**Rosids I & II—Euphorbiaceae, Brassicaceae & Malvaceae**

Today you will be looking at three families in the rosid clade: Euphorbiaceae, Brassicaceae and Malvaceae. Euphorbiaceae is in rosids I (as are Rosaceae and Fabaceae from the previous lab) and is in the order Malpighiales, along with Violaceae (violets), Passifloraceae (passion flowers), and Salicaceae (willows). Brassicaceae and Malvaceae are in rosids II, in the orders Brassicales and Malvales, respectively. Brassicaceae are closely related to Capparaceae (the caper family) while Malvaceae are related to Cistaceae (the rock-rose family), though the exact relationship is unclear.

**Euphorbiaceae – the spurge family**

Euphorbiaceae is a family of ~300 genera and 7000+ species, making it one of the top ten most speciose plant families. Euphorbiaceae have a cosmopolitan (worldwide) distribution and are particularly prevalent in the old world tropics. While many associate Euphorbiaceae with succulent plants similar to Cactus, these succulent species represent only a small portion of the family and occur only in the old world (Note: Cactaceae are a new world family). Our North American representatives are mostly small non-succulent herbaceous perennials, but all share similar floral morphology and thick, milky (usually) sap. **NOTE: The sap from these species is poisonous. If you get it on your hands, make sure you wash your hands before contacting other parts of your body**.

*Manihot* (cassava) is a primary food source in tropical and subtropical regions. Other economically important species included *Hevea* (rubber) and *Euphorbia* (poinsettia). *Ricinus communis* (castorbean) is considered one of the most poisonous plants in the world due to the protein, ricin. The largest genera in the United States are *Chamaesyce*, *Euphorbia* and *Croton*.

Answer the following questions using the specimens provided.

1. *Jatropha sp.*
   1. Inflorescence: determine the inflorescence type.
   2. Are the flowers perfect/imperfect? Complete/incomplete? What do you notice about the arrangement of flowers on the inflorescence?
   3. Without removing the pistil, how many carpels do you think are present? What is the ovary position?
2. Euphorbia – species in this genus also posses compound cymes but in a condensed form comprising a unique structure known as a cyathium. Define **cyathium**.

2a*. Euphorbia milii*

* 1. Describe the leaf complexity. **Note:** pinch the leaf and you will see milky juice coming out, which is a diagnostic character of this family.
  2. Diagram an inflorescence and include bracts, involucres, nectariferous discs (How many?), pistillate flowers (How many?), and staminate flowers (How many?). Refer to Zomlefer book ( drawings on P. 108) for clarification before asking your TA.
  3. Can you determine the number of carpels? If so, how many are there? What is the ovary position?

2b. *Euphorbia pulcherimma* (Poinsettia)

1. Can you identify the bracts and involucres? How many of each per cyathium do you see?
2. How many nectariferous discs per cyathium?
3. How many carpels are present? What is the ovary position?
4. *Codiaeum variegatum* 
   1. What is the inflorescence type? Are the flowers perfect or imperfect? Is the plant monoecious or dioecious?
   2. Do you see a perianth? Can you differentiate a calyx and corolla? If so, how many petals and sepals are present?
5. *Croton alabamense*
   1. What is the inflorescence type? Are the flowers perfect or imperfect? Is the plant monoecious or dioecious?
   2. Do you see a perianth (Do not remove flowers)? Can you differentiate a calyx and corolla? How many petals and sepals are present?

**Brassicaceae—the mustard family**

The family Brassicaceae is comprised of ~376 genera and ~3200 species. Many well-known crops such as *Brassica oleracea* (broccoli, cabbage, cauliflower, etc.), *Brassica rapa* (turnip, Chinese cabbage, etc.), *Brassica napus* (rapeseed, etc.), *Raphanus sativus* (common radish), and *Armoracia rusticana* (horseradish) are members of this family. The species *Arabidopsis thaliana*, which has long been a genetic model organism for angiosperms, is also in this family. Species are found predominantly in the cold and temperature regions of the Northern Hemisphere with major centers of diversity in the Mediterranean and southwestern/central Asia. The largest genera in the United States are *Draba*, *Arabis*, and *Lesquerella*

Answer the following questions using the specimens provided.

1. *Brassica sp.*
   1. Describe the phyllotaxy and leaf complexity.
   2. What is the inflorescence type? What is the floral symmetry?
   3. Perianth: How many sepals are there? How many petals are there? **Define:** cruciform.
   4. Androecium. How many stamens? **Define:** tetradynamous stamens
   5. Gynoecium: How many carpels? What is the ovary position?
   6. Identify fruit type. **Define**: silique. How is it different from a legume?
2. *Cardamine sp.*
   1. What is the habit of the plant? Describe the phyllotaxy and leaf complexity.
   2. What is the inflorescence type? What is the floral symmetry?
   3. Perianth: How many sepals? How many petals?
   4. Androecium. How many stamens?
   5. Gynoecium: How many carpels? Ovary position?
   6. Identify fruit type.

**Malvaceae—the mallow family**

Malvaceae is a family with 75 genera and over 1000 species with a wide range of distribution, particularly common in the tropics. Malvaceae contains many important North American species including *Hibiscus* *esculentus* (okra), *Hibiscus syriacus* (rose-of-Sharon), and a species that produces fibers you are probably wearing right now (*Gossypium hirsutum,* cotton). Species in this family possess a unique identification feature in the connate androecium, which forms a tube around the style (Note: The androecium is not adnate to the style). The largest genera in the United States are *Hibiscus*, *Abutilon*, *Sida* and *Sidalcea*.

Answer the following questions using the specimens provided.

1. *Hibiscus sp.*
   1. Without removing the flower, attempt the floral formula for this species. You may check your answer in the Zomlefer index..

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

**Euphorbiaceae**

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

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

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

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

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

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

**Brassicaceae**

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

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

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

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

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

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

**Malvaceae**

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

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

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

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

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

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

**References:**

Zomlefer, W. B. 1994. *Guide to Flowering Plant Families*. University of North Carolina Press.