

MODULE #15: Kingdom Plantae: Physiology & Reproduction

In this document you will find information regarding **Experiment 15.1 - Flower Anatomy**

Instructions for Exp. 15.1:

1. Review the experiment instructions.
2. Review the videos posted on the website under class resources (Part 1-7).
3. Review the still picture information on the desert dandelion & globemallow.
4. Follow the experiment instructions with your own flower samples.
5. Review the microscopic pollen pictures.
6. Document your findings.

Index:

- ☼ Page 2-3 - You will find the experiment instructions (for reference) including Figure 15.6-*The Structure of a Flower*, from your textbook.
- ☼ Page 4-7 - Directions & pictures of microscopic pollen.
- ☼ Page 8-11 - Still pictures & information on the desert dandelion.
- ☼ Page 12 - Still pictures & information on the desert globemallow.

Next week (April 20-24) you will also need to complete **Experiment 15.2 - Fruit Classification**

The objective of this experiment is to observe various types of fruit and compare their differences. You will need a variety of different fruit (see Supplies) to complete this experiment. They indicate there are website resources to help with this experiment if needed. I have included a website from Apologia for help with fruit classification, if needed:

- ☼ <http://www.fruitsinfo.com/classification.htm>

EXPERIMENT 15.1-Instructions

Flower Anatomy

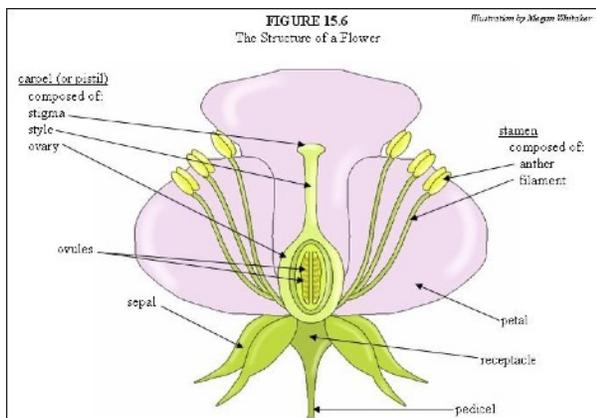
Supplies:

- Sharp scissors (If you have the dissection kit, use the scissors in it.)
- Sharp blade (If you have the dissection kit, use the scalpel in it.)
- Slides and coverslips
- Water
- Dropper
- Magnifying glass
- Microscope
- Lab notebook and colored pencils
- A variety of flowers (Most flower shops will save old flowers for you if you contact them ahead of time and tell them why you want them. They do not need to be fresh, but you should get a good variety. An example of a good variety would be: a rose, a carnation, a daisy, a lily and a tulip. At least one of them, preferably more, should have stamens and at least one carpel that are easy to see. In the list above, the lily and tulip will have easily visible stamens and a carpel. The rose and carnation will have them as well, but they will be harder to find. Look in the very center of the flower. The daisy is a composite flower, so its reproductive organs will be even harder to see.)

Object: To observe various types of flowers and compare their differences and similarities

Procedure:

1. Choose a flower that has easily visible reproductive organs.
2. Begin dissecting the flower by carefully pulling off the petals and sepals on one side, making sure you do not disturb the other parts.
3. Use your knife to cut the carpel vertically through the middle. This will expose the ovary and ovules if they are developed enough. Try to do this without breaking off the carpel, so that you see a good cross section of the flower intact.
4. Make a drawing of the flower and label the parts.



Although Figure 15.6 shows you the basic anatomy of a flower, please realize that there are many variations on this basic structure. As we have already mentioned, imperfect flowers have only one of the two reproductive organs. In addition, some flowers have several carpels (instead of just one as is shown in the figure). A single carpel can also have just one ovule instead of several. Finally, some flowers are actually composite flowers, which are made up of several individual flowers. The sunflower, for example, looks like a single flower from far away. If you examine it closely, however, you will see that it is actually numerous tiny flowers that form in a single receptacle.

5. The following is a list of things to look for and label in your drawings:

- Pedicel – stalk that supports the flower
 - Receptacle – “bulge” at the tip of the pedicel
 - Sepals – leaflike structures at the base of the flower, collectively called the calyx
 - Petals – collectively called the corolla
 - Stamens - male reproductive parts
 - Filament – stalk of a stamen
 - Anther - forms and holds pollen
 - Pollen grains – dustlike grains on (or in) the anther which contain the sperm nuclei
 - Carpel - female reproductive part
 - Stigma - top of carpel, receives pollen
 - Style - supports stigma
 - Ovary - contains ovules
 - Ovules - holds egg, develops seed
6. Now choose a composite flower, like a daisy, aster, sunflower, or dandelion. Composite flowers are made up of hundreds of complete individual flowers. Use the magnifying glass to see if you can identify the carpels and stamens on your composite flower.
 7. Repeat steps #1-6 for all of the flowers that you have.
 8. Scrape some pollen from each flower.
 9. If you do not have a microscope, do steps #10-12. If you have a microscope, skip to step #13.
 10. Observe each pollen sample using the magnifying glass. See if you can note any differences between the pollen samples.
 11. Use the magnifying glass to look at any other parts of the flowers that you wish to see better.
 12. Skip to step #18.
 13. Place a sample of pollen on a slide and add a drop of water.
 14. Cover the wet sample with a coverslip.
 15. Observe the pollen sample with the microscope and draw what you see.
 16. Repeat this process for every sample of pollen, noting the varying shapes and colors of the pollen.
 17. Investigate with the microscope any other part of the flower that you wish to see better.
 18. Clean up and put away all of the equipment.

Experiment 15.1 – Step 13 - 16 (pollen slides)

Object: To observe, utilizing a microscope, the pollen of various types of flowers and compare their differences and similarities

In the video I showed slide preparation of pollen from three different types of flowers. I will offer you four views of each slide; 40x, 100x, 400x, 400x (magnified 2x by the camera). Utilize these views of the slides to accomplish step 15 of this experiment.

The pollen samples we will be using are from:

- Desert globemallow - Figures 1.1 - 1.4
- Peruvian lily - Figures 2.1 - 2.4
- White tulip - Figures 3.1 - 3.4

Desert globemallow pollen - Figures 1.1 - 1.4

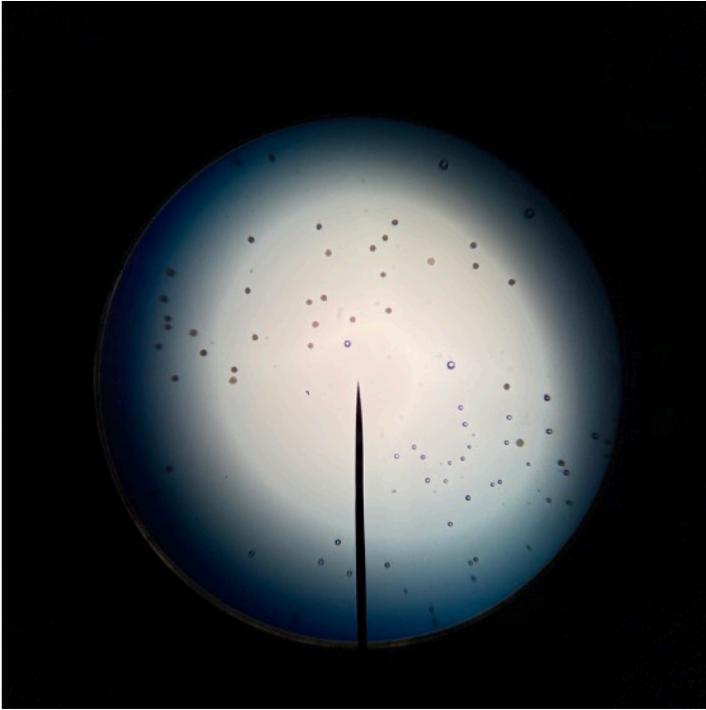


Fig. 1.1 - 40x

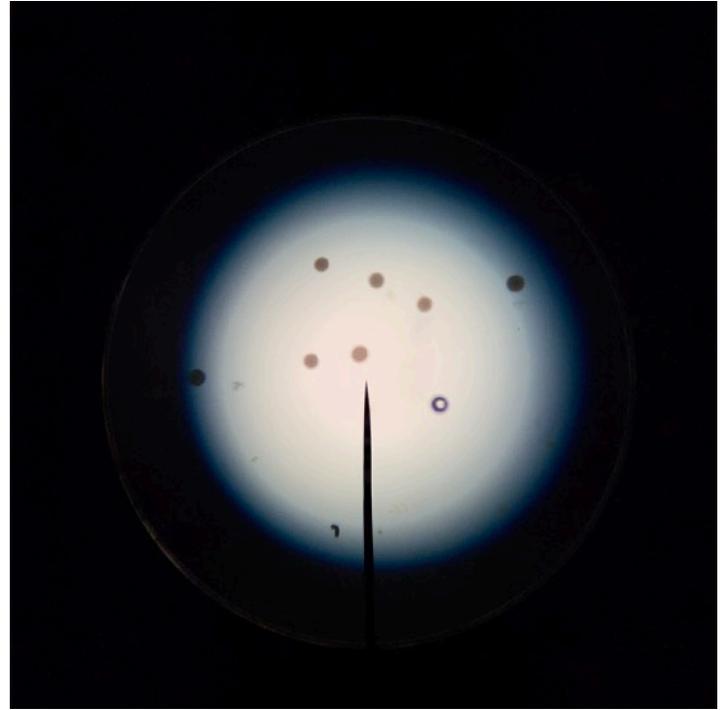


Fig. 1.2 - 100x

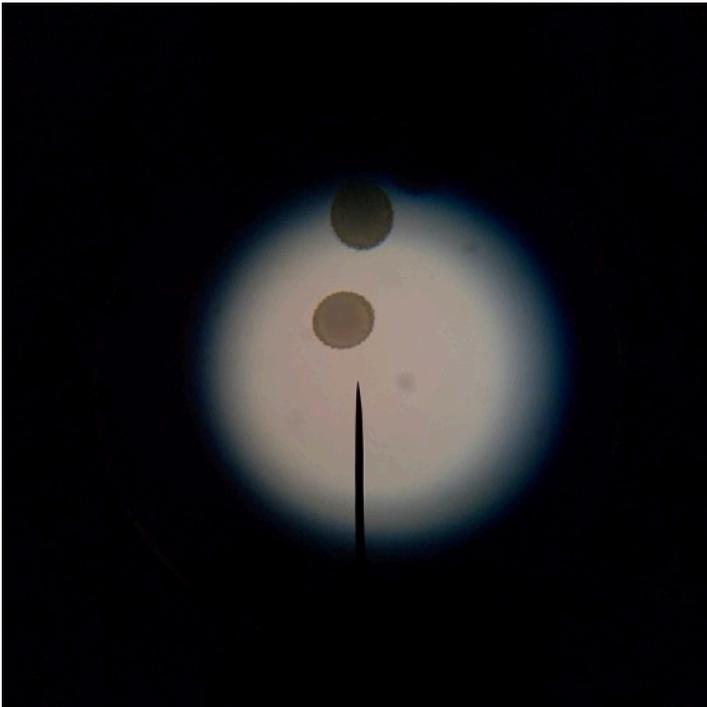


Fig. 1.3 - 100x

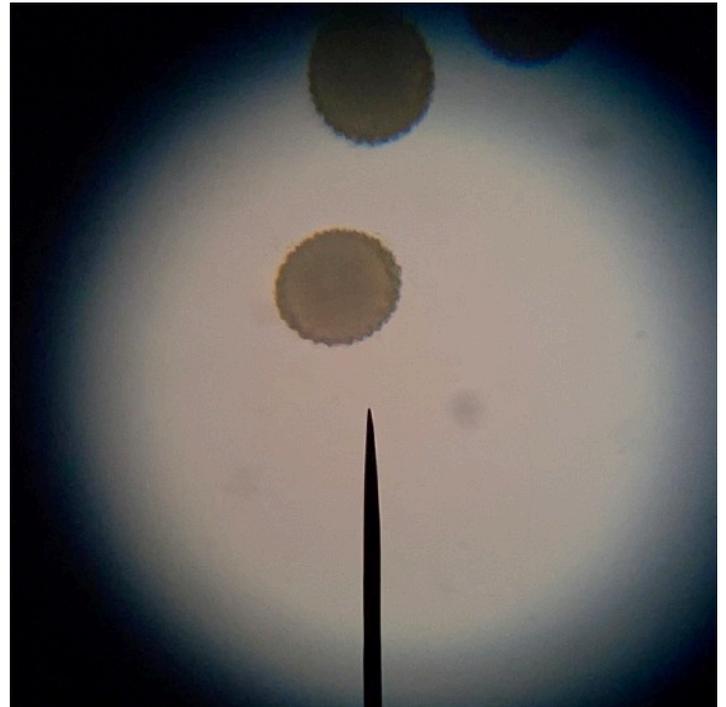


Fig. 1.4 - 400x & Magnified 2X on camera

Peruvian lily pollen - Figures 2.1 - 2.4

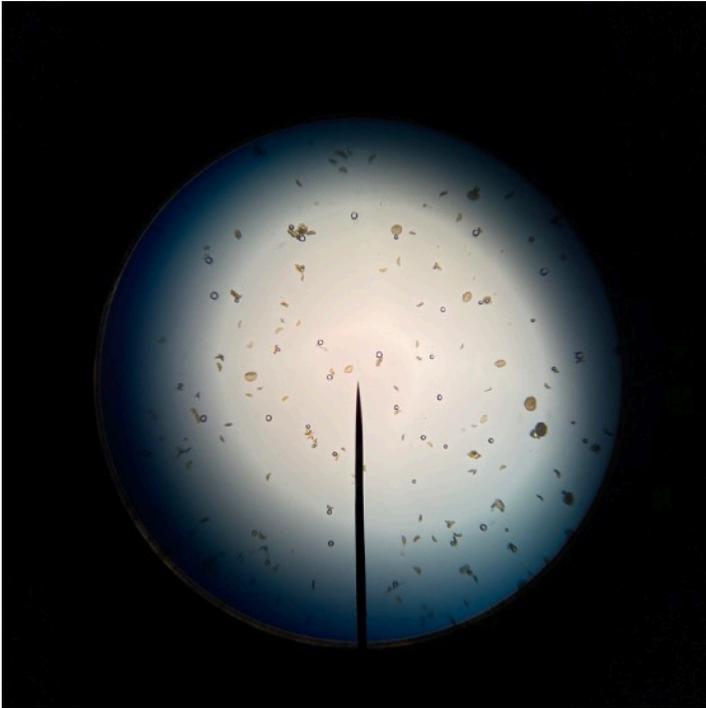


Fig. 2.1 - 40x



Fig. 2.2 - 100x



Fig. 2.3 - 100x



Fig. 2.4 - 400x & Magnified 2X on camera

White tulip pollen - Figures 3.1 - 3.4

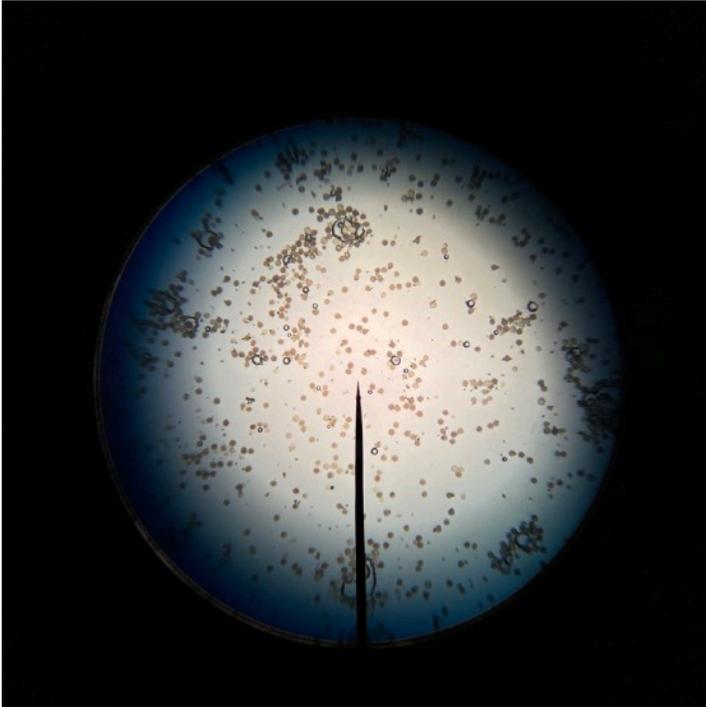


Fig. 3.1 - 40x

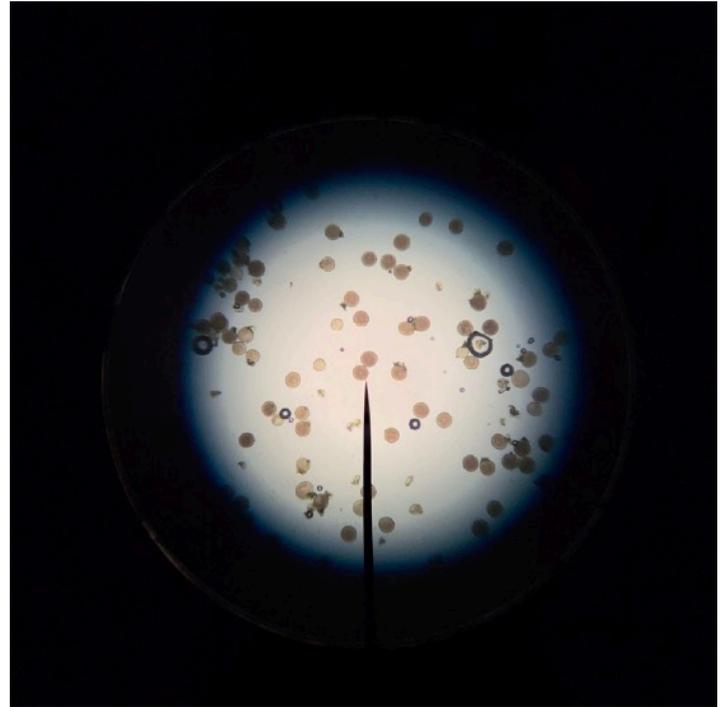


Fig. 3.2 - 100x

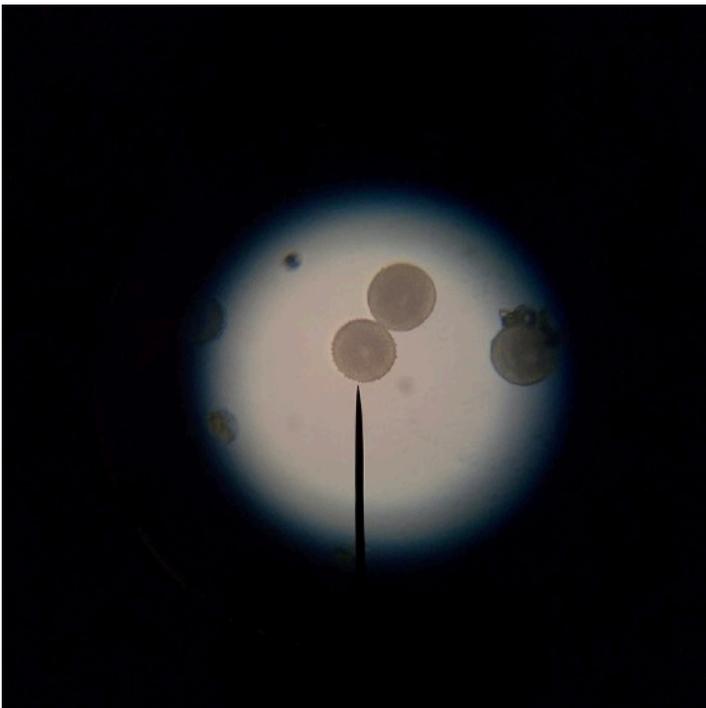


Fig. 3.3 - 100x



Fig. 3.4 - 400x & Magnified 2X on camera

Information & Pictures of the Desert Dandelion-1

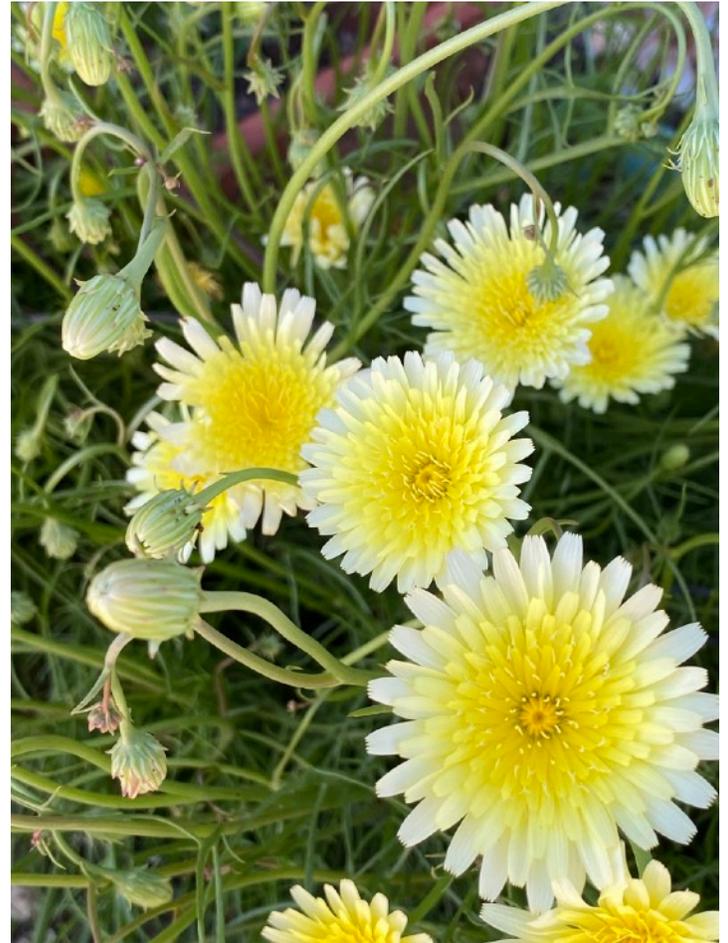
This is a wild flower common to the high desert and specifically my yard. You should go outside and view the different wild flowers in your yard and compare the anatomy of what you find. I mention this flower in the Intro video. The desert dandelion does not produce a “puff” like the common dandelion weed but the flowers do look very similar.



desert dandelion

Malacothrix glabrata

Malacothrix glabrata (smooth desert dandelion or desert dandelion) is an annual plant in the sunflower family (Asteraceae). It is common to the southwestern deserts of North America and has showy pale-yellow to white flowers. The name "glabrata" refers to the leaves being (nearly) hairless. Like other members of its genus, it has a milky sap and flower heads composed of smaller strap-like flowers called "ligules". (Source: Wikipedia, [Malacothrix glabrata](#), CC BY-SA 3.0)



Desert dandelions from my yard (above)



Common dandelion weed with “puff” (left)

Information & Pictures of the Desert Dandelion-2

These pictures are the same flower with the right side zoomed in for detail. Can you locate the carpel and the stamen? Can you locate the pollen.

You might think the center of this flower might be the carpel but it is not. The very center of the flower is actually more petals that will open as the flower ages and you can see an “older” flower on the next page (it has no “hub” in the center).

On page 11 you will see pictures of the flower under the stereo scope.



Information & Pictures of the Desert Dandelion-3

These pictures are of an “older” flower from my yard and it also shows the same flower with the right side zoomed in for detail.



Information & Pictures of the Desert Dandelion-4

This is a picture of the flower from the previous page under the stereo scope (10x-left & 10x with the camera zoomed to 2x-right). It does not appear that there is a carpel & stamen but yet each of the thread like lobes come out of the center of each petal. These "threads" appear to be coated with pollen for the upper half. When I cut this flower open at the receptacle each petal had an ovary attached at the base, hence the relation this flower has to the sunflower.



Information & Pictures of the Desert Globemallow-1

The desert globe mallow is also a wild flower common to the high desert and my yard. What kind of wild flowers do you find in your yard? You can view the walk-thru video (Part 6) that shows the anatomy & dissection of this flower. The top right photo on this page shows the “globe” shape of the petals of this flower. The bottom picture show one of the plants growing in my yard. This particular desert globemallow also has a bristly fiddle neck (brighter green with little yellow flowers) growing out of the middle.



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desert globemallow

Sphaeralcea ambigua

Sphaeralcea ambigua, commonly known as desert globemallow or apricot mallow, is a member of the genus *Sphaeralcea* in the mallow family (Malvaceae). (Source: Wikipedia, [Sphaeralcea ambigua](#), CC BY-SA 3.0)

