



SWIFT

OPTICAL INSTRUMENTS

Exceptional Optics ■ Durable Construction ■ Innovative Designs

Lesson Plan

Flower Dissection - Teacher Guide

Time of Activity: one class period, 60 minutes

Objectives for students:

1. Students will be able to list the parts of a flower
2. Students will be able to relate the structure of the floral parts to their function.

Relation to National Standards:

- Unifying concept of Form and Function
- Unifying concept of Evolution
- Unifying concept of Evidence, Models and Explanation
- Life Science standard of Interdependence of Organisms

Brief description of lesson :

1. Begin with a brief introduction of terms associated with a flower.
2. Have students read through the first part of the lesson and answer introductory questions.
3. Students will proceed with the flower dissection using a stereo microscope.
4. While dissecting the flower, students will observe structure of the flower using the stereo microscope and place all flower parts onto an index card and label each part.
5. Students will save one stamen to examine pollen grains,
6. Students will create a wet mount of pollen grains and observe them under a compound microscope.
7. Students will properly store their microscope and clean up lab materials.

Materials, equipment and supplies:

Stereo and compound microscopes, Brassica rapa flowers, tweezers, scissors, index cards, pencil, tape, microscope slides, cover slips, water, disposable pipettes

Suggested Assessment:

Assessment will be made on questions answered throughout the lesson plan packet, the index card with the flower parts, and a quiz on flower parts. A virtual assessment may be made using the digital capture options of the Swift Imaging software.



Photo courtesy of Wikipedia.com



Lesson Plan Page 2

Flower Dissection - Teacher Guide Continued

Below you will find some background reading about flowers. While you are reading the information, please answer the questions throughout. After you read through the background information, you will be asked to dissect a flower from a *Brassica rapa* plant.

Objectives

1. Students will be able to list the parts of a flower
2. Students will be able to relate the structure of the floral parts to their function

Science Skills

Microscopy
Observation
Slide Preparation

Science Concepts

Plant Structure and Function
Reproduction

Background

A definition you need to know...

Gamete: Male and female sex cells, sperm and eggs.

What is a flower? In human eyes it is something to enjoy, with color and fragrance. For many plants, flowers are vital organs of reproduction containing both male and female gametes. For bees and other nectar-feeding animals, flowers are a food source of food.

1. What is the purpose of a flower for a plant?
2. Do flowers help any other organisms? How do they help those organisms?



3. Why do you think flowers are brightly colored?

Most flowers have the same basic parts, though they are often arranged in different ways. The five main parts of a flower are the sepals, petals, stamens, pistil, and nectaries. The sepals are the green leaf-like structures at the base of the petals that protect the developing flower. The petals are the colored leaf-like structures within the sepals.

4. What are the five main parts of a flower?
5. What are the two leaf-like structures of a flower called?



Lesson Plan Page 3

Flower Dissection - Teacher Guide Continued

The stamen has two parts, the anther and the filament. The anther contains the pollen grains, which contain the male gametes.

The pistil usually has three parts, the stigma (which receives the pollen), the style (the neck below the stigma) and the carpel (or ovary). Brassica flowers have two fused carpels, separated by a thin membrane. The carpels house the ovules, which contain the female gametes.

6. What is the male structure of the flower called?
What are the two parts of this structure?

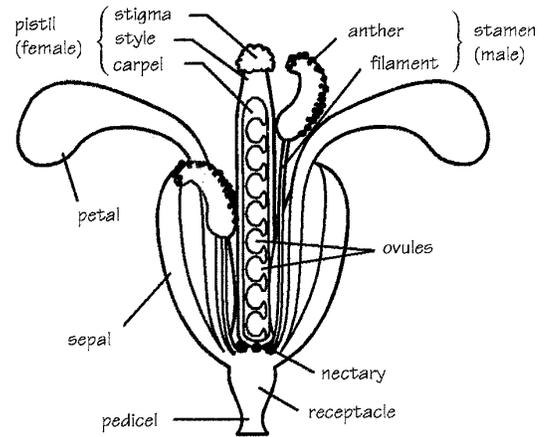
7. What is the female structure of the flower called?
What are the three parts of this structure?

8. Which part of the flower do you think become the seeds of a plant? (hint: look at the picture)

9. What part of the flower do you think becomes the seedpod? (hint: look at the picture)

Sugar-rich nectar is secreted by the specialized nectary tissues. These are strategically located in the flower to ensure that nectar-gathering animals will receive pollen from anthers and transmit it to stigmas.

10. On which part of the flower are pollen grains found?



Flower Dissection Student Activity

Materials needed:

- Stereo Microscope
- Compound Microscope
- One index card
- One Brassica rapa flower
- Tweezers
- Tape
- Scissors
- Black rubber stopper
- Pencil
- Microscope slides
- Cover slips
- Water
- Pipette

Stereo Microscope Applications:

Procedure:

Obtain a flower from one of your Brassica rapa plants by cutting a flower below the pedicel (make sure you leave a little bit of the stem). The pedicel is the bottom most part of a flower (see diagram above for specific location of the pedicel). You are now ready to examine the flower.

1. **Let's start with stabilizing the flower.** You all have a black rubber stopper that has an incision in it. If you squeeze the stopper, the incision will widen. When the incision widens, you can place your flower into the slot. Release the stopper, and the flower will remain in place. (Watch your teacher for further instruction.)



Lesson Plan Page 4

Flower Dissection - Teacher Guide Continued

2. Before you begin to dissect the flower, look at the flower from above. Do this with your stereo microscope. Adjust your stereo microscope so that you are examining the flower under 10X. If you look closely between the petals, near the receptacle, you will see the nectaries. They look like droplets of water. Change the power. Feel free to adjust the power to 20X, 30X or 40X for a closer look. (the powers you use depend on the options on your stereo microscope) Can you see them? How many do you see?

Number of nectaries: _____

3. Examine the flower under 10X, 20X, 30X and/or 40X. Look closely at the petals, stamen and pistil. The petals glisten in the light.

Why might have plants evolved to have brightly colored flowers?

Examine the pistil under 10X, 20X, 30X and/or 40X. The pistil looks slightly sticky.

Why do you suppose this structure is sticky? Is there anything stuck to the pistil?

Look closely at the stamen under 10X, 20X, 30X and/or 40X. Do you see the clumps of yellow fuzz? That is the pollen. We will be looking at the pollen later in this lesson.

4. It is now time for the dissection. Dissection may be easier if it is done under magnification using your microscope. Start by removing the sepals of the flower. It may be easiest to do this if you hold the flower with your finger from below the pedicel and removing the sepals with a pair of tweezers.

5. Place the sepals on the index card and tape them in place.
6. Once you have taped the sepals in place, label them.
7. Repeat the same procedure for the following flower parts in the following order: petals and pistil.
8. You still have stamen remaining on your flower. Remove all but one of the stamens, tape them onto your index card, and label them. Place the last stamen to the side to be used to observe pollen grains.
9. On your finished index card, you should have sepals, petals, stamens and one pistil. All structures should be labeled.
10. Please put your tape and tweezers back in their proper locations.
11. Write your name on your index card and hand it in to your teacher.

Digital Microscopy Applications:

Capture an image of each part that you have dissected. You can annotate each image and label with the appropriate part. Create a "virtual index card" for each part you identify. Be sure to include measurements of each structure.

Compound Microscope Applications: Observation of Pollen Grains

1. Obtain your one remaining stamen from your Brassica rapa flower.
2. Place the stamen onto your microscope slide and tap the stamen a few times with your tweezers. Pollen grains should fall from the stamen.



SWIFT

OPTICAL INSTRUMENTS

Exceptional Optics ■ Durable Construction ■ Innovative Designs

Lesson Plan Page 5

Flower Dissection - Teacher Guide Continued

3. Remove the stamen, leaving pollen grains behind, add one drop of water, and cover it with a cover slide.
4. Adjust your microscope. Start with the 10X objective. Locate small, yellowish, oval shaped objects. Change your objective to 40X. These small, yellowish, oval shaped objects are the pollen grains of the Brassica rapa flower. Draw the pollen grains in the box below. Be sure you label the magnification correctly.
5. Clean up your materials and hand this packet into your teacher.

Digital Microscopy Applications:

Using your Swift Cam and Swift Imaging Software you can capture your images. See Step number 4. Capture the image that you see when using the 10X objective. Label the image with the correct magnification (10X). Capture the image that you see when using the 40X objective. Label the image with the correct magnification (40X). Be sure to save your images. Can you think of any other annotations you may do using the software? Hint: You can measure and use the filter options.

Flower image from www.fastplants.org

*Adapted from "Flowering and Pollination: Pollination Biology" by the Wisconsin Fast Plants program. Bateman, K.A. 2005

Swift Optical Instruments would like to thank the Science Teachers of Lexington High School, in Lexington, MA for their inspiration and contributions to this project. We give special recognition to Whitney Hagins, Ken Bateman, Kristine Thyng, Sue Offner, Nora Murphy, and Elliott Gimble for their efforts and for their dedication to teaching.