

Biol 3306 Plant Collection Project

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Collection project overview

A portion of your grade in this course (20%) is based on a plant collection you will build over the next few weeks. You will collect specimens so that they could be deposited in a herbarium and a few of your specimens that are of particular interest might be thus deposited.

Herbaria were originally developed as a taxonomic repository to aid in correctly identifying and circumscribing plant species. Plant systematics remains an active field and many modern herbaria have digitized their collections so that high definition images of the herbarium sheets can be viewed online. Modern herbaria have taken on new importance as evolutionary biology and ecology have advanced. In particular, historical collections have been used to document changes in species composition, ecology, and the environment in ways that may not have been envisioned by early collectors (Meineke et al 2018). For example, Munson and Long (2017) recorded shifts in flowering time of grasses across the western USA based on examining herbarium specimens. John Cristy and colleagues (2009) used collections from herbaria around the Portland region to study the biological factors that have influenced invasion success of new plant species introduced to the area. TTU professor Dr. Matt Johnson and his students are using herbarium specimens from the Guadalupe Mountains of west Texas to study vegetation changes in our region and in what is now Guadalupe Mountains National Park.

The E.L Reed Herbarium at Texas Tech University (<http://www.mossmatters.com/herbarium/>) was started in 1925 and stores over 20,000 recorded specimens, with 10,000 still to be entered into the collection. Your collections have the potential to contribute to this ongoing effort and addressing the systematic, evolutionary, and ecological questions of future researchers.

Project details

This semester 20% of your grade will be based on the quality of your plant collection project. You will submit 10 specimens, pressed and dried, identified at least to family. You must include well documented collection information such as the altitude/longitude coordinates of the collection location and notes on the plant community around the collected plant.

You will turn in the project in two stages: On October 16th, the first 5 specimens and corresponding notes are due. On November 20th, the entire collection is due along with at least one fully mounted specimen ready for depositing in the EL Reed Herbarium and with your full collection notebook.

IMPORTANT: You will need to collect while plants are still flowering. In some years, that might be as late as the end of October which is typical first frost in Lubbock. However, you should aim to have all or most of your specimens collected by the end of September to be absolutely safe. If you wait until October to collect, you could be too late.

Project grading

At the first project due date you will turn in five pressed specimens in newspaper identified at least to family. You will turn in typed collection notes and identification details with the five specimens. Use

cardboard sheets to protect your specimens and bind the outer cardboard sandwich with binder clips to keep them together. This is worth 20% of the project grade and you will be scored on the quality of the collection and pressing (identifying features such as flowers or fruits present, material pressed well) and on your identification to plant family using the keys provided.

On the final project due date you will turn in 10 specimens (these can include the five submitted before or all new ones). One specimen must be mounted on archival paper and have a correctly filled out label. We will have a class dedicated to this mounting process and have a set of times the herbarium will be open for you to complete your mounting the week before the project is due. The other specimens can be submitted as they were for the initial submission. You will need to select the specimen for mounting about a week before pressing and keep it in a freezer for several days before mounting.

Project grading (100 points possible)

Initial October submission

There are up to four points per specimen for 20 points total. Scoring rubric: 1-2 points each specimen based on selection and quality (wild plants only with location information, good flowering material, well pressed), 1 point for correct family identification, 1 point for quality of collection notes.

November submission

The submission is worth 80 points but 100 points are possible — so it is possible to receive extra credit on this portion!

The Rubric:

- 10 points available for the single mounted and fully identified specimen. Of these 10 points, 5 are for the quality of the pressing and mounting and selection of material and 5 are for the included label and accompanying identification notes.
- There are 7 points available for each of the 9 additional specimens (based on quality of specimen and pressing, and quality of the id to family).
- There are 2 points per unique plant family in the collection. With four unique families you will can obtain 81/80 points! And that is even without any of the unpressed specimen being identified to species. 91 out of 80 points are actually possible if you provide 10 unique families.
- One additional point per specimen correctly fully identified to species (of the nine unmounted). Therefore, 100 points are possible out of 80 if everything was pressed and mounted perfectly, all were good wild collections, and everything was correctly identified all the way to species.

Instructions for plant collection and pressing

Materials you will need

We will provide plant presses and hand lenses.

- Plant press (check out in class) and newspapers, blotter paper, cardboard for the press
- Hand lens (checked out in class)
- Field notebook and pencil/pen (prefer bound notebooks)
- GPS or GPS phone app for marking geographical location records. Record the latitude and longitude of each specimen.

- Pocket knife or garden trowel for digging small plants
- Optional: a shovel to dig out large plants with deep roots
- Masking tape and sharpie are useful for marking individual plants (tape around bunch or stem) when collecting if pressing later.
- If you will collect several specimens and then press them all at once a bit later, a plastic bag is helpful. Use a plastic garbage bag with a moist paper towel inside. Make sure the bag is large enough for the plants you are going to collect that day. This is for collecting while walking around and keeping specimens in suitable condition for pressing later that day.

You do not always need to carry the press to the field, you can press back at your vehicle or even at home or lab. However, you do want to press as soon after collecting as possible with the caveat that species identification is often easier BEFORE pressing.

How to collect plants

To make a good herbarium specimen, plants collected should have intact organs such as leaf, stem, root (for small plants), flower (usually necessary for identification) and fruit (if present). For large plants such as shrub and trees, root is not required for collection, however, for herb and grass, root is usually collected along with and is attached to aerial parts.

At the time of collection, collector should take notes in a field notebook about the possible characteristics for identification (especially whether the plant is an annual or perennial), collection date, collector, collection number (continuous personal collection numbers for you lifetime), habitat characteristics including soil type and co-existing plants, color of fresh flower, leaves, fruits, scent, and plant size and any other pertinent information that may not be obtained from the resulted specimen. Use only one page per collected specimen so as to leave room for notes during later identification using taxonomic keys.

Take a photo or several of the plant before you collect. Note the photo number/file name in your collection notes. This is useful for identification and can also be uploaded to iNaturalist (but see below for instructions and warnings!)

It is helpful to have extra plant materials if you are not able to key the plants out at the scene as plant identification usually requires dissection of the plant material.

Collected material should be stored in a plastic bag. You can collect multiple plants into a large bag; simply use masking tape to label each one with its collection number. Inside the bag, place some moist paper power to prevent the plant from wilting. If you are going to press the plant in the field, take newspaper and plant press with you. You can store plants for 24 hours usually in a refrigerator in the bag without damage. But plan to identify and press soon.

How to press plants

Open a single newspaper sheet and place the plant flat between the two halves. Lay out plant parts with all diagnostic characteristics viewable from a single side (eg one leaf turned with top surface up, another with the bottom up). Make sure both sides of the leaves are visible, and turn flowers/fruits in various directions so the fronts, sides and backs of them are visible. Long, slender plants can be folded in a zigzag fashion or clipped in strategic locations to fit inside the newspaper sheet. Bulky parts and fleshy fruits can often be halved or sliced before pressing. Odd fragments (bark or large hard fruits) should be kept in numbered or labeled envelopes or packs and attached to the main specimen.

Always write down collection number on the newspaper, plastic bag and notebook along with other information. Make sure the collection number on your collection bag, newspaper and field notebook always match. Use the lower right margin on the newspaper to put the id number. When you have made a tentative id, you can add that to the newspaper as well.

If you are going to mount the specimen you are collecting, think ahead about how you are going to lay out the specimen on a mounting paper to make it identifiable to people who use it as a learning resource. Once the material dried out during press, you can't change the layout anymore.

Reference: <https://www.brit.org/plant-collection-and-preservation> .

Identification

I will teach the basics of plant identification by using my own simple key to plant families and by using floras (plant id books) that contain dichotomous keys. I will also teach you how to use iNaturalist, which is an app and community project for collecting species records. Please be careful using this app and learn to use it correctly because improperly entered records pollute the data.

References

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