Guide to flowering plant morphology

Introduction

Flowering plants are an important component of the prairie community. They provide food for herbivores, nectar for pollinators, and nest sites for birds. Plants also provide fuel for the fires that are critical to the persistence of prairie in Iowa. Because of the importance of flowering plants, you will spend today's class learning their basic structure and function. You will then apply this knowledge to identify prairie plants at CERA.

Glossary of flowering plant morphology

Before class, read through this glossary and examine the attached diagrams. Come to class prepared to discuss and/or diagram these basic components of plant morphology.

Actinomorphic: A flower that is divisible into equal, mirror image halves by two or more planes.

Alternate phyllotaxy: In this phyllotaxy, leaves arise from alternate sides of the stem, and only one leaf arises from a given point (node) on the stem.

Anther: The portion of the stamen that contains pollen.

Compound leaf: A leaf whose blade is subdivided into two or more segments.

Filament: The stalk that attaches the pollen-bearing anther to the flower.

Inferior ovary: In this floral morphology, the ovary is seated below the stamens, petals, and sepals.

Lamina: The flattened, expanded portion of the leaf. Also referred to as the blade.

Opposite phyllotaxy: In this phyllotaxy, pairs of leaves arise from a given point (node) on the stem.

Ovary: The portion of the pistil that contains the ovules (unfertilized seeds).

Perianth: The leaflike structures that surround the male and female parts of the flower. There are two whorls of leaflike structures: petals and sepals.

Petal: The inner whorl of leaflike structures that surround the male and female parts of the flower. Petals are often, but not always, brightly colored, presumably to attract pollinators.

Petiole: The structure that attaches the leaf blade to the stem.
**Pistil**: The female portion of the flower.

**Receptacle**: The structure at the base of the flower to which the perianth, stamen, and pistil are attached.

**Sepals**: The outer whorl of leaflike structures that surround the male and female parts of the flower. Sepals are often green-colored, but in some species they are brightly-colored, presumably to attract pollinators.

**Simple leaves**: In this leaf morphology, the leaf blade is not subdivided.

**Stamen**: The male portion of the flower.

**Stigma**: The portion of the pistil onto which pollen is deposited. Pollen deposited on the stigma will fertilize the plant's ovules, resulting in seed production.

**Stipule**: Small, leaflike structures positioned where the leaf attaches to the stem.

**Style**: The elongated portion of the pistil between the stigma and the ovary. The pollen tubes have to pass through the style to reach and fertilize the plant's ovules.

**Superior ovary**: In this floral morphology, the ovary is seated above the stamens, petals, and sepals.

**Whorled phyllotaxy**: In this phyllotaxy, more than two leaves arise from a given point (node) on the stem.

**Zygomorphic**: A flower that is divisible into equal, mirror image halves by only one plane.

*Identifying plants*

Now that you have refreshed your knowledge of flowering plant structure and function, you can apply this knowledge to the real world by identifying some prairie plants.

1. With today’s field partner, find a field guide to flowering plants, a hand lens, and a pair of clippers.

2. Go out into the prairie and find five different plant species that are in flower. *If necessary*, clip a single specimen or part of each plant so you can get a closer look at it. *(Note: A class of overzealous botanists can easily destroy a plant population by collecting too many plants. You should never clip plants growing at CERA unless you are specifically directed to do so by your instructors!)*
3. **Don't open that field guide!** Instead, you should take a very close look at each of your plants, and describe their floral and vegetative morphology. You can do this by attempting to answer the following questions for each of your plant species:

   a. What color are the petals and sepals?
   b. Approximately how many flowers does each plant produce?
   c. How many pistils and stamens are there on each flower?
   d. Is the ovary inferior or superior?
   e. Is the flower actinomorphic or zygomorphic?
   f. Are the leaves simple or compound?
   g. Are the leaves alternate, opposite, or whorled?
   h. Are stipules present at the base of the leaf?

   **Each member** of your group should write the answers to these questions in his or her field notebook. Accompany the descriptions with appropriate drawings of the structures – remember that drawing is a form of description, but also a way to learn about what you are seeing. *(Note: Read p. 17 of *Investigations: A Handbook for Biology and Chemistry Courses* for information on keeping a scientific notebook.)*

4. Once you have described each of your species, open up your field guide and use your descriptions to identify them. For each species, you should note the following in your field notebook:

   a. the common (English) name
   b. the scientific name
   c. which family the species belongs to

In addition, you should also note anything you noticed about each species' ecology. For example, does the species tend to occur in wet or dry portions of the prairie? Does it occur in the treeless prairie or in the tree-filled savanna? Is it rare or common at CERA? Are insects eating and/or pollinating the species? Can you identify them?

*(Note: Material and diagrams for this handout come from JP Smith's *Vascular Plant Families* and WB Zomlefer's *Guide to Flowering Plant Families.*)*
Fig. 13. Floral morphology.
Fig. 8. Leaf parts and composition.