.

Roberts, Bev (2009). "Amazing Survivors." *Floreo* 19 (Autumn): 6-7.

Wood, R.D., and Mary B. Williams. 1967. **"**Australian Characeae Which Survived the Armidale Fire." *Muelleria: An Australian Journal of Botany* 1: 175–196.

KATY GLEN
Paper and Photograph Conservator
Grimwade Conservation Services, University of Melbourne
Melbourne, Australia
katy.glen@unimelb.edu.au

BRIONY PEMBERTON
Paper Conservator
Pemberton Conservation
Geelong, Australia
pembertonconservation@outlook.com

JOSEPHINE MILNE
Manager, Collections
Royal Botanic Gardens Victoria
Melbourne, Australia
Pina.Milne@rbg.vic.gov.au