

Name _____

Date _____ Class _____

B15 *Flower Structures*

Skills

- dissecting flowers
- identifying flower parts

Objectives

- *Identify* the structures and arrangements of the female and male reproductive organs of the flower.
- *Compare* and *contrast* sepals and petals.

Materials

- gloves
- monocot flower (gladiolus, tulip, or lily) or dicot flower (azalea, camelia, evening primrose, morning glory, or snapdragon)
- hand lens
- sheet of white paper
- transparent tape
- microscope slide
- coverslip
- compound light microscope
- water
- dissecting needle
- dropping pipet
- scalpel

Purpose

In this lab, you will examine a typical flower and observe the parts adapted for the production and protection of seeds.

Background



Every flower consists of a set of adaptations that help to ensure successful reproduction. For example, flowers often have bright colors, attractive shapes, and pleasing aromas. These traits help them attract insects and other animals that will carry pollen grains from flower to flower. Pollination also occurs by means other than animals carrying the pollen. For some flowering plants, the wind plays an important role in transferring pollen from plant to plant.

The seed-bearing plants that produce flowers are **angiosperms**. The flower produces the seeds, each of which contains a new plant embryo. The parts of the flower are usually found in four whorls, or rings. **Petals** are one of the four whorls. They attract pollinators. **Sepals** lie outside the petals. They protect the bud.

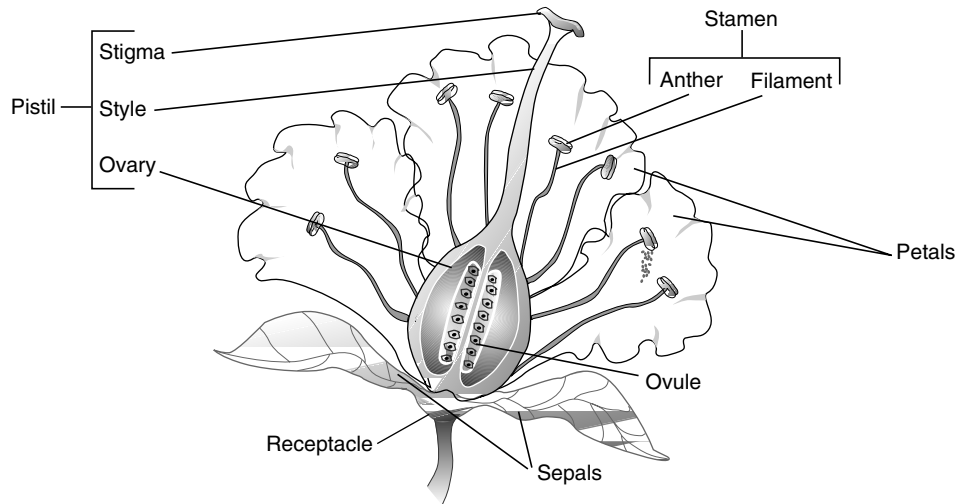
The reproductive organs, the stamens and pistils, make up the third and fourth whorls and lie inside the petals. A **stamen** is a male reproductive part. It consists of an anther that is held up by a **filament**. The **anther** produces pollen grains. A **pistil** is a female reproductive part. Its top is called the **stigma**. It is sticky to ensure that when pollen grains land on it, they stick to it. The middle supporting structure is the **style**, and the large base is the **ovary**, where the eggs are produced.

Procedure

Part 1—Examining Flower Parts

1.   Put on gloves. Examine a sample flower with a hand lens. As you look at the center of your flower, be careful not to damage any parts. Notice how the parts are arranged in circles and attached at the flower base. **CAUTION: Some fluids from plants are irritating to the skin. Be sure to wear gloves when handling such plants. Keep your hands away from your face.**

2. Use the diagram below to help locate the sepals. The ring of sepals is called the *calyx*. In the table below, record the number of sepals in your flower, describe their appearance, and note the presence or absence of an odor.



Description of Flower Parts

Flower Parts	Description	Odor	Number of Parts
Sepals			
Petals			
Stamens			
Stigma			
Style			
Ovary			
Ovules			

3. Very carefully remove the sepals, one by one, by using your first finger and thumb to break each off at the receptacle. Hold a sepal up to the light to observe the veins in it. Place your sepals in a row along the top of a sheet of paper, and attach them using tape. Label the row *Calyx*.
4. The next ring of parts, the petals, is referred to as the *corolla*. In some flowers, the petals are fused at their base. Record the number of petals, their appearance, and the presence or absence of an odor in the table above.
5. Very carefully remove the petals, one by one, by using your first finger and thumb. Hold one of them up to the light to observe its veins. On your sheet of paper just below the sepals, attach your petals in a row using tape. Label this row *Corolla*.

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- ◆ What is the difference between the sepals and petals?

- ◆ What is the calyx of the flower? What is the corolla?


Part 2—Examining the Reproductive Organs

6. Locate the stamens inside the circle of petals. Count and record the number of stamens, and describe their appearance in the table on the previous page.

- ◆ In multiples of what number do your stamens occur?

7. Gently break off the stamens at their bases. Be careful not to damage the pistil or pistils. On your sheet of paper just below the petals, attach the stamens using tape. Label one stamen, anther, and filament.

- ◆ What substance does the anther produce?

8.  Make a wet mount of pollen grains taken from one of the anthers. The grains are located along the length of the two pollen sacs of the anther if the grains are mature. If not, borrow some grains from another lab group. Place a drop of water onto a microscope slide. Use a dissecting needle to scrape off some pollen grains into the water. Place a coverslip over the slide.


9. Examine the slide under a microscope on low power. Then observe it under high power. Sketch what you see in the left margin.

10. Observe the pollen grain slide from a lab group with a different type of flower from yours.


- ◆ Describe what you see.

11. Your flower will probably have only one pistil, but some flowers have more than one. Locate the pistil or pistils of the flower.

12. Locate and examine the stigma, style, and ovary of one pistil. (*Note: Tulips do not have styles.*) The ovaries of some flowers (tulips and lilies) are located above the point where the sepals and petals are attached. The ovaries of other flowers (gladioli and irises) are located below the point where the sepals and petals are attached. In the table on page 70, record the appearance of the stigma, style, and ovary.

13.  Use a scalpel to cut the ovary open lengthwise up to the style. **CAUTION: Use extreme care with all sharp instruments. Report any cuts to your teacher.** Locate the ovules inside and examine them. In the table on page 70, record the ovules' appearance. Tape the pistil to your sheet of paper below the stamens.

14.  Dispose of your materials according to the directions from your teacher.

15.  Clean up your work area and wash your hands before leaving the lab.

Analysis

16. How does a pollen grain get to the stigma of a pistil?

17. How might the odor of the petals help in pollination?

18. Which parts of the flower develop into the seeds? Which parts develop into the fruits?

Conclusions

19. How does the structure of the stigma aid in pollination?

20. What type of angiosperm do you have, a monocot or a dicot? Explain.

Extensions

21. If your flower was a monocot, repeat this lab using a dicot. If yours was a dicot, use a monocot. Then compare the two kinds of flowers in number of sepals, petals, and stamens. Determine how this information is useful in plant identification.

22. Do further research on the variety of ways in which different types of flowers become pollinated. Draw a chart to illustrate your findings, and share it with your class.

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B15 *Flower Structures*

Skills

- dissecting flowers
- identifying flower parts

Objectives

- *Identify* the structures and arrangements of the female and male reproductive organs of the flower.
- *Compare* and *contrast* sepals and petals.

PREPARATION NOTES

Materials

Time Required: one 50-minute period

- gloves
- monocot flower (gladiolus, tulip, or lily) or dicot flower (azalea, camelia, evening primrose, morning glory, or snapdragon)
- hand lens
- sheet of white paper
- transparent tape
- microscope slide
- coverslip
- compound light microscope
- water
- dissecting needle
- dropping pipet
- scalpel

Purpose

In this lab, you will examine a typical flower and observe the parts adapted for the production and protection of seeds.

Background

Materials

Materials for this lab activity can be purchased from WARD'S. See the *Master Materials List* for ordering instructions.

Preparation Tip

Before the lab, call florists, funeral homes, or grocery stores that carry fresh flowers to arrange for donations of flowers. You can also have students bring in flowers for this lab.

Every flower consists of a set of adaptations that help to ensure successful reproduction. For example, flowers often have bright colors, attractive shapes, and pleasing aromas. These traits help them attract insects and other animals that will carry pollen grains from flower to flower. Pollination also occurs by means other than animals carrying the pollen. For some flowering plants, the wind plays an important role in transferring pollen from plant to plant.

The seed-bearing plants that produce flowers are **angiosperms**. The flower produces the seeds, each of which contains a new plant embryo. The parts of the flower are usually found in four whorls, or rings. **Petals** are one of the four whorls. They attract pollinators. **Sepals** lie outside the petals. They protect the bud.



The reproductive organs, the stamens and pistils, make up the third and fourth whorls and lie inside the petals. A **stamen** is a male reproductive part. It consists of an anther that is held up by a **filament**. The **anther** produces pollen grains. A **pistil** is a female reproductive part. Its top is called the **stigma**. It is sticky to ensure that when pollen grains land on it, they stick to it. The middle supporting structure is the **style**, and the large base is the **ovary**, where the eggs are produced.

Procedure

Disposal

Discarded flower parts may be placed in the laboratory trash can.

Part 1—Examining Flower Parts

1.   Put on gloves. Examine a sample flower with a hand lens. As you look at the center of your flower, be careful not to damage any parts. Notice how the parts are arranged in circles and attached at the flower base. **CAUTION: Some fluids from plants are irritating to the skin. Be sure to wear gloves when handling such plants. Keep your hands away from your face.**

PROCEDURAL NOTES

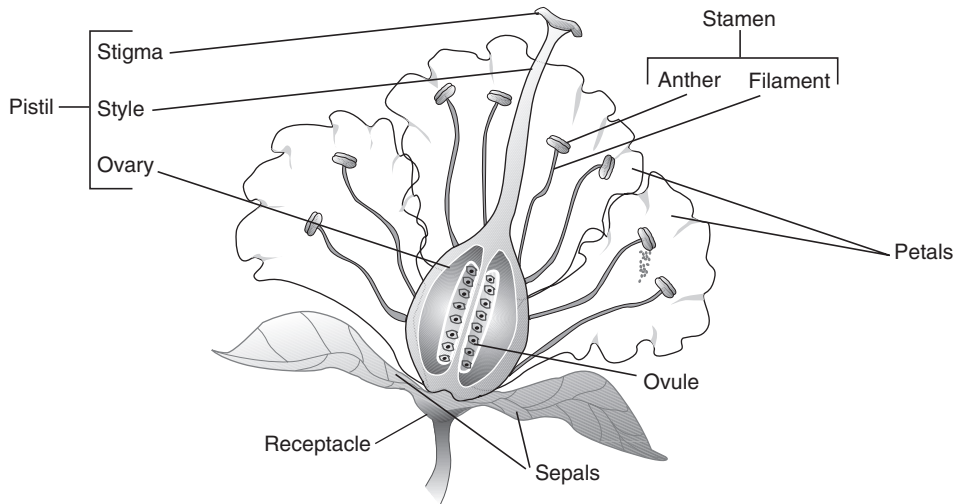
Safety Precautions

- Discuss all safety symbols and caution statements with students.
- Caution students not to hold the pistil in their hand when slicing it open. Provide a suitable cutting surface on which to perform this task.

Procedural Tip

It is possible that students will be trying to dissect a flower with an inferior ovary, e.g., gladiolus or evening primrose. Inferior ovaries are located below, or embedded in, the receptacle.

2. Use the diagram below to help locate the sepals. The ring of sepals is called the *calyx*. In the table below, record the number of sepals in your flower, describe their appearance, and note the presence or absence of an odor.



Description of Flower Parts

Flower Parts	Description	Odor	Number of Parts
Sepals			
Petals			
Stamens	Answers to entire table will vary.		
Stigma			
Style			
Ovary			
Ovules	rounded, possibly green or pale yellow		

3. Very carefully remove the sepals, one by one, by using your first finger and thumb to break each off at the receptacle. Hold a sepal up to the light to observe the veins in it. Place your sepals in a row along the top of a sheet of paper, and attach them using tape. Label the row *Calyx*.
4. The next ring of parts, the petals, is referred to as the *corolla*. In some flowers, the petals are fused at their base. Record the number of petals, their appearance, and the presence or absence of an odor in the table above.
5. Very carefully remove the petals, one by one, by using your first finger and thumb. Hold one of them up to the light to observe its veins. On your sheet of paper just below the sepals, attach your petals in a row using tape. Label this row *Corolla*.

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- ◆ What is the difference between the sepals and petals?

Sepals are often green, although they may be other colors, and they are very thick at the base.

Petals may be brightly colored and are inside the sepals.

- ◆ What is the calyx of the flower? What is the corolla?

The entire whorl of sepals is called the calyx, and the entire whorl of petals is called the corolla.

Part 2—Examining the Reproductive Organs

6. Locate the stamens inside the circle of petals. Count and record the number of stamens, and describe their appearance in the table on the previous page.


- ◆ In multiples of what number do your stamens occur?

Answers will vary. Monocots have flower parts in multiples of three, and dicots have flower parts in multiples of two, four, or five.

7. Gently break off the stamens at their bases. Be careful not to damage the pistil or pistils. On your sheet of paper just below the petals, attach the stamens using tape. Label one stamen, anther, and filament.

- ◆ What substance does the anther produce?

pollen

8.  Make a wet mount of pollen grains taken from one of the anthers. The grains are located along the length of the two pollen sacs of the anther if the grains are mature. If not, borrow some grains from another lab group. Place a drop of water onto a microscope slide. Use a dissecting needle to scrape off some pollen grains into the water. Place a coverslip over the slide.




9. Examine the slide under a microscope on low power. Then observe it under high power. Sketch what you see in the left margin.

10. Observe the pollen grain slide from a lab group with a different type of flower from yours.

- ◆ Describe what you see.

Answers will vary since different species of plants may produce different shapes of pollen.

11. Your flower will probably have only one pistil, but some flowers have more than one. Locate the pistil or pistils of the flower.

12. Locate and examine the stigma, style, and ovary of one pistil. (*Note: Tulips do not have styles.*) The ovaries of some flowers (tulips and lilies) are located above the point where the sepals and petals are attached. The ovaries of other flowers (gladioli and irises) are located below the point where the sepals and petals are attached. In the table on page 70, record the appearance of the stigma, style, and ovary.
13.  Use a scalpel to cut the ovary open lengthwise up to the style. **CAUTION: Use extreme care with all sharp instruments. Report any cuts to your teacher.** Locate the ovules inside and examine them. In the table on page 70, record the ovules' appearance. Tape the pistil to your sheet of paper below the stamens.
14.  Dispose of your materials according to the directions from your teacher.
15.  Clean up your work area and wash your hands before leaving the lab.

Analysis

16. How does a pollen grain get to the stigma of a pistil?
A pollen grain is generally moved to the stigma by animals or wind, or it simply falls on the stigma.

17. How might the odor of the petals help in pollination?
Some animals that act as pollinators are attracted by the odors.

18. Which parts of the flower develop into the seeds? Which parts develop into the fruits?
The ovules become seeds, and the ovary (and sometimes the receptacle) becomes the fruit.

Conclusions

19. How does the structure of the stigma aid in pollination?
The stigma projects up from the ovary so as to be exposed, and it has a sticky surface that pollen grains will easily cling to.

20. What type of angiosperm do you have, a monocot or a dicot? Explain.
Answers will vary. If the student counted the stamens, sepals, or petals and recorded a multiple of three, it is probably a monocot. If the student recorded a multiple of two, four, or five, it is probably a dicot.

Extensions

21. If your flower was a monocot, repeat this lab using a dicot. If yours was a dicot, use a monocot. Then compare the two kinds of flowers in number of sepals, petals, and stamens. Determine how this information is useful in plant identification.
22. Do further research on the variety of ways in which different types of flowers become pollinated. Draw a chart to illustrate your findings, and share it with your class.

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