Lab 15
The Flowering Plants

**DOMAIN Eukarya**
**KINGDOM Plantae**
**Phylum: Anthophyta**

Angiosperms are the most widespread plant phylum with the highest species diversity. They range in size from the giant sequoia growing in California's Sequoia National Park (275 feet tall and 30 feet across at the base) to the microscopic plant, *Wolffia*. There are a two species of tiny flowering plants on display.

To appreciate this range in size, examine the demo slide showing a whole mount of a *Wolffia* plant (also shown on a finger tip on right). Draw what you see.

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**Exercise 1: Flower dissection**

Tour the greenhouse and collect five different flowers to bring back to the lab and examine:

Are your flowers perfect?

1.

2.

3.

4.

5.
Dissect your flowers and identify the whorls that are present. Draw at least one of these flowers and label the parts as follows:

Look at the perianth.

Find the calyx. *What are the individuals parts called?*

Find the corolla. *What are the individuals parts called?*

What are two synonymous terms for the male fertile parts?

1.

2.

Find the filament.

Find the anther.

Look at the prepared cross-section slide of mature *Lilium* anthers. Draw what you see.

What are two synonymous terms for the female fertile parts?

1.

2.

Find the ovary.

Find the style

Find the stigma – look at it under the dissecting scope.

What aspects of the stigma are reminiscent of trichomes?
Look at a cross section of a very young *Lilium* ovule. Draw what you see. Label the megasporophyte and integuments.

Look at a cross section of a mature *Lilium* ovary. Can you find a section that shows the eight cells of the mature female gametophyte? Draw what you see.

Look at a longitudinal section of a mature embryo of *Capsella*. Draw what you see. Label the cotyledons, shoot meristem, root meristem, root cap, and hypocotyls (embryonic stem).
Exercise 2: Fruit types

Seeds are the reproductive structures of Gymnosperms and Angiosperms. The seeds of gymnosperms develop on the exposed surface of the scales of cones, whereas the seeds of angiosperms usually develop within a protective fruit produced from the ovary of a flower. Some fruit is dispersed by wind and water. However, many fruits are fleshy and have enticing colors and flavors to attract animals. When animals consume fruit, they digest the pulpy protective layers of the fruits but defecate the seeds. Passing through an animal’s gut has been shown to enhance the germination success of many species. Today we are going to look at a number of fruits and try to classify them according following scheme we discussed in class. Spend a few minutes looking at the PowerPoint presentation that introduces the fruit types. Then look at the fruit on the center bench and classify them.

Classification of fruit:
1. Simple fruits
   A. Fleshy fruits
      Berries
      Drupes
      Pomes
   B. Simple dry fruits:
      i. Dehiscent
         a. Follicle
         b. Legume
         c. Siliqua
         d. Capsule
      ii. Indehiscent
         a. Achene
         b. Samara
         c. Caryopsis
         d. Schizocarp
         e. Nut

2. Aggregate fruits
3. Multiple fruits
Classify the samples on the back bench.

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<tr>
<th>Name</th>
<th>Fruit type</th>
<th>Dispersal agent</th>
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An electron microscope uses a particle beam of electrons to illuminate a specimen and create a highly-magnified image. Electron microscopes have a much greater resolving power than light microscopes and can obtain much higher magnification of up to 2 million times. For comparison, the best light microscopes are limited to magnifications of 2,000 times. Both electron and light microscopes have resolution limitations imposed by the wavelength of radiation they use. The greater resolution and magnification of the electron microscope is related to the wavelength of an electron, its de Broglie wavelength, which is much smaller than a photon of visible light.

The electron microscope using electrostatic and electromagnetic lenses to form the image by controlling the electron beam to focus it at a specific plane relative to the specimen. This is similar to a light microscope that uses glass lenses to focus light on or through a specimen to form an image.
Today we are going to examine pollen grain morphology using the scanning electron microscope at UMD. Specifically, we are going to compare pollen morphology of the two major classes of flowering plants, the monocots and the dicots. Monocots and dicots differ in a number of ways that you are probably familiar with from general biology (see figure below)

You may not know that pollen morphology also differs. Monocots tend to produce pollen with single furrow or pore, whereas dicots tend to produce pollen with three furrows or pores. The first angiosperms had pollen with a single furrow or pore through the outer layer (monosulcate). This feature is retained in the monocots, but most dicots are descended from a plant which developed three furrows or pores in its pollen (triporate).

Use the pattern of leaf venation and the number of flower parts to find a monocot and eudicot that are in bloom in the greenhouse. Write down the name of the plants you have selected.

1. Monocot =

2. Eudicot =

Dust pollen onto the stub that you will bring to the electron microscope for visualization of your pollen. Make sure to keep track of which stub has the different pollen types.