**Euasterids— Asteraceae, Solanaceae, Rubiaceae, Lamiaceae**

Today you will be looking at four families in the in the euasterids clade: Asteraceae, Solanaceae, Rubiaceae and Lamiaceae. Rubiaceae (Gentianales), Solanaceae (Solanales) and Lamiaceae (Lamiales) are all found in euasterids I. Asteraceae (Asterales) is in euasterids II. These four families are some of the most successful angiosperms on the planet.

**Asteraceae – the Sunflower Family**

Asteraceae is considered (depending on the circumscription) to be the largest angiosperm family by number of species. This highly successful group is found all across the world in all types of habitats ranging from mountaintops to deserts. Many economically important species are found in this family including *Helianthus annuus* (sunflower, a North American domesticate noted for confectionary seeds and seed oil), *Carthamus tinctorius* (safflower, noted for seed oil), *Lactuca sativa* (lettuce, Boston, Bibb, Iceberg, Romaine, etc. are all cultivars of this species), *Cynara scolymus* (globe artichoke, the part you eat is the inflorescence bud), *Gerbera* sp. (the gerbera daisy, an ornamental that is also important for the study of flower formation), *Dahlia* (ornamental), and many more. The genus *Ambrosia* (ragweed) is the primary source of the allergen that causes hayfever in the United States.

Answer the questions below using the species provided.

1. *Chrysanthemum leucanthemum (Leucanthemum vulgare)*
2. What is the inflorescence type?
3. How many types of florets are there in the inflorescence? Name them.
4. Describe the perianth of the florets.
5. Describe the androecium of the florets
6. Describe the gynoecium of the florets
7. *Acmella oleracea (Spilanthes oleracea, Spilanthes acmella)* & *Taraxacum officinale* (if available)
8. What is the inflorescence type?
9. How many types of florets are there in the inflorescence? Name them.

**Solanaceae – the Nightshade Family**

Solanaceae is a widespread family found on all continents (except Antarctica) and has been extensively used by humans throughout our history. Many crops are found in this family including *Solanum* sp. (*S. lycopersicum* or tomato, *S. tuberosum* or potato, and *S. melogena* or eggplant), *Physalis philadelphica* (tomatillo), *Capsicum* sp. (peppers of which five species are commonly eaten with *C. annuum* cultivars being the most common), *Nicotiana tabacum* (tobacco) and *Petunia* sp. (ornamental petunias). Many of the important crops of the family (tomatoes, tomatillos, potatoes, tobacco, etc.) were domesticated in the Western Hemisphere. Most of the members of the family are poisonous including many historically important species such as *Datura stramonium* (Jimson weed), *Atropa belladonna* (deadly nightshade, supposedly used to kill Roman Emperor Augustus) and *Mandragora officinarum* (mandrake).

Answer the questions below using the species provided.

1. *Capsicum* sp. & *Solanum jasminoides*
2. What is the floral formula? DO NOT USE YOUR ZOMLEFER BOOK.
3. How does the androecium does the androdecium differ between these two species? How would you describe the androecium of *Solanum*? HINT: It is NOT connate.

**Rubiaceae – the Coffee Family**

Rubiaceae is a highly successful family found throughout the world on every continent except Antarctica. The majority of the diversity is in the humid tropics of Central and South America and southeastern Asia. The family is best known for (crop-wise) *Coffea arabica* (and to a lesser extent *Coffea canephora*, or coffee). It is also the family from which *Cinchona* sp. (a producer of quinine, the first effective anti-malaria drug), *Psychotria ipecacuanha* (the source of ipecac) and *Gardenia jasminoides* (the common gardenia, an ornamental) are derived.

Answer the questions below using the species provided

1. *Coffea arabica*

No questions here. Just look at this plant and give it thanks for all of the wonderful, caffeine-induced productivity it has given you during your life.

1. *Pentas sp.*
2. Describe the corolla shape.
3. Dissect the ovary, how many carpels are there? What is the ovary position?
4. Is the inflorescence determinate or indeterminate?
5. Describe the phyllotaxy.
6. *Sherardia arvensis*
7. Describe the corolla shape.
8. Dissect the ovary, how many carpels are there? What is the ovary position?
9. Is the inflorescence determinate or indeterminate?
10. Describe the phyllotaxy.
11. *Myrmecodia* sp.

No questions here. This genus is comprised of epiphytes that grow on the branches and trunks of trees, often up in the canopy of tropical forests. These plants form a mutualism with ant species that live in hollowed portions of the caudex. The plants act as a shelter and above ground nest for the ants, while the ants protect the plants from predators and provide it with some nutrients.

**Lamiaceae – the Mint Family**

Lamiaceae, like the other families you have seen today, are widespread and on all continents except Antarctica. The members of this family are often aromatic and this has influenced their common use as culinary herbs. Some of these herbs include oregano (*Origanum vulgare*), mint (*Mentha* sp.), basil (*Ocimum basilicum*), rosemary (*Rosmarinus officinalis*), sage (*Salvia officinalis*) and thyme (*Thymus* sp.). There are also a number of ornamentals from the family including *Solenostemon* sp. (formerly *Coleus*), *Orthosiphon*, and *Salvia* sp. (*S. hispanica* or chia, of Chia Pet fame, is a widely recognized species).

Answer the questions below using the species provided

1. *Orthosiphon stamineus* & *Salvia sp.*

Dissect the flowers of both species and answer the following questions:

1. Describe the corolla
2. Describe the androecium.
3. Lamiaceae are uni-pistillate, with a 2-carpellate, superior ovary and a gynobasic pistil. However, because of the presence of a false septum, the ovary appears 4-carpellate and is in fact 4-locular; each locule develops into a single-seeded mericarp. What is the additional structure besides the 4 mericarps you seen when observing the gynoecium?
4. What is the inflorescence type?
5. Describe the stem and phyllotaxy.

Now let us attempt to synthesize the above information into an overall description for each family.

**Asteraceae**

Phyllotaxy and leaf complexity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calyx: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Corolla: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Androecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Gynoecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Any other special identifying features: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Solanaceae**

Phyllotaxy and leaf complexity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calyx: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Corolla: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Androecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Gynoecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Any other special identifying features: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Rubiaceae**

Phyllotaxy and leaf complexity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calyx: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Corolla: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Androecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Gynoecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Any other special identifying features: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lamiaceae**

Phyllotaxy and leaf complexity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calyx: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Corolla: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Androecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Gynoecium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Any other special identifying features: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_