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Vintage Plant Pressing techniques in STEM

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Vintage Plant Pressing techniques in STEM



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Goals and Objectives:

Students learn classic plant collection techniques through the use of plant presses utilizing the always present weedy plant of South Florida! In this project, students learn plant growth and anatomy through the collection, pressing, and identification of the weedy plants that grow abundantly in our South Florida Urban landscapes! The beauty of this project is in the discovery of the intricacies of weedy plants, while also applying classic botanical collection and identification techniques. Much like our early 18th century botanists' Carl Linnaeus and John Bartram, students will process and describe vegetative and reproductive characteristics of the common weeds found around their community grounds. As a class, many species can be contrasted and their natural history and ecosystem resources uncovered!

Here are some examples of how this lesson could be applied:

- Students learn to find candidate specimens and identify reproductive structures.
- Students learn basics of Plant anatomy: Parts of a plant including root, shoot, leaves and reproductive structures (inflorescences and flower characteristics).
- Students apply systematic observation skills as they process and press their plant specimens by using templates.
- Students identify and review the natural history of their collected plants using a combination of field guides, inaturalist app, and online plant blogs &/or digital data bases.
- Students apply proper binomial nomenclature, classification and taxonomy skills to the level of Family, Genus, species & common name(s).
- Students complete written descriptions of where their plants were collected including Abiotic environmental factors (sun, temperature, location, soil type,...) and Biotic factors (plant animal interactions such as pollination and seed dispersal).

- Students create anatomical drawings and annotations of their specimen observations and gain insight into detailed scientific documentation.
- Students mount and label dried specimens identical to a herbarium specimen. Insight into plant herbarium collections and their importance in plant and ecosystem science research is gained.

This project is fun! It opens up a world of wonder towards plants using simple collection techniques of herbaceous 'Weeds'.

Historical and meaningful understanding is gained in a hands-on way! Botanist and naturalist John Bartram from Colonial America did not know the name of the plants he collected on his 'Travels' in the 1730's, yet he did press many plants and send them to his colleague Carl Linnaeus across the Atlantic ocean! In these activities, students get to 'discover' plants in the same way - through collecting and documenting them!

Teachers will want to attend this workshop because they can easily cater the activities to the level of STEM they want to teach! Lots of specific digital support resources such as databases, blogs, textbooks specific to South Florida Botany and more is easily available via the internet.

Florida Standards:

SC.4.L.16.1

Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.

SC.1.L.14.2

Identify the major parts of plants, including stem, roots, leaves, and flowers.

SC.912.L.14.53

Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.

SC.4.L.17.4

Recognize ways plants and animals, including humans, can impact the environment.

G.K12.3.1.2c

Scientific Method - Perform: Construct scientific research using proper protocol for scientific study.

Course Outline and Overview:

The focus of this course is to experience and gain insight on plant collection, documentation and mounting techniques used in Plant science and Herbarium collections. Furthermore, emphasis is placed on the connections between our Urban pollinator interactions with plants and concepts of conservation and services provided by ecosystems.

Four activities are included that can be broken down into separate labs and classroom activities. These include

1. Ecosystem resources investigation.
2. Plant herbarium collections
 - a. Plant Collection techniques
 - b. Systematic observations of plants (& their anatomy)
 - c. Herbarium sample processing
 - i. Plant pressing techniques
 - ii. Plant mounting techniques



Lesson Plan and Step-by-Step Instructions:

This next lab assignment culminates our study of Angiosperm anatomy (see online textbook [Botany in Your Backyard](#) Chapters 6, 7 & 8) by requiring you to thoroughly document the vegetative and floral anatomy for a single species of a flowering plant you are to collect 'from your own backyard', school yard, or community park area. Ultimately some of the collections could be added to a classroom Herbarium collection which provides a resource for continued investigations on our local pollinators in our urban community in South Florida.!

Pre-assignment I- ecosystem resources from flowering weeds: watch and take notes on pollinators from the following two videos. The goal of these videos is to stress the importance of urban area ecosystem resources to insect biodiversity.

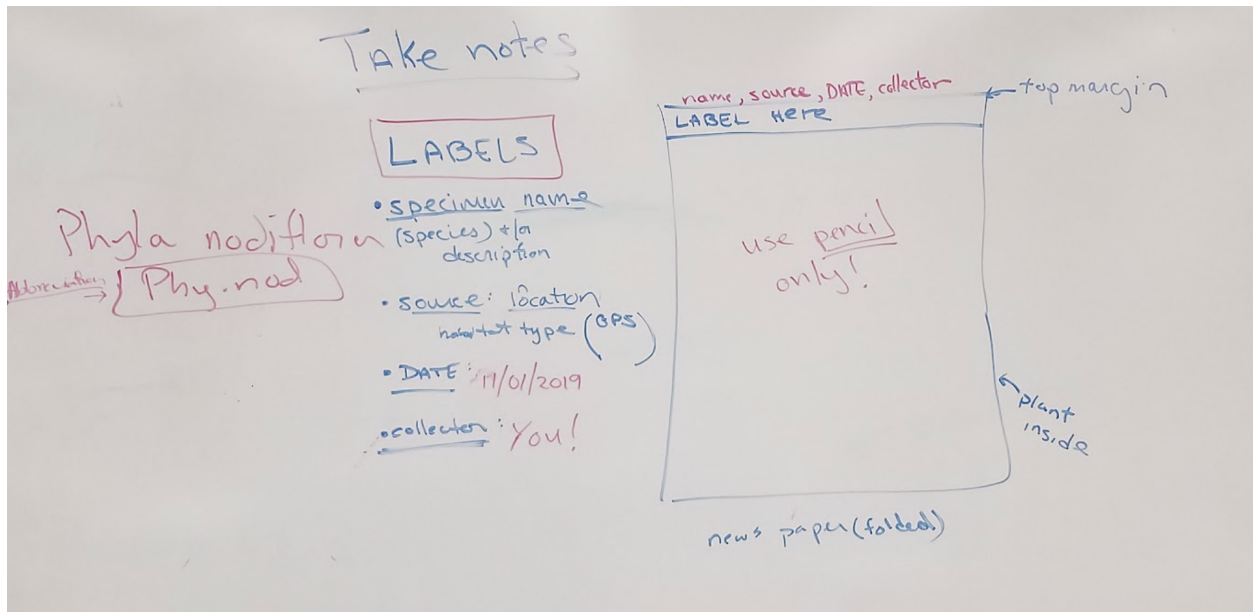
- [Pollination: Trading food for Fertilization](#) (11 min)
- TED talk by Marla Spivak: [Why Bees are disappearing](#) (16 min)

Note: BYBY Chap 7 on Inflorescence, Pollination & Fruits will revisit Pollination topics!

Pre-assignment II- how to press and mount plants. Review videos in advance with your class. Then review briefly in person the day of each activity.

Watch the below tutorials together and then review:

1. How to press plants- [Dr. Lee Vines](#)



See above drawing for details on how to label newspapers in your plant press. Always use a pencil and write at the top of the newspaper; otherwise this will be hard to read once your collections are stacked within the press. Include Specimen name &/or description, the habitat type and location (source), the date collected, and name of collector!

Optional: Suggested grade rubric: 4 points total

2 points: quality of specimen collected: includes multiple leaves & flowers (if applicable), no roots.

1 point: front and back leaves are positioned in specimen

1 point: proper labeling information included in the top left front corner

2. Herbarium Mount: [Preparing an Herbarium Mount \(Lee Vines\)](#)

Optional: Suggested grade Rubric:

1 point Label correctly filled in

1 point specimen properly placed

1 point folded leaf with apex visible.

1 point presence of reproductive structure.

Instructions:

1. **Collect a plant specimen** from an Urban Meadow Habitat- (30-45 minutes); be sure there are flowers &/or fruits present on your specimen. In other words, find an untended weedy patch of 'grass' and collect a flowering weed from it! Remember to take notes for identification and habitat while collecting (see template below). Have students collect different types of flowering weeds. They can work together on the same assignment BUT use different plants! It sets the stage for students to work together.

Materials:

- Plastic publix style baggies or gallon ziplock bag
- Scissors
- Garden gloves (optional), scissors, plastic
- Botany 10x hand lens or loope (optional)



2. **Make detailed observations back in the classroom:** (one or two 60 minute sessions depending on the level of detail you require from your students)

Observe and identify the anatomy of your plants. Set up a template either on a **google sheet, google doc, microsoft word, or powerpoint doc** (per your preference). See Template below.

Materials:

- **Digital resources open or up on the promethean board**
 - [Botany Companion \(& Botany in your Backyard textbook\)](#)
 - [weedbook](#)
 - [IRC: Natives for your Neighborhood database- native plants only](#)
 - [Atlas of Florida Plants database](#)
- **Pencils and sketching paper**
- **Camera with editing and labeling photo options**
- **Colored pencils**
- **Computer or other device with google or microsoft suite access**

Each student will create their own composite presentation of their plant specimen. **ALL IMAGES AND DRAWINGS MUST BE STUDENT GENERATED AND STUDENTS MAY NOT SHARE SPECIMENS; NO GOOGLE OR INTERNET IMAGES ARE ALLOWED.**

Using ***observational and documentation techniques (such as photos from your phone cameras or sketches)***, complete a thorough coverage of vegetative and reproductive characteristics of your weedy specimen.

Submit your assignment into Schoology or another online system provided by your instructor.

**Specimens can be kept in a plastic baggie with a moist paper towel in the front of a refrigerator for several days if needed as you complete the work or specimens can be dried before observations..*

3. **Press your plant (45-60 minute session)-** Once you have photos and/or drawings completed, then attempt to press the plant in newspaper on a flat surface; then add books to cover the specimen. If you don't have a newspaper, any paper will do. Once dried (1 to 2 weeks) the plant can be stored for as long as needed and possibly mounted and added to a classroom or school collection! Be sure to provide extra layers of paper around your specimen since you will not have the blotting paper we used for our earlier lab collection. Save your specimen for later mounting.

Materials:

- Plant press (one per classroom)
- Plant buckle (two per press)
- blotting paper (2 per student/team)
- cardboard spacers (2 per student/team)
- newspaper (1 large sheet/team)
- 10x hand lens or loupe - optional but recommended (1 per team)
- Smart phone 30x microscope adaptor (optional) or dissecting microscope (optional)



4. **Mount your plant** (30-45 minute session)- optional

Materials:

- mounting supplies:
 - glue (watered down slightly)
 - paint brushes
 - clear tape
 - printed labels (create your own)
 - mounting paper
 - ruler
- digital resources for video review (with internet access)

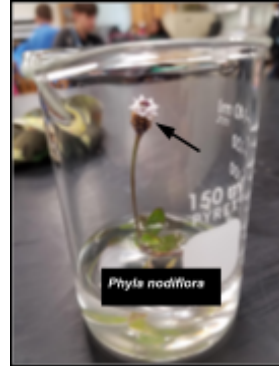
Plant observational Documentation Template-
(you may use Google docs & slide or Microsoft word & powerpoint suites)

(suggested- use as a guide but you may present to your own aesthetic; see below resources and any source under classroom Botany resources section for ideas)

Title

Identification:

Scientific name
Common name
Family
image/photo of your choosing
Where collected
Date of collection
Collector



Habitat/Ecosystem: describe where you found the specimen, GPS coordinates, other plants &/or animals nearby. Photo (optional)

Vegatative descriptions: (see chapter 8 BYBY)

- picture(s)/drawing(s)
- Labels (anatomical)
- Written description

→ **Stem description, node and internode, lenticels?**

→ **Leaf arrangement (alternate, opposite, whorled), leaf type (simple vs. compound), leaf attachment (petiolate or sessile), leaf margin, leaf shape**

→ **Roots; especially if stolons (horizontal)**

***include hairiness (glabrous or pubescent; hispid, tomentose), stipules, etc if relevant**

Floral descriptions: (see chapter 6 & 7 BYBY)

- picture(s)/drawing(s)
- Labels (anatomical)
- Written description
 - **Inflorescence type (sketch/photo included)**
 - **Flower attachment (pedicilate or sessile)**
 - **Close up sketch/photo of individual flower and floral formula**
 - ◆ **K- Calyx and/or sepals**
 - ◆ **C- Corolla and/or petals**
 - ◆ **A-Androecium and/or stamens (anther, filament)**
 - ◆ **G-Gynoecium and/or pistil (stigma, style, ovary)**

***remember connation and adnation observations (fusion), ovary position (superior or inferior), symmetry (Actinomorphic or Zygomorphic).**

Resource List: (see also step by step guide)

In order to complete this project teachers will need:

Access to internet (videos and resources)

Promethean board (for display purposes)

Microsoft or Google suites

Smart phones (cameras)

School yard or other areas to collect weeds from

Plant collection materials:

- Plastic publix style baggies or gallon ziplock bag
- Scissors
- Garden gloves (optional), scissors, plastic
- Botany 10x hand lens or loope (optional)

Plant observation materials:

- Digital resources open or up on the promethean board
 - [Botany Companion \(& Botany in your Backyard textbook\)](#)
 - [weedbook](#)
 - [IRC: Natives for your Neighborhood database- native plants only](#)
 - [Atlas of Florida Plants database](#)
- Pencils and sketching paper
- Camera with editing and labeling photo options
- Colored pencils
- Computer or other device with google or microsoft suite access

Plant press materials:

- Plant press (one per classroom)
- Plant buckle (two per press)
- blotting paper (2 per student/team)
- cardboard spacers (2 per student/team)
- newspaper (1 large sheet/team)
- 10x hand lens or loope - optional but recommended (1 per team)
- Smart phone 30x microscope adaptor (optional) or dissecting microscope (optional)

Plant mounting materials:

- glue (watered down slightly)
- paint brushes
- clear tape
- printed labels (create your own)
- mounting paper
- ruler

Additional resource links:

- [Botany Companion \(& Botany in your Backyard textbook\)](#)
- [weedbook](#)
- IRC: [Natives for your Neighborhood database](#)
- [Atlas of Florida Plants](#)
- [TCN: Confounded compounded leaves-](#)
- [Wild coffee TCN](#)
- [Plant pressing guide](#)
- [Virtual Herbarium basics \(Charles Sturt University Virtual Herbarium\)](#)



Student examples of composite assignment:

Herbarium Collection #3 Matchweed: *Phyla nodiflora*



Collector: [REDACTED]

Date collected: 9-28-2015

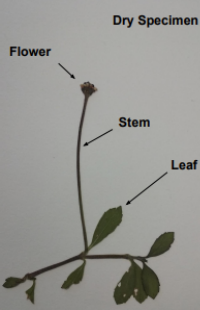
Location Collected: Biotech Urban Meadow

25°37'49" N 80°21'35" W

Name of Specimen: Match Weed

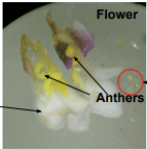
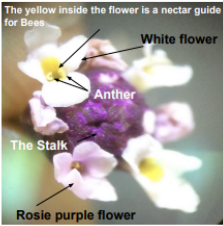
Species name: *Phyla nodiflora*

Dry Specimen



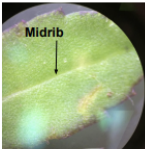
Floral Description

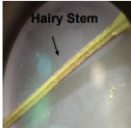
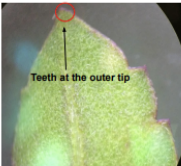
The rosie purple to white flowers emerge around the tip of the purple stalk, forming a match-head appearance. It blooms all year round (From May-October). The flowers have 2 anthers inside with a yellow paint inside as a nectar guide for the bees since they see ultra violet lights.

Leaf Description

The Leaves of a matchweed have an opposite leaf arrangement. Each leaf has teeth at the outer tip. The blade is not smooth. Hairy branching stems. Along with furry leaves. Match Weeds can spread by both seeds and stolons along prostrate stems; it creeps by rooted nodes. The growth rate is fast and full to partial sun.



Horseherb (*Calyptocarpus vialis*)

<http://theherbshelf.com/horseherb-ecampkover-22-march/>



Period 4
11-23-15

Calyptocarpus vialis Family Acanthaceae

GPS
N 25°37'48"
W 080°21'31"

http://www.wildflower.org/plants/result.php?id_plant=CAVI2

This specific specimen (Horseherb) was collected opposite of the Butterfly garden located within BioTech @ Richmond Heights. Horseherb grows close to the ground around other weeds and grasses. Because Horseherb is level to the ground and there is not variation in height, it receives light constantly.

Horseherb (*Calyptocarpus vialis*)

Description

The small opposite broad leaves have toothed margins and conspicuous veins. Stems grow along the ground, rooting at nodes. Bright yellow flower heads are only a quarter inch across. The plant itself is very small (as seen in reference to my fingers).

<http://plantbook.org/weedbook.pdf>



Native to...

Southeastern U.S. to
Central America

Fresh specimen



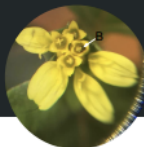
Dry Specimen



Horseherb Anatomy



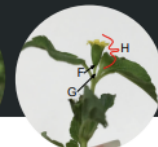
A- anthers (contain pollen)



B- stigma (receive the pollen from the anthers)



D- opposite leaf arrangement (leaves are directly opposite of each other)



F- receptacle (holds flower parts)

C- corolla (petals)

G- peduncle (floral stalk)

E- simple leaves (single blade)

H- indeterminate (final flower) and terminal (grows on top of plant)