The Emergence of the Science of Botany: Preservation of Personal Herbaria

LuEsther T. Mertz Library

The Exsiccated Specimen Collection

Herbarium, plural herbaria: from the Latin herba 'grass, herb', is a systematically arranged collection of dried plant specimens that were gathered, pressed, organized, and attached to a protective support material. The term also refers to the building or room housing a herbarium, or a box, cabinet, or book where the specimens are kept.

The LuEsther T. Mertz Library contains a collection of personal herbaria known as the Exsiccated Specimen Collection. It comprises more than 100 objects, dating primarily from the 19th century. The Collection includes the personal herbaria of botanists, botanical souvenir books of popular tourist areas, and many sentimental volumes of dried flowers from the Victorian era. The earliest item, Catalogus Plantarum Flore, assembled between 1660 and 1753, is a combination of plant specimens, manuscripts, collages, and illustrations.

Most of these herbaria do not include all required plant parts and the essential data necessary to make them suitable for the scientific study of plants. What these herbaria do offer is artifactual value, shedding light on a period when interest in the emerging science of botany greatly inspired many people, outside of the science realm, to collect plant specimens for their personal enjoyment and study.

The Survey

In 2016, as part of the Mertz Library's efforts to make all of its special collections available to the public, the Exsiccated Specimen Collection was cataloged using the Library of Congress Classification System. Following the Library's preventative preservation protocol the objects were inspected, given a deep freeze treatment at minus 40 degrees centigrade for 72 hours, and cleaned before they were catalogued and integrated into the Collection.

An item-level survey of the Collection was carried out to record and photo-document the physical characteristics and current conditions of each object in order to plan for rehousing, handling recommendations, and future treatment. Using FileMaker Pro software, a database was built using our standard book condition survey form. The form was adapted to suit the unique characteristics of the Collection by creating new fields such as "Loose Plant Matter."

Preliminary Survey Findings:

A Herbarium, plural Herbaria, is a composite object including essentially the following elements: the dry specimen; the support material (paper, cardstock, glass); adhesive (animal glue, gum Arabic, and others); attaching aids (thread, paper strips, metal pins); written notations in various media (iron gall ink, blue ink, printing ink, pencil), paper labels. Herbaria can be found as loose sheets or bound volumes.



Boxes - Containing Loose Sheets, Cards or Glass Plates

The Collection contains a variety of bindings and formats, including leather-bound albums, hand-sewn pamphlets, and blank books. Twenty percent of these herbaria are unbound, consisting of loose herbarium sheets housed in a box or portfolio, and a small portion without protective enclosures.



Several methods of plant attachment were observed, often applied simultaneously on the same page. The most frequently found is the use of adhesive either by direct application to the plant or on paper strips. Other methods included sewing with thread, applying selfadhesive cloth or paper strips, or cutting slits into the support to insert the specimens. There was no visual evidence of adhesive or other attaching materials in the wet-mounted algae specimens.





The majority of the Collection was stored in overfilled archival file boxes with items of various sizes stacked on top of each other. More than ninety percent of the objects require an enclosure and surface cleaning.

The Conservation staff at the Mertz Library conducted a survey of the Exsiccated Specimen Collection to better understand its preservation and conservation needs. The purpose of this poster is to share the preliminary findings of the survey, while engaging our colleagues in the uniqueness of this collection.

The Preservation of Plant Specimens: **Brief Historical Overview**



Left: NYBG Steere Herbarium Specimen collected by Daniel Atha in 2012 Right: Catalogus Plantarum Flore Specimen, ca. 1660 – 1753 These images belong to the C.V. Starr Virtual Herbarium of The New York Botanical Garden

The preservation of plant specimens on loose sheets of paper or in bound volumes has a history of almost 500 years. Luca Ghini (1496– 1556), an Italian professor of botany, is attributed with creating the herbarium as a collection of dried plants kept as a permanent record. He introduced the use of paper for drying plants under pressure, as well as providing the necessary support for mounting and protection for storage, handling, and transporting.

Handmade Pamphlet (1808)





One section sewn through the fold. Gray stains may indicate use of mercury chloride. Specimens attached with glue, paper strips, and pins. Notations in iron gall ink.

Blank Book (1880)



Full-leather, gold-stamped binding. Multi-colored pages. Plant specimens sewn in place or inserted through slits made in the pages.

Souvenir Album – Wooden Boards (n.d.)



Portfolio of Folded Sheets (n.d.)



Unattached plant specimens and handwritten labels inside folded

Eighty percent of the bound herbaria presented structural damage, probably due to poor quality materials and methods, inappropriate use, and poor handling.

Eighty-nine percent of all the objects presented loose and/or damaged plant matter, mainly due to the dried plants' inherent brittleness, adhesive failure, inadequate format, and poor handling.

The survey revealed evidence of previous insect activity in 17 objects. The insect damage was present almost exclusively on the plant matter, not the paper mounting supports or bindings. Within an object, some specimens severely affected by insects would be adjacent to specimens that were untouched. This could indicate some plants were more attractive to insects than others.

Unidentified gray stains haloing mounted specimens were found in two objects. This staining could indicate the presence of mercury chloride, which was used on the plant specimen as a preservative and pesticide.

The Plan for Preservation and Management of this Collection:

The presence of dry plant matter makes the objects more susceptible to insects and handling damage than traditional books and scrapbooks. Therefore, the first concern regarding the Exsiccated Specimen Collection was to reduce the risk of insect infestation. Since the preservation of past herbarium practices have been so successful, current methods were investigated and applied to our specific case. The Library's Conservators conducted research in botanical literature and consulted with the Curators of the Steere Herbarium to discuss and develop preservation guidelines.

The preservation needs for most Herbarium collections are similar to

The common practice of early botanists was to bind these individual herbarium sheets as books. All collectors had their own methods of organizing and documenting the specimens, and decorative elements were commonly added for embellishment. Portfolios were later used to protect loose herbarium sheets in place of binding them. This allowed more flexibility in managing the collection.

Swedish botanist Carl Linnaeus (1707–78) established new guidelines for standardizing herbarium practices in his publication *Philosophia Botanica,* 1751. Most notably he recommended keeping the sheets unbound with very specific data regarding the plant specimen written on them. This method facilitated the comparative study and rearrangement of specimens and was less physically strenuous on the plant specimens than bound volumes.

He also suggested storing the sheets horizontally, in specially designed cabinets, and arranging them according to his new system of plant classification that he introduced in his publication *Species Plantarum*, 1753. These principles remain standard requirements for scientists today.

By the end of 18th century, the bound herbaria were largely abandoned by scientists but continued among amateur collectors.

The LuEsther T. Mertz Library And The William and Lynda Steere Herbarium

The New York Botanical Garden was founded in 1891 primarily as a research institution dedicated to the study of the science of botany. The Mertz Library and the Steere Herbarium provide essential tools for the research work of botanists.

Album - Text Weight Leaves (1875)



Quarter-leather and paper album, sewn through the fold. Paper stubs allow room for plant specimens. Detached plant fragments in gutter. Graphite notations. The postage stamp fragments were used to attach plants to support and helped to roughly date album.

Album – Heavy Card Leaves (n.d.)









Olive wood boards with cloth or leather spines. Printed text and labels. Plant specimens neatly glued and pressed. Insect damage.

Portfolio of Pamphlets (n.d.)





sheets of thin paper. A rudimentary leather and chipboard portfolio houses the set.

Loose Sheets, No Housing (n.d.)





More than 100 seaweed specimens, wet-mounted with or without adhesive to thick paper cards. Cards are adhered overall to sheets of thinner, very brittle paper.

Box of Glass Plates (n.d.)



the needs of a library collection in that they both require a controlled, low temperature and humidity environment.

Flat storage of specimens are recommended and airtight containers/cabinets are used to prevent or contain potential insect infestation.

From this information, a preservation and management plan was devised for the Collection.

Our main objective was to stabilize the Collection, taking the following steps:

- 1. Freeze all objects for 72 hours at -40°C as initial preventative pest control
- 2. Clean each object using a HEPA-filtered vacuum cleaner. 3. Make individual wrappers for each object.
- 4. Provide standard sized enclosures for each object for physical protection that allows for easy insertion of new acquisitions.
- 5. Customize interior of boxes to secure object inside. Use envelopes to contain detached plant matter inside boxes. 6. Label with instructions for handling and warning of potentially harmful chemical residues.
- 7. Flat storage in sealed cabinets with insect traps for monitoring activity.

8. Maintain low temperature and humidity environment.

Once the stabilization of the Collection has been completed, investigation into the extent to which the specimens were exposed to fumigation and direct application of pesticides is significant. Knowledge of the risks involved and safe handling of these objects is essential.

Careful conservation and curatorial review will be necessary to discuss the use of the Collection and how to address detached or loose plant matter before any treatment is implemented.

The Steere Herbarium contains more than 7.8 million dried plant and fungal specimens, carefully preserved, labeled, and arranged for reference for the study of botany, taxonomy, ecology, and horticulture.

The Mertz Library counts among its holdings many of the most extraordinary and pioneering botanical and horticultural works ever created. Ten centuries of knowledge, from the 12th century to the present, are represented in the Library Collection, with particular strength in systematic, floristic, and economic botany and horticulture, gardening, and landscape design. These subjects are reflected not only in the large collection of books and journals but also in electronic databases, nursery catalogs, manuscripts, prints and drawings, and scientific reprints.



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Survey photos by Catherine Stephens.

Half-leather, gold tooled album. Plant specimens are attached with strips of colored, self-adhesive paper.



Published portfolio of five pamphlets. Letter-pressed labels. Plant specimens attached with strips of adhesive cloth, possibly "isinglass plasters," i.e., early adhesive bandages.

Box of Loose Sheets (1882)



40 loose sheets of paper, each containing one or more fully adhered plant specimens. Plants are labeled, dated in ink, and stored in repurposed wooden box.

16 mounted seaweed and algae specimens. Wet mounted to card and sealed between a glass plate and gray board with black tape. Stored in repurposed box.

"Have you made an herbarium yet? I hope you will if you have not, it would be such a treasure to you; most all the girls are making one. If you do, perhaps I can make some additions to it from flowers growing around here."

Excerpt from a letter by Emily Dickinson to her friend Abiah Root, 1845

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