

Preserving the *Herbarium*: A Case Study in Preservation Techniques

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I: Introduction

All historical artifacts, no matter how permanent and resilient they may seem, are ephemeral when considered through the long view of historical time. While items cannot be maintained in stasis indefinitely, care and attention can greatly lengthen their usefulness as windows on history and heritage. Materials preserved in museums and special collections typically have the best chance of longevity, with curators and conservators tasked with maintaining their conditions. In contrast, items in personal collections are often neglected or mistreated through passive care and owners not knowing or remembering what they have. Personal collections consequently face significant challenges to preservation.

Rather than explore a broad field or aspect of archival preservation, this paper will focus on the interwoven dimensions of conservation, care, and access for a particular item. *Herbarium and Plant Descriptions* by Edward T. Nelson, found among family keepsakes in Ryan Perry's uncle's house, offers a number of challenges to preservation. Published in 1888 as a guide for collecting plant specimens, the *Herbarium* also includes loose folds of paper where amateur botanists could describe and store their collection. Our copy has been filled out and contains well-preserved plant specimens likely collected from the vicinity of the Perry Farm homestead in Homer, New York. The accompanying entries date from May 1897, suggesting that the specimens were collected and catalogued by Ryan Perry's great, great aunt Rhoda Perry.

By focusing on a single item and working outward, it becomes possible to chart important stages of preservation as the item is accessed and a treatment plan is developed. Our preservation plan operates under the assumption that *Herbarium* will remain in a personal

collection. Following the maxims “do as little harm as necessary” and “when in doubt, make a box,” we have elected to take a conservative approach to this item so as to not disturb the extremely fragile plant material contained in the pages.¹ The first stage of our preservation plan covers the construction of an appropriate phase box. Next, we will explore the unique challenges associated with preserving the plant material. Finally, this paper will cover the task of digitization and access. Together, these elements cover the major considerations for the preservation of historical materials.

II: The Phase Box

The Physicality of a Phase Box

The phase box belongs to the group of protective enclosures for three-dimensional objects.² It is made of acid free barrier or phase box board, a material, therefore, that will not do any harm to the enclosed object.³ It consists of an inner and an outer box which in combination enclose the object perfectly.⁴ Velcro fasteners ensure that the enclosure will stay closed when put on a shelf. A phase box would be especially well suited for protecting the *Herbarium* due to the loose-leaf, unbound construction of the book. The plant specimens would be difficult to remove without damaging them, making a protective enclosure the least intrusive option.

Purpose and Advantages of the Phase Box as Preservation Measure

The phase box, as stated above, is a protective enclosure. “[E]nclosures can serve two purposes—to hold together an item with several parts, whether a book with loose boards or a

¹ Kenneth Lavender, *Book Repair: A How-to-do-it Manual* (New York: Neal-Schuman, 2001), 5.

² For a detailed description of protective enclosures see Lavender, 167-234, for the phase boxes in particular see pages 206-216.

³Ibid., 210.

⁴Ibid., 215.

filmstrip and its accompanying audiotape; and to protect special items, such as fragile books of historical importance or books with fine bindings.”⁵ With regard to the *Herbarium*, a phase box offers the following advantages: first of all, it stabilizes a book that by its own structure is unable anymore to support itself. Secondly, it is able to do that without any change of the physicality of the actual book and the arrangement of the plant specimens. No original parts of the book need to be replaced, i.e. no potentially irreversible treatment is needed in order to protect the book from the outside. Thirdly, it protects the cover and paper effectively from sunlight. Due to its firm nature, it increases the protection of the object in case of accidental dropping or hitting and scratching. Last but not least, we have to mention the cost-effectiveness of this comparatively inexpensive means of protection which is an important argument with regard to the actual monetary value of the book itself.

Creation of a Phase Box for “Herbarium and Plant Description”

The dimensions of *Herbarium and Plant Description* are 9.75 by 7.5 by 1.5 inches. Considering the fact that the phase box will enclose the whole book while its two parts are even overlapping on the front and on the back, a barrier board of about 23 by 18 inches is needed (length of the longest part (inner box) = 2 x height + 2 x depth + 1/8 of an inch – ¼ = 22.625 inches; required minimum height of the barrier board sheet = height + breadth of the book = 17.25 inches).⁶

Additionally required materials are glue (e.g. PVA) or double-sided tape, a brush, a ruler, small Velcro fasteners, an X-Acto knife, and a bone folder.⁷ Since the book’s physical structure is not supporting itself anymore, it is better to use a stronger type of barrier board such as 4ply.

⁵Ibid., 167.

⁶ Ibid., 213-215.

⁷ Ibid., 210.

The time required for the creation of this phase box is between 15 and 20 minutes if the material itself is at hand.

III: Preserving the Plant Specimens:

The book we have chosen to preserve, *Herbarium and Plant Descriptions* by Edward T. Nelson, has over 35 dried herbs and plant specimens within its pages. Most specimens are mounted on standard herbarium sheets and this specific herbarium does not contain any mounts containing fungi and/or algae (which most herbaria have). The paper of the *Herbarium* should consist of either 100% alpha cellulose or cotton rag paper that is acid free and pH neutral, according to the report generated by Conserve O Gram.⁸ Based on how little deterioration and damage the pages have, it is safe to say that the paper of this book meets the general preservation guidelines.

The biological material presents a problem to the pages of the book, however. Not only is the age of the book itself an issue, but the preservation of biological materials can be risky, especially since our book has not been stored or preserved according to archival standards. Over time, the acid in the plants has resulted in the discoloration of the pages to a yellowish color. While the book has been kept in fairly good condition (given the circumstances it was in), there are still some slight discolorations in the book. While these are minor, the majority of the sources consulted did not suggest washing the book, or its pages, due to the delicate dried material within its pages.

Plant specimens must be preserved and mounted in specific ways, according to the American Museum of Natural History. Since this book and the plants inside them had been

⁸ "Preparing And Storing Herbarium Specimens." *Conserve O Gram* 11 (November 2009). National Parks Service, accessed April 17 2014. <http://www.nps.gov/museum/publications/conserveogram/11-12.pdf>.

mounted in the mid 1800s, suggestions that the sources have provided for treating more recent specimens would not apply. These suggestions include: placing the mounted plant in the freezer for a few days to kill insects, place the plants under multiple layers of newspaper, blotting paper, cardboard and wood, and some sources suggest placing the specimen in a microwave oven to dry it out, though the sources note that this process would decrease the ultimate usefulness and longevity of the plant.⁹

For our book, faint traces of mold and/or mildew seem to be present on some of the plants. One crucial step is to identify and possibly remove the mold and mildew without causing further damage to the plants. One tip given by the State Library of Victoria is to determine whether the mold is dry or wet. Dry mold is soft and powdery, whereas 'wet' mold can be in the form of fuzzy spots or patches and/or spidery web-like strands¹⁰. The dry mold (which we seem to have in our book) is best treated by what all the sources agree on: ventilation.

If the book were to have wet mold, then it would best be treated by being removed to a well-ventilated and isolated area for drying. Fans are generally discouraged to hasten drying, as they spread mold spores through the atmosphere. It is also suggested to ventilate somewhere away from air conditioning systems, so the spores do not remain inside the air conditioning system. However, our book currently does not show any signs of major mold or mildew infestation. While there is some minor damage (mainly from the plants), it can be brushed away with a simple, soft brush or a dry cloth, as the paper does not seem to be affected. This is especially

⁹ "How to Press and Preserve Plants," American Museum of Natural History, 2013, accessed April 17 2014 <http://www.amnh.org/explore/curriculum-collections/biodiversity-counts/plant-identification/how-to-press-and-preserve-plants>; "Preserving Plant Specimens," Royal Botanical Gardens and Domain Trust, April 17 2014, http://www.rbg Syd.nsw.gov.au/plant_info/identifying_plants/processing_plant_specimens/Preserving_plant_specimens; "Preparing And Storing Herbarium Specimens," *Conserve O Gram* 11 (November 2009), National Parks Service, accessed April 17 2014, <http://www.nps.gov/museum/publications/consveogram/11-12.pdf>.

¹⁰ "Identify, Prevent, and Remove Mold and Mildew from Books - Bibliology," Bibliology, last modified July 27 2010, accessed April 17 2014, <http://www.biblio.com/blog/2010/07/identify-prevent-remove-mold-and-mildew-from-books/>.

visible from the loose-leaf binding the book has. Another way to remove the mold this copy the book has acquired may also be a HEPA-filtered vacuum cleaner fitted with a "...micro-vacuum attachment to reduce the level of suction to gently remove mould spores from the surface," according to the State Library of Victoria.¹¹ Cornell University Library also suggests that mold can be detected using an ultraviolet light, to make sure that all the mold has been detected and can be properly dealt with¹².

It is important to note that while fumigation (which can consist of chemical treatments such as ethylene oxide) may kill off mold and mildew, it does not eliminate the need to physically clean and ventilate the mold from items. Dead mold still poses the same health risk to people, especially to those dealing with the item directly and may be breathing and/or touching the infected material.¹³ While the chemicals can be used to deal with mold outbreaks, in most cases this is not recommended as the chemicals used may leave hazardous residue on the treated material—this applies to our book especially, as it is both old and contains delicate material within.

Most of the major sources pertaining to dried plant preservation and conservation, point out that digitization (photographs, scans, etc.) would be the best method to preserve the semblance of the plants, if not the physicality of the material. Since our book is something that we wish to preserve, digitization is both inexpensive and the most viable option, which we will discuss in our next section.

¹¹"Dealing with Mould," State Library of Victoria, accessed April 17 2014, <http://www.slv.vic.gov.au/explore/conservation-guides/dealing-mould>.

¹²"Mold," *Library Preservation and Conservation Tutorial*, Cornell University Library, accessed April 17 2014, <https://www.library.cornell.edu/preservation/librarypreservation/mee/management/mold.html>.

¹³"Dealing with Mould."

IV: Digitizing Plant Specimens

There are several benefits to digitizing Edward T. Nelson's *Herbarium and Plant Descriptions*. Digitization would provide broader access to the book, it would increase the longevity of the plant specimens, and it would create additional formats in which the material can be viewed. Even though this copy of the book is part of a private collection, digitization is a necessary component to the overall preservation of the object.

The process of digitizing plant specimens is a relatively new phenomenon, but one that is being practiced by a variety of institutions. The Institute of Museums and Library Services (IMLS) has been a major proponent of the digitization of plant specimens. The institute believes digitization is "valuable for scientific and historic studies because they document the time period and distribution of local flora."¹⁴ Herbaria, repositories of biological material, have increasingly found the need to digitize their specimens in order to provide greater access to their material while simultaneously reducing the need for the physical handling of the objects.¹⁵ Digitizing *Herbarium and Plant Descriptions* will largely follow the guidelines set forth by prominent institutions and herbaria. Acquiring digital images of the plant specimens is the first step in digitizing this object.

Ideally the specimens would be scanned with a platform scanner or a flat-bed scanner. Scanners provide the best option for digitization because the optical resolution far exceeds what

¹⁴ "Planting Seeds of Information: Creating a Digital Natural History Collection," Institute of Museums and Library Services, last modified 2011, accessed March 29 2014, http://www.ims.gov/planting_seeds_of_information_creating_a_digital_natural_history_collection.aspx.

¹⁵ Larry Schmidt, "Digitization of Herbarium Specimens, a Collaborative Project" *American Library Association*. Baltimore: n.p., 2007. <http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/national/baltimore/papers/64.pdf>, 65.

is possible with most digital cameras.¹⁶ However, for the purposes of this project, a digital camera seems to be the most logical option because it is cost effective and easily accessible. It is recommended to use a Digital Single-Lens Reflex camera (DSLR) because it provides the greatest resolution and is extremely efficient. When photographing or scanning any plant specimen, the most important aspect is maintaining the integrity of the specimen being digitized. Before photographing, the surface of the specimens should be cleaned, mounted, and positioned in a way so that the labeling is captured in the image.¹⁷ Once the photographing is complete, it is necessary to create metadata for the specimens as well as transfer the images to a medium that can store the information and images.

Since this object is over a hundred years old, it is likely that the data relating to the specimens are incomplete by today's standards. When creating the metadata, it is important to list as much information about the specimen as possible. The metadata should follow the fifteen properties of the Dublin Core Metadata Element Set, as well as list specific plant information like species and habitat.¹⁸ These metadata guidelines have become increasingly standardized in order to create continuity among digital databases. While this object may never be a part of a herbarium database, complete metadata is necessary in order to provide context around the specimens and to preserve what information is known about the plant samples. Once the metadata have been created, the next step to preserving this object is creating different media for storage and preservation.

Creating additional media of the digitized specimens ensures a safety net in the event of a preservation disaster. It is recommended to create computer files, paper copies, and a CD/DVD

¹⁶ Lang-Hsuan Kao and Mei-Chen Liang, *Vascular Plants Digitization Procedures Guidelines*, Taipei City: International Collaboration and Promotion of Taiwan e-Learning and Digital Archives Program, 2010, accessed April 17 2014, <http://collab.teldap.tw/digitalLibrary/VascularPlants.pdf>.

¹⁷ Kao, 29-31.

¹⁸ Schmidt, 66.

copy of the digitized object.¹⁹ Paper copies ensure that there is a tangible document of the digitized item. Paper copies should be organized according to the metadata and stored in a climate controlled environment within a protective enclosure. Saving the images to a computer or an external hard drive ensures another medium in which the object can be viewed and preserved. CDs or DVDs are the last media that should be created—they provide yet another avenue to access the material as well as preserve the intellectual content of the object. It is important to note that digital formats often change and preserving digital objects requires maintenance on the files so that they remain compatible with current technologies.

The process of digitization is often much more complicated than the methods that have been suggested. The approach to digitizing this specific object was largely formulated with the most logical and affordable solutions in mind. If this object were part of a herbarium there would undoubtedly be questions of digital content protection, database uploading procedures, and whether or not to outsource the specimens depending on the volume of the collection. While digitization is not a measure of preserving the physical object itself, it is a method of preserving the intellectual content of the item and reduces the need for direct interaction with the specimen, which increases the longevity of each sample.

V: Conclusion

Developing a preservation plan for this copy of *Herbarium and Plant Descriptions* poses unusual challenges and considerations, stemming from its unbound pamphlets and delicate organic material. That being said, all historical materials pose different challenge and degrees of urgency for preservation. As a result, items need to be assessed for treatments and prioritized in

¹⁹ Cornell University Library/Research Department, "Digital Preservation," *Moving Theory into Practice Digital Imaging Tutorial*, last modified 2003, accessed April 24 2014, <http://www.library.cornell.edu/preservation/tutorial/preservation/preservation-01.html>.

workflows according to their needs and relationship to the greater collection. Ideal treatments can be unrealistic when considered in terms of available resources and the potential for damaging an item through irreversible methods.

While removing the plant specimens from the *Herbarium*'s paper enclosures may be the best way to preserve the paper and accompanying notes from Rhoda Perry, there is a strong probability that the fragile plant matter would be irreversibly harmed in the process. Moreover, the historical value of the plant specimens remains incorporated with the meticulous process that Rhoda Perry performed in arranging and preserving the plants in the *Herbarium*. Removing the plants from the pages would strip them of their context. While the plants could still be of interest to a biologist, their historical value would be compromised. As a result, less invasive measures such as building a phase box, cleaning the mold and excess debris, as well as digitization procedures would help to extend the longevity of the item and improve access without compromising the physical and historical integrity of the *Herbarium*.

Enacting this modest preservation plan should serve to extend the life and usability of the *Herbarium*. Since this item is not a part of a formal collection, regular assessments should be made to ensure that the item remains in good condition. Keeping the book in a space that has relatively constant temperature (below 68 degrees Fahrenheit) and humidity (between 40% - 60%) will also help in maintaining the *Herbarium*'s condition.²⁰ With the proper consideration of preservation principles, *Herbarium and Plant Descriptions* could remain an item of continued use and appreciation for many more years to come.

²⁰ Sasha W. Eisenman, "Preservation of Herbarium Specimens," Rutgers University, 2005, Accessed April 27 2014, http://aesop.rutgers.edu/~icbg/2005_training_course/eisenman_specimen_preservation.pdf.

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