University of Florida Herbarium

Preparation of Plant Specimens for Deposit as Herbarium Vouchers

FLORIDA MUSEUM OF NATURAL HISTORY

INTRODUCTION

A **voucher herbarium specimen** is a pressed plant sample deposited for future reference. It supports research work and may be examined to verify the identity of the specific plant used in a study. A voucher specimen must be deposited in a recognized herbarium committed to long-term maintenance. More information on herbaria may be found in our web document "Herbaria and Herbarium Specimens."

Why is voucher material needed? Plant classification is constantly changing. Shifts in species alignments and groupings are made as new evidence comes to light. Identifications are subject to change. Vouchers specimens help cross-reference these changes to previous research.

GETTING STARTED

Preplanning for the preparation of voucher specimens is crucial. Arrangements should include:

- **targeting collection locations and date** periods to obtain useful specimens;
- **obtaining collection permits** from appropriate agencies (this can take months); and
- **establishing official contact** with government, herbarium, and research personnel in the area you will be working. This is required by law in most countries.

PRESSING AND DRYING PLANT SPECIMENS

Specimens are pressed in a **plant press**, which consists of a wooden frame (for rigidity), corrugated cardboard ventilators (to allow air to flow through the press), blotter paper (to absorb moisture), and folded newspaper (to contain the plant material). The plant press is tightened using straps with buckles or bolts with wing nuts. The objective of pressing plants is to **extract moisture** in the shortest period of time, while **preserving the morphological integrity of the plant**, and to **yield material that can be readily mounted** on herbarium paper (an acid-free cardstock) for long-term storage.

In order to fit on a standard herbarium sheet, a plant specimen should be pressed flat to no more than 11 X 16 inches. If the specimen will not fit those dimensions, it may be folded or cut into sections. Multiples of smaller plants may be pressed together in order to provide ample material for mounting and study. Small loose pieces, such as seeds, may need to be placed in a small paper packet inside of the newspaper. Large fruits or bulbs are often cut in half lengthwise or in slices prior to pressing. In order to insure rapid and thorough drying, extremely succulent materials such as cactus stems may need to be sliced open and some of the fleshy interior scraped out. Each specimen should consist of a stem with attached leaves and, if at all possible, flowers and/or fruits. The roots of herbaceous plants should also be included. In the case of very large trees, shrubs, or vines, pieces should be selected to illustrate to the greatest extent possible the overall characteristics of the plant and the range of variation in flowers, leaves, and other structures. Each collection, i.e. gathering of a plant specimen, should be assigned a **collection number**. Data for each collection should be entered in a **field notebook** (see discussion of label data below). If ample material is available, a minimum of three specimens should be pressed for each collection, especially if collecting in a region where the flora is poorly known. This will help facilitate the identification of the plants through the distribution of specimens to various herbaria and researchers. An ethical collector will insure that his/her collecting activities do not pose a significant threat to the survival of endangered species or habitats.

Care should be taken to make good specimens. **Pressing material immediately upon collection** results in the best specimens. Samples that are allowed to wilt prior to pressing will generally produce inferior specimens. Plants should be **carefully arranged** as they are placed in the press to maximize preservation of diagnostic features. Leaves, flowers, and fruits should be spread out so that they do not overlap and can be observed from different perspectives. The collection number should be clearly written on the outside of the newspaper containing each plant specimen. The plant **press must be kept tight**; this prevents shrinkage and wrinkling of the plant material and yields specimens that are easier to mount securely on herbarium paper. The pressed plants must also be **thoroughly dried** prior to storage and mounting. Best results are obtained with the use of an electric drier that holds the presses and

provides steady bottom heat between 95°F and 113°F (e.g., see Blanco et al., 2006). A **low ambient humidity** and **good airflow** around and through the presses also insures rapid and thorough drying of plant material. As the specimens dry, it may be necessary to further tighten the straps on the press to minimize shrinkage and wrinkling. Rapid drying promotes the best retention of plant color, but excessively high temperatures or long drying periods can result in blackened, discolored, and brittle specimens.

Mounting and storage of specimens require a considerable financial commitment in the form of archival materials, labor, and storage cabinets. Herbaria have the prerogative not to accept specimens if the cost of labor/materials for processing is excessive or if the quality of specimens or accompanying data is unsatisfactory. Due to differences in mounting methodologies and materials, most herbaria prefer not to accept already mounted specimens. Because plant classification is generally based on the morphology of flowers and fruits, in most cases sterile (non-flowering or -fruiting) specimens will not be accepted.

IDENTIFICATION OF PLANT SPECIMENS

The identification of plant specimens requires a considerable amount of time and effort. It is important to find out what research is being or has been done on the flora of the region where you are working. A thorough literature review and consultation with herbarium personnel will give you a good basis for starting the identification process.

The identification of unknown plant material is accomplished with the use of **dichotomous keys; published plant descriptions, illustrations and photographs**; and **comparison with properly identified herbarium specimens**. A microscope is essential for the observation of many diagnostic features.

Regulations pertaining to collecting plants vary from country to country and state to state, so it is important for you to make official contacts well in advance. It is customary and may be required to deposit one full set of specimens in a herbarium in the host state or country. A local herbarium is the ideal place to begin your quest for identifications, as its collection may be the most comprehensive for the region. It may be possible to arrange to identify your plants and receive assistance from staff members at this institution. But, one must realize that the identification of even relatively common plants may be time-consuming. Most institutions run on tight budgets and do not have staff available to assist or supervise visitors. Even if you are not able to identify your plants to species, you may be able to roughly group them by family or genus. This will allow you to seek experts in specific plant groups who may be willing to look at specimens in their purview. Experts in the flora you are working with may be interested in your collections and willing to give assistance. Your collections may, in fact, be helpful to their projects.

When submitting a plant specimen for identification, it is critical that the sample includes flowers and/or fruits and a portion of the stem with at least several leaves attached. Information of the plant's growth habit, size, and the habitat where it is found (as well as any other features of the plant that may not be apparent from the sample, such as plant color or fragrance) often assist in the identification process. When submitting photos for identification include a general include full-frame close-ups of foliage as well as flowers or fruits. Be sure each photo includes a scale in

the form of a ruler or coin. The photos should be accompanied by the same descriptive information provided with a pressed plant sample.

HERBARIUM SPECIMEN LABELS

A plant specimen is incomplete without label data. Label data is a form of field data and must be accurate. The following are important elements:

- **Scientific name**: genus, species, authority, infraspecific information
- **Determiner** of the scientific name: the name of the person who identified the plant
- **Detailed location**; the location is used by researchers on several levels:
    - for general mapping to region, county or province;
    - for detailed mapping, as in GIS computer applications;
    - to physically locate the plant(s) in order to obtain further research material. The location should consist of: country, state or province, county or municipality and a description of the location in reference to roads, road junctions, mile markers and distances from cities and/or towns. Latitude and longitude, section, township and range, and elevation may also be helpful. A location taken with a Global Positioning System (GPS) is a desirable complement to the locality description. GPS coordinates MUST include a datum!
- **Habitat**: the type of plant community where the plant is growing and, if known, other plants growing in association
- **Plant habit**: describes the form of the plant (tree, shrub, vine, herb) and its height. Examples: tree, ca. 50 ft. tall. sprawling herb
- **Frequency**: is the plant rare, occasional, frequent or common?
- **Plant description**: describe characteristics of the plant which may be lost upon drying, such as flower/fruit color and fragrance, leaf orientation and aroma
- **Collector name**: it is recommended that the collector be consistent and use their full first name, middle initial (or full name) and full last name.
- **Other collectors (*see label examples note below)** present with the collector
- **Collection number**: a sequential straightforward numbering system (1,2, 3, ...) is preferable.
- **Date of collection**: a format with the month spelled out or abbreviated and 4 digit year will prevent confusion. E.g., 3 May 2003, not 3/5/03 or 5/3/03.

Label Examples

* Please note, label formats vary considerably. We currently recommend that determiner be paired with the identification. There are two standards to denoted multiple collectors and a collection number. E.g.:

- David W. Hall #1946 with Chuck Nance and Allen Ake - where the collection number is know to be that of David W. Hall and may be cited as David W. Hall #1946 but is sometimes also cited as: David W. Hall, Chuck Nance and Allen Ake #1946.
- David W. Hall, Chuck Nance and Allen Ake #1946 - where the collection number is

theoretically that of the first collector but the number could also be a team number. This should always be cited as: David W. Hall, Chuck Nance and Allen Ake #1946

Herbarium of the University of Florida
Gainesville, Florida, USA

PLANTS OF FLORIDA

SCROPHULARIACEAE

***Striga gesnerioides* (Willd.) Vatke**
det. D. W. H.

POLK COUNTY: Just S. of Bartow city limits, ± ½ mi. E. of US 17, along S. side of Clear Springs Rd. 2 populations: ± 1800 ft. E. of railroad tracks and ± 45 ft. S. of center line of rd.; ± 400 ft. further E. and 95 ft. S. of center line. Flws. lt. purple; infrequent.

coll. David W. Hall # 1946 17 August 1993
with Chuck Nance and Allen Ake

Herbarium of the University of Florida
Gainesville, Florida, USA

CULTIVATED PLANTS OF FLORIDA

Nandina domestica Thunb.
det. K.D.P.

ALACHUA COUNTY: Gainesville, University of Florida campus, cultivated at south end of west side of Rolfs Hall. Cylindrical shrub, ca. 1 m. tall. Fruit bright red.

coll. Kent D. Perkins # 5555 12 Dec 1999

PLANTS OF BORNEO

Artabotrys suaveolens Blume
Det. J.C. Regalado, 1987

Malaysia. Sabah. Tambunan District: Crocker Range, Km 64.5 on Kota Kinabalu - Tambunan Road. 5°46'N, 116°21'E. Elev. 1220 m. Montane dipterocarp forest. Crocker Formation. Woody climber on roadbank.

John H. Beaman 7178 9 October 1983
With: Reed S. Beaman and Teofile E. Beaman

Herbaria of Michigan State University (MSC) and Universiti Kebangsaan Malaysia, Sabah Campus (UKMS)

PROJETO FLORA AMAZÔNIA
Instituto Nacional de Pesquisas da Amazônia
The New York Botanical Garden

Rhabdodendron amaconicum (Spr. ex Benth.) Huber

Mun. Óbidos, Pará. 91 km de Oriximiná nos Campos de Ariramba, entre rio Jaramacaru e Igarapé Mutum. Aprox. 01°10'S, 55°35'W. Campina aberta, solo areno pedregoso. Arbusto de 4 m de altura. Frutos com cálice esverdeados. Fruitos imaturos verdes.

C.A. Cid Ferreira, 9749 04 DEZ 1987

Plantas coletadas com apoio de ENGE-RIO e Mineração Rio Norte, com participação de C.A.C. Ferreira, C. Farney de Sá, G. Martinelli, E. Soares, C.D.A. Mota de E.F. Batista.

Annotations
Specimens are frequently re-identified once the original label is prepared and/or the specimen has been mounted. These re-identifications are recorded on annotation slips.

MOUNTING HERBARIUM SPECIMENS

Mounting is the process of affixing a dried pressed plant and its label to a sheet of heavy paper. This provides **physical support that allows the specimen to be handled and stored** with a minimum of damage.

Prior to attachment, the specimen and its label are laid out on the paper to allow maximum observation of diagnostic (usually reproductive) features as well as the range of variation in vegetative structures, including both sides of the leaves. Plants are generally **positioned in a life-like arrangement** (that is, with roots or lower stem toward the bottom of the sheet and flowers toward the top). When laying out the plant, be sure to leave space on the sheet for the **specimen label**, **annotation labels**, and institutional **accession seal**. A **paper envelope or packet** should also be attached to the sheet to contain any fragments of the specimen that break off over time. Once the optimum arrangement of the specimen has been determined, it is attached to the sheet using a combination of glue and strips of gummed linen cloth tape. **Glue** is used sparingly to attach the larger portions of the plant, such as stems, large leaves, and fruits. **Gummed linen mounting strips** are then applied to reinforce portions of the plant that might be torn loose as the specimen is used. Large or bulky items may need to be sewn onto the sheet with a **sturdy linen thread**. The objective is to secure the specimen firmly to the mounting paper, while leaving some pieces of the plant loose enough to be removed if necessary. Excessive applications of glue that embed flowers and seeds on the sheet may make it impossible to observe diagnostic features or to remove samples, thus rendering the specimen useless for scientific study. The best way to learn proper mounting procedures is through hands-on training and practice with a variety of plant specimens. Because herbarium specimens are intended for long-term study and storage, it is critical that that all supplies used for mounting be both **durable and archival**. Archival denotes materials that are free of acids and other compounds that may cause them or the specimen to degrade or discolor over time. Consequently, the mounting paper, label paper, packet paper, ink, glue, mounting strips, and storage folders should all be acid free and designed for long-term stability.