



Dry Forest

Concepts

Floral structure and importance of flowers

HCPS III Benchmarks

SC6.6.4

Duration

1 hour

Source Material

Digital Flowers

Vocabulary

pollinators
whorls
sepals
petals
stamen
pollen
anthers
stigma
style
bilateral symmetry
radial symmetry
cross section
longitudinal-cross section

Lesson 5: Flowers

Summary

Students will learn about floral structure and why flowers are important to pollination and reproduction. They will do a flower dissection and drawing, labeling the parts of the flower in order to learn the structure of a plant reproductive system.

Objectives

- Students will be able to draw and label a flower.
- Student will learn the importance of flowers and their anatomy.

Materials

Hibiscus Flower (1 per group)
Blank sheet of paper (1 per student)
Markers, crayons, or colored pencils (1 set per student)
Dissection tools (sharpened pencil and scissors, or scalpel/razorblade, 1 set per group)
Digital Microscopes or hand lenses (1 per group)
KWL worksheet
Flower anatomy worksheet
Flower dissection worksheet
Flower dissection guide (see attached pages)

Making Connections

Students will recall which part of the plant makes seeds, which were studied in “Lesson 2: Seed Anatomy” and “Lesson 3: Seed Transport”. Students will make connections to flowers that they might have growing in their house or in their yards.

Teacher Prep for Activity

Ask each student to bring in 3-5 Hibiscus flowers (so when some forget there will be enough for the entire class). If using scalpels or razorblades, make sure that you have supplies set up safely for students. Make copies of the *KWL* worksheet and the *Flower anatomy* worksheet. Read the background information and familiarize your self with flower anatomy. Make overheads or use a projector to display the flower dissection guide for the students to use and follow along with flower dissection worksheet.

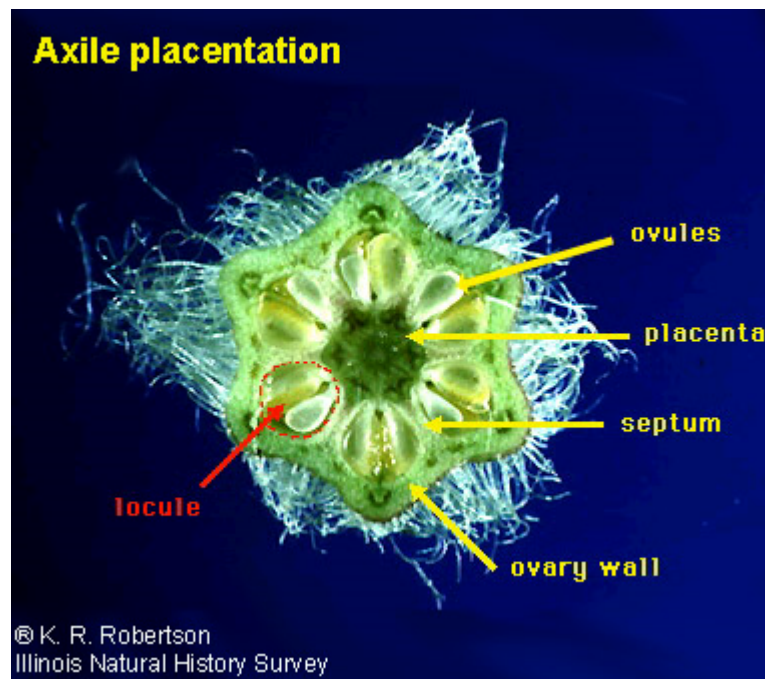


Background

Flowers are interesting for a number of reasons. Not only are they attractive in both sight and smell (some are even edible); they are also an important part of plant reproduction. So, why are flowers pretty colors and why do they smell nice? The most important reason is because it helps to attract **pollinators** to spread their pollen around. They are essentially advertising for reproduction. Birds and insects are attracted to the bright colors and fragrance flowers produce.

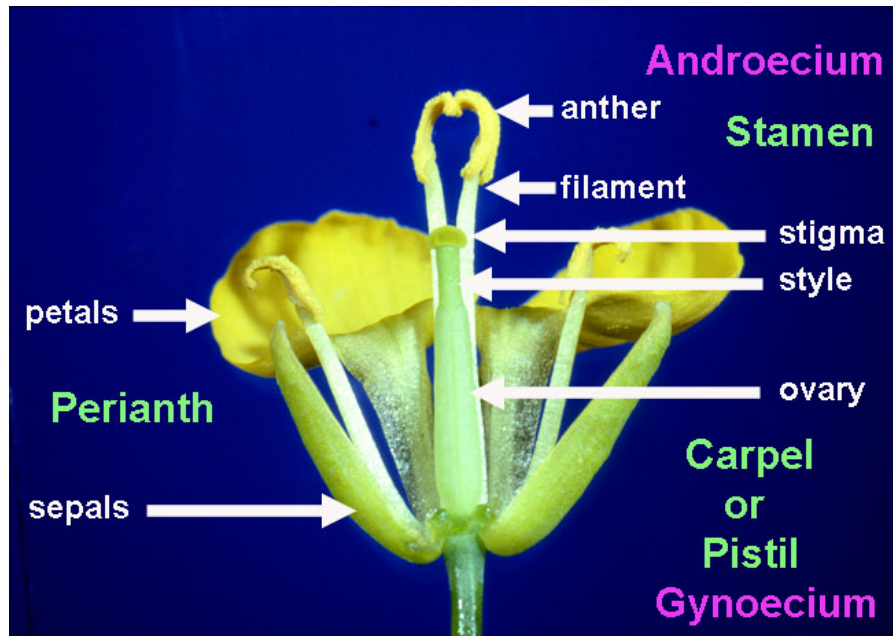
Flowers have four main parts or **whorls**. The outer whorl is made up of **sepals**. Sepals are often green and are typically the part of the plant that contains the bud. The next whorl is made up of the **petals** of the flowers. The petals are typically brightly colored and help attract pollinators. The next whorl is the **stamen**. The stamen is the male reproductive part of a flower and produces **pollen**. The pollen comes out of the **anthers**, which are at the end of the stamen. The last whorl is the **stigma**. The stigma is the female reproductive part of the flower, and the tip of the stigma is called the **style**.

Below the style is the **ovary** of the flower. The ovary is often divided in different compartments depending on the type of flower. In the picture below (Axile placentation, which is a type of ovary structure), the ovules become the seeds and are attached to the placenta. The locule is the pairing of two ovules in this picture. The septum is the space between the locules and the ovary wall is the outer edge of an ovary.





The picture below shows the most common structures of a flower. The androecium is the male part of the flower, which consists of **stamen**. The stamen has an **anther** and a **filament**. The gynoecium is the female part of a flower. This is also known as a carpel or pistil and consists of the **stigma**, **style**, and **ovary**. The perianth is made up of the **petals** and **sepals**.



Flowers come in many different shapes and have different symmetry; either **bilateral** or **radial symmetry**. Most orchids have **bilateral symmetry** (one symmetrical axis) while flowers like tulips or asters have **radial symmetry** (multiple symmetrical axes). Floral dissections are fairly easy and typically accompanied by floral drawings that help students learn the parts of a flower.

Vocabulary

Pollinators: organisms that bring pollen between plants

Whorls: the different parts of flowers, there are 4

Sepals: the outer most whorl, protect buds

Petals: the second whorl, often used to attract pollinators

Stamen: part of the third whorl, male reproductive organ, have anthers on the end

Pollen: part of the third whorl, contains the genetic material to transfer to other plants

Anthers: part of the third whorl, on the end of stamen, contain pollen

Stigma: part of the fourth whorl, female reproductive organ, the tip of the style

Style: part of the fourth whorl, the stigma is the on the tip

Bilateral symmetry: can only be divided in half, like a person's face

Radial symmetry: can be divided in multiple ways, like a piece of pie

Cross section: A section made across the plant, width-wise (see Axile Placentation picture)

Longitudinal cross section: A cross section made along the length of the plant (see the flower parts picture)



Procedure

1. Hand out *KWL* worksheet on flowers and fill out first 2 questions.

Activity 1: Group Discussion Series

1. Topic: Introduction to flowers

Question 1: Why do you like/dislike flowers?

Answer: This is just a question to get the students thinking about flowers.

Question 2: What can flowers be used for?

Answer: Flowers are often used as decoration. Some flowers are also edible (there are many edible violets).

Question 3: Why are flowers important?

Answer: Flowers are an important part of plant reproduction. They are designed to pass pollen between male and female parts.

Question 4: Why are birds and insects important to plants?

Answer: Flowers can be pollinated by wind, but often are pollinated by animals. In Hawaii, birds and insects are incredibly important pollinators. The native Honey Creepers pollinate many of the flowers. There are also native bees that are important in pollination. The European honeybee, which has been in the Hawaiian Islands since 1857, is also an important pollinator in Hawaii and the rest of the world.

Question 5: How do plants attract pollinators?

Answer: Plants offer rewards for pollinators. Many flowers have nectar to attract birds and insects. Insects also eat the pollen. There are some flowers that mimic insects. There is an orchid that attracts pollinators by mimicking a female (see attached photos).

2. Draw a picture of a flower on the board. (It does not have to be ornate, just something that shows the structure of the flower; see the scientific drawing example). Go over the parts of the flowers from the outer whorl to the inner whorl (starting with sepals, then petals, then anther and stamen, and lastly stigma, style, and ovary)

3. Topic: Floral Symmetry

Question 1: How can flowers be divided?

Answer: Some flowers can be divided many different ways. This is radial symmetry (tulips). Other flowers can only be divided in half, which is bilateral symmetry (orchids).



Question 2: What are some other examples of radial symmetry? Bilateral symmetry?

Answer: May include birds of paradise for bilateral and Ohia lehua blossoms for radial.

Activity 2: Flower Dissection

1. Have each student (or pair of students) obtain a flower and dissection supplies. Also hand out the *Flower Dissection* worksheet.
2. The students should examine the symmetry of the flower and record it on a sheet of notebook paper. Is it radial or bilateral?
3. They should then examine the flower before cutting. How many sepals, petals, stamen, styles? They should record all of this on the worksheet.
4. Instruct the students to begin their flower dissection by starting a floral drawing. They should begin their drawing with the sepals. The drawing does not have to be detailed, but something similar to the picture above or the example included will be acceptable.
5. They should then draw and label each whorl of the flower on the worksheet. They should also include any other observations they have about the flower.
6. Have them try to make a longitudinal cross section of the flower (cutting it in half length wise). Their drawing should look similar to a flower with a longitudinal cross section.
7. Have them cut a cross-section of the ovary, below the style and see where the seeds will develop. Have them draw a cross section of the ovary on their worksheets. How many seeds do they think it will produce?
8. Have students finish up by answering question 3 on their *KWL worksheet*.

Assessments

Flower Dissection worksheet

KWL worksheet

Resources

<http://www.life.uiuc.edu/plantbio/digitalflowers/>

<http://www.life.uiuc.edu/ib/335/Flowers/FloralTerms.html>

Extension Activities

Flower Art:

Flowers have been used in art and as decoration for many years. There is a huge market for flowers throughout the world, especially in Hawaii. Many well known artists have painted plants and flowers. For example, Monet's Water-lilies or one of Georgia O'Keeffe's many paintings of flowers.

“When you take a flower in your hand and really look at it, it's your world for the moment. I want to give that world to someone else. Most people in the city rush around so, they have no time to look at a flower. I want them to see it whether they want to or not.” — Georgia O'Keeffe



Flower pressings

1. Use fresh flowers without any moisture on them.
2. Place the flower between two sheets of paper and place in a book with at least 1/8 inch on each side.
3. Let sit for 1-2 weeks and then remove.
4. Phone books are good for this, as are big science textbooks.

Flower Printing

1. Take a flower and brush paint on one side of it.
2. Press the flower with paint onto a piece of paper.
3. Repeat this process with different types of flowers and different colors until satisfied.

Flower Painting/Drawing

1. Have students paint or draw a picture of a flower.
2. It can be a flower on display or one from their imagination.

Leaf Rubbings

1. Have students pick a few leaves from near-by foliage.
2. Place the leaf under a sheet of paper.
3. Using either a colored pencil or crayon shade over the leaf on the piece of paper.

Gallery Walk

1. Use the last 15-20 minutes of class for the students to do a gallery walk.
2. Give each student 2-3 post-it notes and allow them to place positive comments about a piece of art.
3. No piece of art should have more than 5 notes and they should all be positive comments.



Name: _____

Date: _____

Flowers K-W-L

What do you know about flowers?

What do you want to know about flowers?

What did you learn about flowers?



Name: _____

Date: _____

Flower anatomy

- 1) Why do you like or dislike flowers?

- 2) What can flowers be used for?

- 3) Why are flowers important?

- 4) Why are birds and insects important to plants?

- 5) How do plants attract pollinators?

- 6) How can flowers be divided symmetrically?

- 7) Give an example of a flower with bilateral symmetry. Radial symmetry.



Name: _____

Date: _____

Flower Dissection

- 1) What kind of symmetry does the flower have?

- 2) How many sepals?

- 3) How many petals?

- 4) How many stamen?

- 5) How many styles?

- 6) Draw and label all four whorls of the flower.



7) Draw a cross section of the ovary.

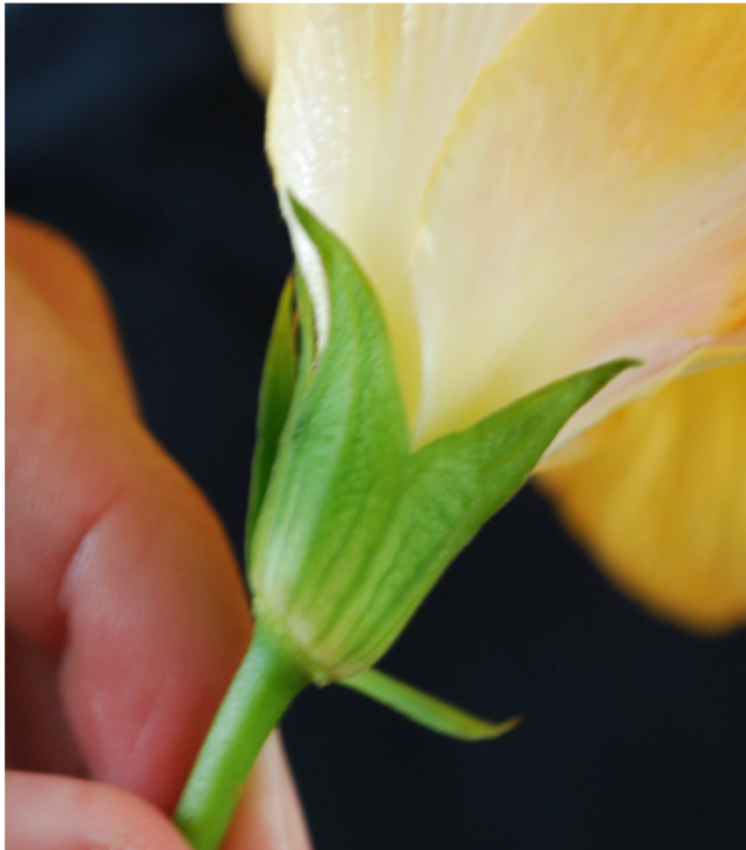
8) How many seeds do you think the ovary will produce?



Materials required for flower dissection.



First the bract must be removed. A bract is a small modified leaf below the sepals.



Not all of the bracts must be removed. The next layer are the sepals. On Hibiscus, there are 5 and they are fused together.



The scissors were used to cut apart the fused sections and then the sepals were peeled down and pulled off.



The sepals can be ripped off by hand in order to expose the next whorl, the petals.



There are five distinct petals and they can be peeled off of the flower.



The next whorl after the petals are the stamen and anthers, which are the male parts of flowers.



In hibiscus, there is a fused staminal tube. Use a tip of a pencil to slice open the staminal tube, going for base to tip.



Peel back the staminal tube to expose part of the last whorl, the style. The stigma are on the top of the staminal tube and the style runs down the inside of the tube to the ovary.



The style should be apparent after peeling back the tube.



It can be pulled out, by carefully using the tip of a pencil.



The stigma are on the end of the style and when pollen lands on them, the pollen will send a tube down the length of the style to the ovary.



The ovary is at the base of the flower and contains ovules, which turn into seeds.



By cutting the ovary in half with scissors, a cross-section can be shown. There are many ovules within the ovary of the flower.



Scissors can also be used to make a longitudinal section of the ovary, exposing more ovules which will one day become seeds.



A simple example of a drawing of a hibiscus with all parts present. Starting from the outside, the bracts, sepals, petals, staminal tube with stamen, stigma and style with a tube down to the ovary of the flower.