

## BPSC 031 “Spring Wildflowers”

### Lab 8. Asteraceae (the Sunflower Family) and Poaceae (the Grass Family)

#### I. Asteraceae (Sunflower Family)

Annuals, perennial herbs, and small shrubs with a wide variety of leaf designs and arrangements. Diminutive flowers arranged in compact heads (**capitula**) that resemble single, large flowers. Flowers can be **regular** (actinomorphic) or **ligulate** (strongly zygomorphic), with the corolla tube elongated into a long strap-shaped projection or **ligula**. The composite heads have three basic designs: **ligulate** heads with only ligulate flowers as in the dandelion; **discoid** heads with small, non-ligulate flowers only, as in the thistles, and **radiate** heads with peripheral ligulate flowers, called ray flowers, around a central disk of small non-ligulate, or disc flowers, as in the sunflowers and daisies. The heads are surrounded by one or more rows of usually green, sepal-like bracts called **phyllaries**.

Sepals are modified into hairs, bristles, or scales, and persist in the fruit in a dispersal-aiding structure called the **pappus**, or are missing. There are five stamens usually fused by their anthers to form a hollow tube, and a single pistil with an inferior ovary and two style branches. Fruits are small, one-seeded achenes that function as a single dispersal unit. Most achenes have a pappus attached to the top. Plumose pappi can float in the air and are wind-dispersed; bristly or spiny pappi can attach themselves to the fur of animals and are dispersed by passing wildlife.

#### II. Poaceae (Grass Family)

Herbaceous annuals or perennials with densely fibrous roots and often showing stolons or rhizomes for vegetative propagation. Leaves consist of a flat (sometimes rolled) blade with a base that forms a sheath around the stem. The top of the leaf sheath often has a membranous or hairy projection at the union with the blade called a **ligule**. The leaf blades usually have pairs of tiny, earlobe-shaped appendages called **auricles**. A single grass stem with its leaves is called a **culm** or **tiller**. During the early stages of culm development the leaves are basal, with a very short shoot at the base and the sheaths forming a stem-like structure from where the blades radiate. As the culm matures, it eventually produces a shoot with a round, hollow stem that elongates inside the bundle of sheaths and emerges in the upper part of the culm to produce the inflorescence.

The tiny, wind-pollinated flowers —called **florets**— are inconspicuous, greenish, usually bisexual, wind-pollinated, and petal-less. Each floret consists of a pair of bracts: the largest one, away from the flowering stalk or rachis, is called the **lemma** and the smaller or the two, next to the rachis, is called the **palea**. The androecium is composed of three stamens; and the gynoecium has single pistil with a superior, one-seeded ovary and two plumose (feathery) stigmas. Two rounded structures at the base of the flower, called the **lodicules**, are anatomical vestiges of the perianth (petals + sepals). The lodicules swell when the flower matures, and open the palea and the lemma to allow the emergence of the anthers, first, and of the plumose stigmas, later. The florets, in turn, cluster into tiny **spikelets** with two bracts at the base called **glumes**. Glumes, lemmas, and paleas often have spear-like extensions called **awns**. The spikelets themselves are arranged in heads, panicles, spikes, or racemes. Spikelets may have several flowers (florets), a single floret, or some fertile florets and some sterile florets with no stamens or pistil. The fruits are small, one-seeded, dry indehiscent fruits with a thin pericarp adhering so closely to the seed that fruit and seed are incorporated in one single structure: the grass “grain” or **caryopsis**.

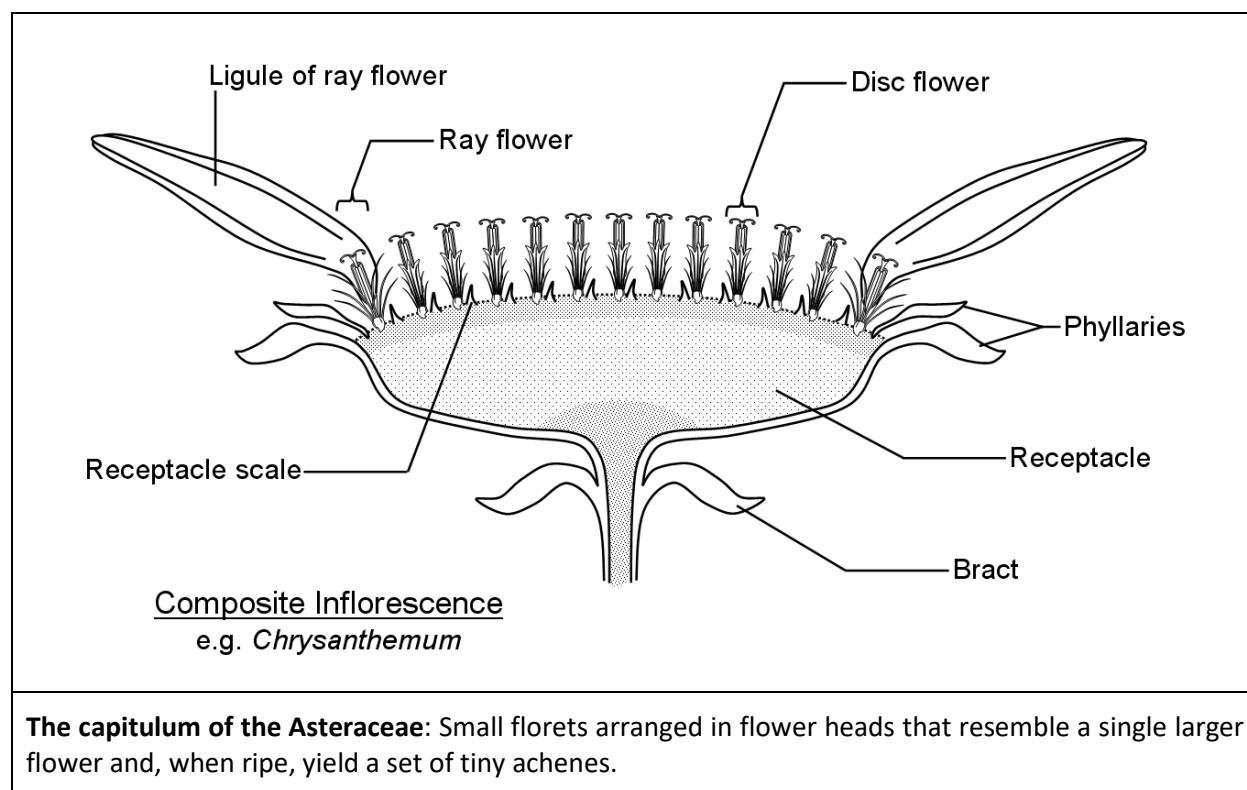
Take randomly one plant from each family in the lab and, according to the family you have chosen, develop the following activities.

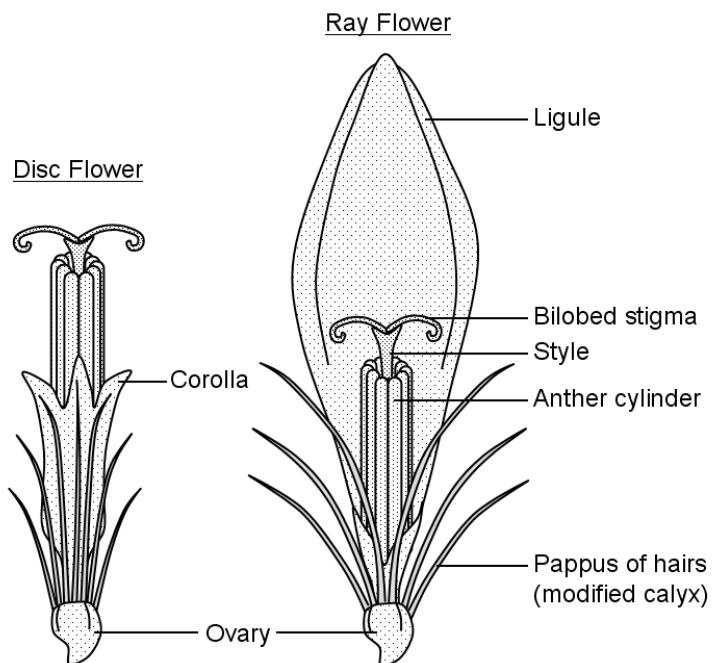
### 1. Asteraceae (Sunflower Family)

- a. Using the loupe, observe the capitulum and identify the individual flowers. You might want to dissect the flower head with a longitudinal cut. Is the head discoid, radiate, or ligulate?
- b. Extract an individual flower from the capitulum. Observe the single-seeded ovary and the pappus. Is the ovary inferior or superior?
- c. Remove the corolla and look in detail at the stamens. Are they fused into a tube? How many petals and stamens can you count?
- d. Make a sketch of the most distinctive traits you have observed in this flower.

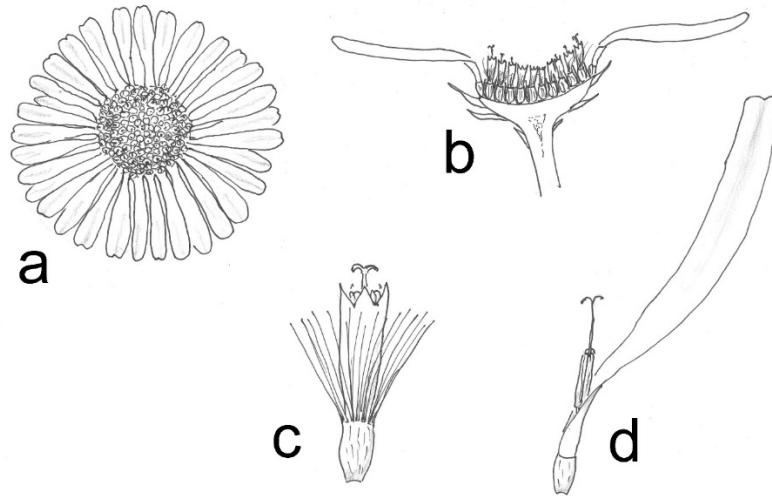
### 2. Poaceae (the Grass Family)

- a. Look at a grass culm and with care, extract a leaf. Observe the highly specialized leaf parts: (a) the sheath and the blade. Can you see the ligula at the union of the sheath and the blade? Does the leaf have tiny auricles?
- b. Look in detail at the florets. Identify the palea and the lemma. Is the ovary superior or inferior?
- c. Observe the organization of the individual florets in the stem. Can you see how the florets cluster into spikelets?
- d. Make a sketch of the most distinctive traits you have observed in this plant.

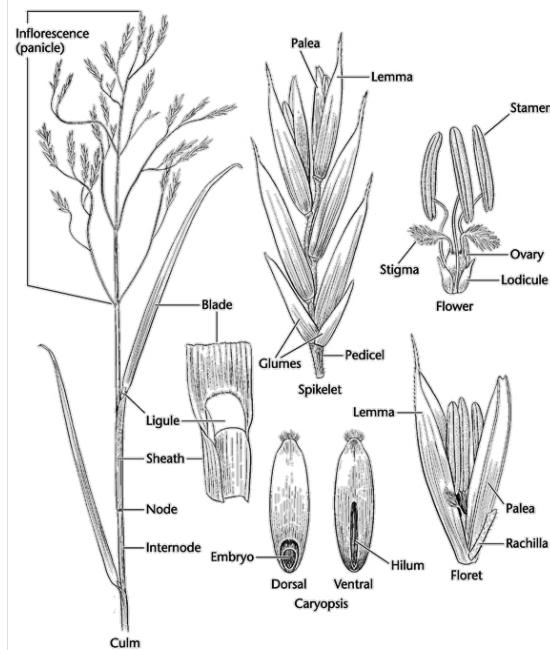




**Ligulate florets vs. regular (non-ligulate) florets:** (left) disk floret with a hairy pappus, and (right) radiate floret with an elongated ligula.



**The Asteraceae at a glance:** Mostly annuals or herbaceous perennials with small florets arranged in flower heads or capitula that resemble a single larger flower and, when ripe, yield a set of tiny achenes (illustration: *Erigeron* sp.). (a) Flower head viewed from above; (b) Flower head, longitudinal section; (c) disk floret with a hairy pappus, and (d) radiate flower with an elongated ligula.



**Main morphological traits in the Poaceae:** (left) Culm structure and leaf morphology; (center top) spikelet; (left) floret structure, and (center below) caryopsis.



**The Poaceae at a glance:** (a) Linear leaf blades subtended by long, tube-like sheaths that resemble hollow stems. (b) Green, wind-pollinated, petal-less florets; sepals reduced to two leaf-like bracts called the palea and the lemma. Florets grouped into spikelets, subtended at their base by two leafy bracts called glumes; fruit a caryopsis.