#### **A Guide for Your Plant Collection**

#### **Introduction**

#### Use common sense when collecting. You may collect plants from anywhere you’d like, **except** you may not collect in state or federal protected areas (nature reserves, national parks, state parks, etc.), as these areas require special permits. You may collect on campus as long as you do not damage horticultural plantings. If you collect on private land, be sure to get permission from the homeowner. Many a collector has been chased at gunpoint because they didn’t obtain permission! **Never collect rare plants**: for example, if you see fewer than five wildflowers growing in a field, do not collect them.

#### Follow the guide provided below closely and you will be successful. Material from this guide will be included on quizzes or the final exam, so please make sure that you study this information in your preparation for such examinations. Feel free at any time to bring in your collection for advice on any aspect of the collection or for assistance in keying out your specimens. Procrastination until the last minute results in badly prepared and mis-identified specimens, along with poor grades. **Specimens that are not completely dry will not be accepted under any circumstances, so start early to ensure your collection will be complete in time for the due date.**

#### **The purpose of collecting**

Today there are two main reasons for collecting plants.

1. The first is to obtain records and specimens of plants to be stored in a **herbarium** (a permanent storage facility where pressed, dried plant specimens used for research). Properly run herbaria where specimens are suitably stored and catalogued have great scientific value. They are almost always pleased to accept good, correctly labeled specimens and are generally willing to allow serious workers access to their collections.
2. The second major reason for plant collecting is to later identify an unknown specimen encountered during fieldwork. Often these specimens consist of small, atypical plants with no flowering or fruiting parts. Experts working in the herbarium may be able to identify these specimens by studying other collections as a reference. Any vegetation survey (also called a **flora**) should include, where possible, collection of at least one specimen of each species encountered. This is known as the **voucher specimen** and should either be kept by the worker for future reference if needed, or stored in a local herbarium. The Hollister Herbarium at Tennessee Tech University (HTTU) currently has about 30,000 specimens. You will be contributing to this collection and your work will be permanently archived as part of the herbarium.

#### **What to look for in a specimen**

Specimens for collection should be as complete as possible. Ideally **flowers** and **fruit** should be included, as well as **vegetative** parts. Clearly, in most cases, this is impossible since ripe fruit and flowers do not usually occur at the same time. Often, however, remains of growth from the previous year can be found at the base of the plant or on another specimen nearby. Only collect fruits or seeds on the ground if you are absolutely certain that they belong to the same plant or the same species.

Specimens should be typical and healthy, with at least some fully expanded leaves where possible. Avoid taking diminutive individuals because they fit into a press more easily or are easier to reach. Take the plant from its typical habitat. If a species normally grows in woodland, do not collect specimens growing by the roadside or in a clearing. Sometimes leaf shape, flower color and other characters are completely altered on plants growing outside their usual ecological habitat.

#### **What to collect**

The whole of small vascular plants should be collected including the underground portion. Roots, trailing or underground stems and storage organs are often helpful (and sometimes essential) in identifying specimens. A strong knife or small trowel is helpful for digging out a plant. Excess soil can be shaken off, or washed off carefully if water is available.

When taking the whole plant is out of the question, specimens containing all essential features (all leaf types, twigs, flowers, fruits and so on) must be cut from the plant. If the species is a large herb such as a thistle, the specimen should include basal leaves as well as enough stem to show the range of stem leaves and flowering and fruiting material. Shrub specimens should include leaves, old and new twigs, buds where possible, and fruit and/or flowers. If lower and upper leaves are different, or there is significant variation between a shaded and unshaded side of a tree, then collections should be made from both. To minimize damage to parent trees and to specimens, twigs should always be cut off cleanly with a sharp knife or pruners. Breaking the twig can strip the bark and ruin a specimen or cause unnecessary harm to the tree or shrub from which it was taken.

#### **How to collect**

Ideally, collections of vascular plants should be put immediately into the field press, because this produces the best looking specimens. Field presses are rather bulky to carry around and may prove impractical in some cases. Collecting into plastic bags is another option. A range of bag sizes should be available. Small plants can be placed singly, or two or three together if necessary, in a suitably sized bag. Care should be taken to keep collections as cool as possible and prevent them from being crushed. Plastic bags are not recommended for serious collecting because the risk of damaging the specimen is very great. Petals are likely to be knocked off, and stems will almost certainly be bent or broken.

With each plant, and firmly attached to it if several plants are collected together, should be a label bearing a collection number which corresponds to numbered notes in the collecting book. Jewelers' tags are an excellent means of labeling plants because they are easy to tie on and, being cardboard, can be dried easily.

#### **Notes to take**

Every specimen should be accompanied by comprehensive notes. For this class, you will record the field data on a datasheet, and you will then transcribe that into a MS Excel file to be turned in as part of your collection. If you continue to collect plants in the future, you may want to start your own field notebook with the same type of information. Many botanists accumulate several notebooks over the course of their work, and can refer to them whenever necessary. These notes may not only aid in identification of the material, but will later be used to complete the information on the herbarium label. It is far better to take **too many** notes than **too few**, and is dangerous to trust information to memory, especially as there may often be several months or more between collection and processing. You will be given a pre-formatted collection handout that you can use in place of a field notebook.

The collection notes for each specimen should contain the following information:

**(1) Collection number:** A serial number specific to collector and specimen. The number may start at 1 and continue through the collector's lifetime. For the purposes of our class, simply list your first name initial, followed by your last name, and then a number that will start your personal collection. There is always one person called the “senior collector” associated with the collection. You may have others in your “team” but your name/number is the only one that will be permanently assigned to that specimen. If you collect a plant on your own, you would simply list your collection as:

S. Krosnick #45

However, if you went out collecting with a friend, and you were the senior collector, you would write:

S. Krosnick #46, with C. Jones and J. Peterson

This lets the reader know that you were the one that made the collection, but other people were in the field with you.

**(2) The Latin name of the plant:** This is important as it helps the collector remember the individual specimen even if the labels are accidentally lost or mixed. Ideally you will try to identify each plant to **plant** **family, genus and species**. For example, if you collect a magnolia tree with fruits on it, you would write in your notebook it as Family: Magnoliaceae and list the genus and species as *Magnolia grandiflora.* Even if the collector has no idea what the specimen is, it is sometimes useful to give a completely arbitrary name such as "lacy moss" or "big leaf". This has a double advantage in vegetation surveys in that this name can then be applied to other specimens of the same species if they are encountered before the material has been identified. This way there is no need to collect the plant more than once or try to remember if it is "Unknown A" or "Unknown B." Also, remember that it is **always** easier to identify plants from fresh material. Take the determination of the plant as far as possible while you are in the field to save yourself headaches later.

**(3) Locality:** This should be as detailed as possible, including the name of roads, lakes and so on in the vicinity, as well as county, township or district. The latitude and longitude will be needed for the herbarium label. Many people have GPS information on their phones and can map waypoints (lat, long) using Google Maps. We also have a handheld GPS unit you can check out to use while in the field. You can never have too much detail in the locality information.

**A good way to test yourself for “enough information” is to simply imagine trying to find the same exact location in 20 years based on the information you put on your label: would you be able to get there easily? If so, you probably have enough detail.**

**(4) Plant Description:** This should include everything about the plant that is not obvious on the herbarium specimen. Essential items are the height, type of bark, whether the stem is upright, sprawling or drooping, obvious smells, whether the plant is clumped, single or growing in patches, and the presence of creeping or underground stems. Flower and fruit colour should also be noted as these often fade on dried specimens.

**(5) Habitat:** This should include the general habitat as well as more specific details of micro-habitat. Important points are type of soil or other substrate (sand, clay, granite, dead wood, other vegetation), associated species, moisture and aspect (fully exposed on a south facing bank; in a damp hollow under dense scrub, etc). The more careful and detailed such notes are the more useful they become.

**(6)** **Date.** This seems obvious, but it isn’t quite as easy at it seems. What date is 3/9/11? March 9, 2011, right? Well, if we were in Europe, the date would be interpreted as September 3, 2011. If you collect something important, someone in Europe might want to study your specimen, so this isn’t as trivial as you might think. Avoid this by writing out the entire date in full. For example: 3 September 2011.

**(7) Names of collector(s).** See the notes above on the senior collector and the “field team.” Be sure to list everyone that was with you at the time of the collection.

**(8) Notes:** Space should be left to note the name of the person who makes the final determination (identification), the date on which it is made and the place were the specimen is sent or stored. The receiving herbarium will also add an accession number to the specimen.

#### **Pressing and drying vascular plants**

The most important thing to do with freshly collected material is to dry it out as **quickly** as possible. This prevents fungal infections and preserves color. Usually this means that plants should be pressed **the same day they are collected**. It is an important aspect of plant collecting that enough time be left at the end of the day to process the specimens. If this includes identification, this stage may be quite slow. When plants have to be left overnight they should be put in a cool place. Sometimes woody specimens can be placed in water for a day or so to force buds or restore wilting leaves before pressing. In general, however, you’ll want to collect the plants and press immediately, if possible. The herbarium (PENN 204) has a plant drier cabinet available to students. This cabinet uses a heater to force warm air through the plant press. Specimens will be dry in 3-7 days, depending on the thickness/density of the specimens (see the next section for more detail).

#### **The plant press**

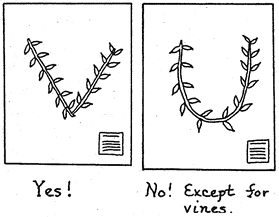
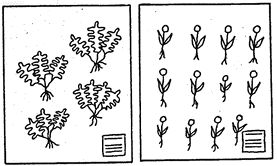
The plant press is designed so that plants can be dried quickly while being pressed flat. It consists of two cross-slatted wooden frames about the size of a folded newspaper (about 11” x 14”). Plant specimens are laid in folded newspaper between layers of blotter sheets and corrugated cardboard. The newspaper provides a folder for the plant. The paper, blotter and foam draw the moisture away from the specimen. The cardboard allows air circulation within the press to speeds up the drying process, and helps keep the specimens flat. Plants in their newspaper folders are piled in layers of alternating blotter and cardboard on one of the wooden frames (i.e., cardboard - blotter - folded newspaper [with plant inside] - blotter - cardboard - blotter - etc.). When laying out of the specimens is complete, the second frame is laid on top of the pile which is compressed and strapped as tightly as possible. The press is then placed to dry in warm (not hot), dry, circulating air. After this, the specimens may be left undisturbed for several days or weeks until they are completely dry and the press can be emptied. The straps have to be tightened periodically as the plant material shrinks.

Herbaria have special drying cabinets in which the presses are dried. In the field drying is not so easy, but it should have priority as specimens are easily ruined if they remain damp. A press left upright on a rock, or kept on a car roof rack, where air can circulate will dry much faster than one left lying in a tent, vehicle or room. If you don’t have access to a drying cabinet you may try to dry your press in your car by leaving it on the back seat on a sunny day. Cars regularly heat up to more than 200°F, and can help dry specimens quite quickly. Leave your press in the car for several days to dry your specimens if need be.

#### **Laying out the specimens for pressing**

Two important points should be kept in mind when plants are prepared for the press: (i) that the dried specimen should fit neatly onto a standard herbarium sheet of 11 x 14 inches; and (ii) that as many features as possible should be visible on the mounted specimen. Here are a number of tips, which, if followed, will help produce attractive and worthwhile mounted material. With experience, all collectors develop their own techniques.

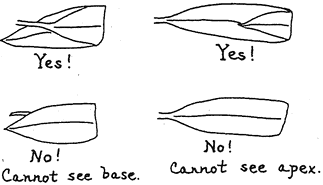
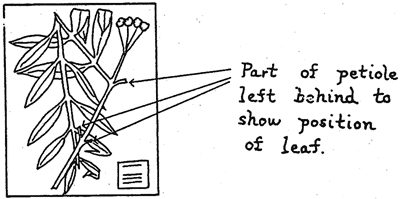
If a specimen is too tall to fit in the press or on the herbarium sheet, make a zig-zag bend in the stem. This shortens the effective length of the specimen without any of the material being lost.

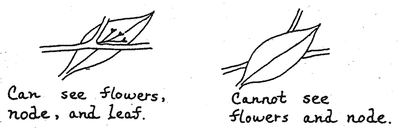
*You should always fold long Small plants require multiple stems to fit on the sheet collections to fill a sheet*

Too many leaves on a herbarium sheet look untidy and can obscure detail. Where it can be done without destroying information, snip off some of the leaves, but ALWAYS leave part of the petiole so that it is evident that leaves have been removed.

Branches that are not naturally flat can be made easier to press if the angles or twigs are bent in the appropriate direction before the plant is laid on the newspaper. Care should be taken not to actually sever twigs or leaves.

The specimen should be laid out so that there is **minimum of overlap** between parts. Sometimes this involves spreading the plant unnaturally. Start near the folded edge of the newspaper and hold the parts in the desired position. Fold over enough newspaper to cover these parts and hold it down with the flat of the hand. Then move to the next portion of the plant, arrange it and fold down a few more centimeters of newspaper. Continue until all the newspaper is folded down and the flats of two hands can cover the whole sheet. You will find that you sometimes need all three hands as well as your chin for this process, but it will be worth it when you finally see the specimen mounted.



**YES! NO!**

When stems are very thick they can be sliced lengthwise so that they are less bulky. Leaves of plants with thick stems do not always get sufficiently pressed and may tend to wrinkle. Using foam sheets helps prevent this because the foam molds itself around the specimen and ensures an even pressure throughout. The end of woody stems should be sliced diagonally so that the color of the wood and pith are displayed.

Leaves or petals that have wilted, or are folded over, will not always lie flat for pressing. By the time the newspaper is dry the leaf will have stabilized and cause no more trouble. On every mount, the back of at least one leaf should always be visible. Sometimes this involves twisting a petiole to obtain the desired effect.

If there are several flowers on a specimen, some should always be pressed open and flat so that the inside is displayed. This can usually be achieved by careful, deliberate pressure with the thumb before the newspaper is folded shut.

Loose seeds and fruit can be placed in a small paper packet or mailing envelope and pressed with the specimen. Later this packet will be glued to the herbarium sheet. Some conifers loose most of their needles on dried specimens. Once the material is dried, the needles can be shaken off and placed in a packet.

#### **The label**

Most herbaria have printed labels about 8x10 cm (about the size of a notecard), which are filled in and glued to each herbarium sheet in their final form. **For this class, you need to turn in: 1) your loose collection in the newspaper you pressed it in, 2) the label (as below) in the newspaper as well (do NOT glue, tape, or staple the label within the newspaper).** A typical label (ca. 4 x 5 inches) is shown below:



This label format provides room for all the essential information noted by the collector at the time of gathering. Note that the species is identified to genus and species, with the author of that name correctly cited (Linnaeus as “L.”).

Plant collecting and pressing is an extremely enjoyable and rewarding experience, and you will learn a great deal about Tennessee local flora by completing this exercise. If you have any questions throughout the process, please do not hesitate to ask! **Happy collecting and good luck!**