BIOL 325 – Plants Systematics Laboratory

Asterid Eudicots, part 2

We study the asterids this semester in three parts due to the large number of taxa we wish to study. In this second part, we will study taxa from the heath family (Ericaceae) and composite family (Asteraceae or Compositae).

Table 1. FYI: Economically important members of the Asterids, part 1 (alphabetically by family).

1) **Ericaceae** are the source of blueberries and cranberries (*Vaccinium*), rhododendrons and azaleas (*Rhododendron*), our state flower the mountain-laurel (*Kalmia*), and numerous other ornamentals such as pieris (*Pieris*).
2) **Asteraceae** (Compositae) includes many ornamentals and vegetable plants: *Helianthus* is the sunflower genus, which is the source of edible sunflowers as well as garden plants and cut flowers; *Cirsium* is an important genus because of its weeds called thistles; *Chrysanthemum* (chrysanthemums) and *Tagetes* (marigolds) are important as ornamentals; *Echinacea purpurea* is important as an herbal supplement and ornamental; *Cynara* is the artichoke genus; *Cichorium* contains chicory, an important weed as well as the source of roots that, when roasted, provide a substitute for or additive to French- and Louisiana-style coffee; *Lactuca* is the lettuce genus.

I. Asterids Part 2

A. Families to Know on Sight

1. Asteraceae or Compositae (composite family) – p. 874

- Small to large herbs (shrubs)
- Lvs alternate to opposite, entire to toothed.
- Head inflorescences subtended by involucre.
- $Ca^{pappus}\ Co^{[5]}\ A^{5,\ connivent\ anthers}\ \underline{\bar{G}}^{[2]}$
- "ray" flowers (ray florets), "disc flowers (disk florets)"
- Head "receptacle" flat, convex, concave; surface can be chaffy.
- Involucral bracts variously formed and often diagnostic.
- Fruits achenes in head.

Diagnostic Summary: Small to large herbs or subshrubs with radiate (e.g., sunflower, aster), ligulate (e.g., chicory, dandelion), or discoid (e.g., groundsel, snakeroot) flower-like heads; infructescense a head of small achenes, often with persistent pappus as dispersal aid.

2. Ericaceae (heath family) – p. 733

Diagnostic Summary: Evergreen or semievergreen shrubs (herbs or small trees) with funnelform or urceolate corollas and 10 stamens with poricidal anthers. Capsules from superior ovaries and berries from inferior ovaries.

Generalized Flora Formula: **Ca** $^{[5]}$ [**Co** $^{[5],\ clawed}$ **A** $^{10,\ basally\ epipetalous,\ poricidal}$] **G** $^{[5]}$ or $\bar{\mathbf{G}}$ $^{[5]}$, fl regular/irregular

B. Genera to Know (you can write your own key to genera)

Ericaceae – p. 733

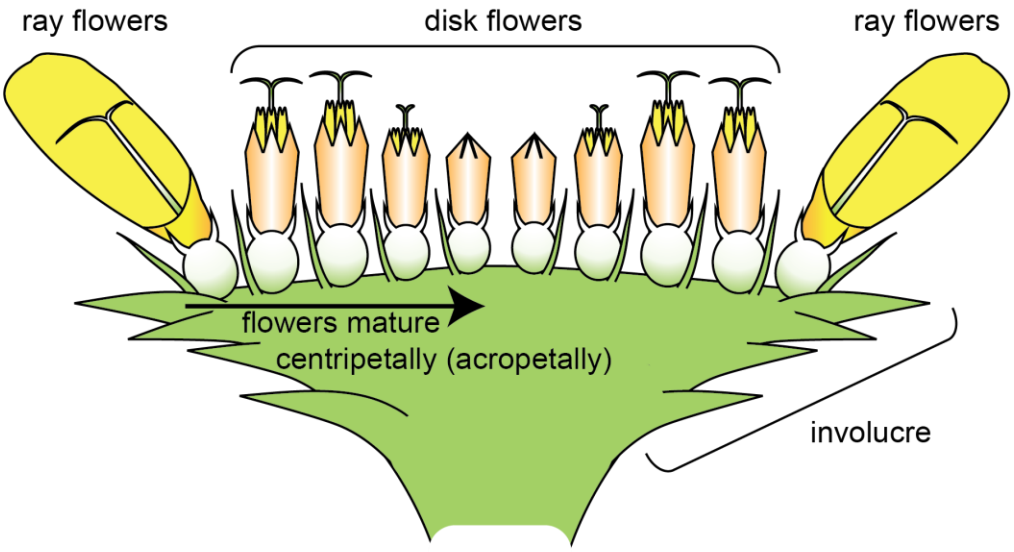
1) *Rhododendron* (shrubs)
2) *Kalmia* (shrubs)
3) *Vaccinium* (shrubs)

Asteraceae –p. 874

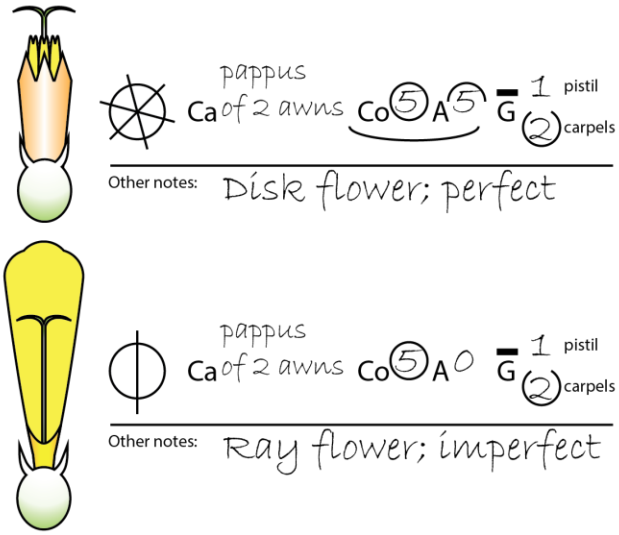
4) *Ageratina* (herbs)
5) *Chrysanthemum* (herbs; not in book)
6) *Cichorium* (herbs)
7) *Cirsium* (herbs)
8) *Echinacea* (herbs)
9) *Helianthus*(herbs)
10) *Solidago*(herbs)
11) *Symphyotrichum* (herbs)
12) *Taraxacum* (herbs)

C. The Composite pseudanthium.

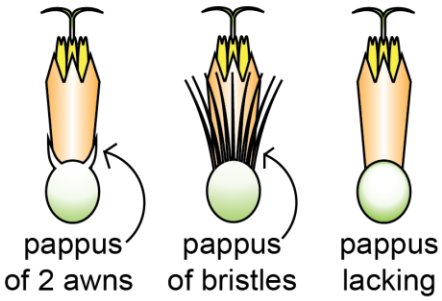
The apparent "flower" of a sunflower, aster or any of their relatives in the Composite family, Asteraceae, is actually a composite of many small flowers (Figs 1 A and B). The calyx of each flower is highly modified as a "pappus" which varies in form throughout the family (Fig 1 C) and generally persists in fruit to aid in seed dispersal. In the sunflower and other similar pseudanthia in many of its relatives, "ray flowers" around the periphery look like petals and serve to attract pollinators, while "disk flowers" in the center serve in pollination and seed production. The involucre and its bracts function like sepals.



A. The head of a sunflower is a contracted rachis subtended by an involucre of bracts. The apparent centripetal pattern of flower maturation follows the acropetal pattern expected along inflorescence rachises generally.



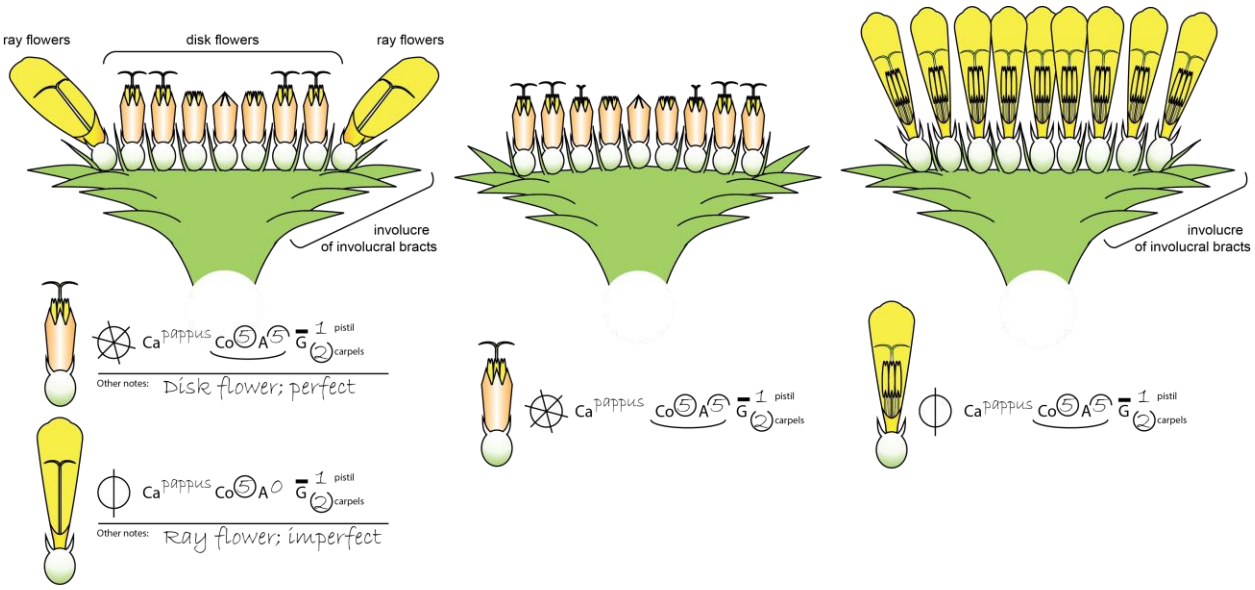
B. The sunflower pseudanthium has two types of flowers.



C. Pappus variation in the Composite family.

Fig 1. The small flowers in the Composite family collectively form showy inflorescences that resemble individual flowers (A, B). The calyx of individual flowers is typically modified to form a "pappus" (C) that serves in many species to aid seed dispersal.

3 head types. Broadly speaking, there are 3 types of heads in the Asteraceae. In a typical radiate head, disk flowers in the center are surrounded by ray flowers around the periphery (see below). Other heads have only disk-like flowers, and these are called discoid or disciform heads. Other heads have only ray-like flowers and these are called ligulate heads.



Head type:	Head type:	Head type:

Fig 2. Three head types in the Composite family, Asteraceae

D. **Key to Composite Genera: Flowers small, in heads that resemble single flowers (composites)**

1. Plants acaulescent…….._____
1. Plants with aerial stems or leafy peduncles
    2. Plants (e.g., leaves and involucre) armed with spines or prickles…….._____

    2. Plants unarmed
        3. Heads discoid and white……_____

        3. Heads ligulate or radiate (sometimes small-radiate and superficially discoid-like) and variously colored
            4. Heads ligulate or ligulate-like
                5. Corolla blue, apex truncate with minute teeth ….. ……._____

                5. Corolla not blue, apex rounded and entire; heads not truly ligulate but some cultivars with most disk flowers converted to ray flowers.

                ……._____
            4. Heads radiate
                6. Heads small (<7 mm diam) and superficially discoid because of small ray florets; typically yellow

                ……._____

                6. Heads larger than 7 mm diam and distinctly radiate; variously colored
                    7. Head disk conical; ray florets purplish and large (> 2.5 cm long)

                    ……._____

                    7. Head disk flat or convex, but not conical; ray florets variously colored and sized, but if purple then < 2.5 cm long

                        8. Lvs (at least the lower ones) alternate & conspicuously lobed

                        ……._____

                        8. Lvs alternate or opposite, entire or toothed

                            9. Lvs broad; Heads large, fewer in number; ray florets yellow and > 2.5 cm long

                            ……._____

                            9. Lvs typically narrow; Heads smaller, abundant; ray florets white, blue, pink or purple and $\leq$ 2.5 cm long

                            ……._____