

Flower Anatomy & Pollination



Submitted By: Stephanie Bradley, Wild Learning Project

Overview

Students will study flower anatomy and dissect a flower to see all of its working parts. Students will perform hand-on activities to learn about flower pollination and how plants and pollinators need each other to complete their life cycles.

Grade Levels

3rd grade

Curriculum Correlation

3.L.2.1, 3.L.2.2

Duration

1 to 2 class periods

Location

Outdoors and Classroom

Materials

Flower Dissection: You will want students to work in pairs. All materials are listed for each pair of students, a fresh cut flower - tulips and daffodils are great choices, a small somewhat sharp paring knife or other sharp object, Magnifying Glass, Cutting Board or thick paper plate, Paper towel, Dust Masks for students with pollen allergies.

Pollination experiment: Art supplies to make pollinators and flowers, popsicle sticks, transparent tape, Powdered Kool-Aid (at least 3 different colors)

Pollinators, Meet your Plants! Activity: Fresh flowers and printed pollinator and flower cards, find here: <http://outdoornebraska.gov/wp-content/uploads/2016/09/Lesson-Plan-Pollinators-Meet-Your-Plants-WITH-CARDS.pdf>

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Learning Targets

1. Students will be able to identify the parts of a flower and their function in the pollination process.
2. Students will be able to explain how animals help pollinate flowers.
3. Student will learn that some plants and trees have adapted over time to attract specific pollinators.



Educators Information

Pollination is the process by which pollen from one plant is transferred to another plant of the same species. By transferring pollen, plants can use pollen from both plants to create seeds with more genetic diversity.

The following Educator's Information is from: [Plant Adaptations for Pollination and Seed Dispersal](http://www.exploringnature.org) by Exploring Nature, www.exploringnature.org

Plants and Animals

Plants and animals need each other. It's not hard to see why animals need plants – most animals eat plants and cannot live without them. Even animals that eat other animals are dependent on plants because without them their plant-eating prey would not exist. Plants, on the other hand, make their own food with photosynthesis – using sunlight, water and the carbon dioxide. Yet if all the animals disappeared from the planet, most plants would disappear as well. Why?

Plants need help to pollinate and spread their seeds. Some plants – about 10% – use the wind for pollination- from the mightiest redwood to the smallest blade of grass. Yet most plants need the help of animals to get the job done.

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The Pollination Situation

Some plants are pollinated by birds – like the hummingbird. A few are pollinated by bats. But by far, more plants are pollinated by insects than anything else. Plants have adapted many traits to attract pollinators. Bright colored blossoms attract bees, flies, butterflies, and moths inside to collect nectar and pollen. Sometimes lines on their petals will guide the insects down into the blossom or a sweet smell will attract pollinators from a long way off. In turn, moving from blossom to blossom, collecting nectar, the insects spread the plants' pollen to other blossoms on that plant and others nearby. Most plants are not picky about who pollinates them and have open flowers with ray or disc blossoms – like asters, daisies or black-eyed Susans – where any insect can land, collect nectar and carry pollen on to another flower.

The Honeybee and the Treefoil Pea

Some plants, however, want just one type of insect to pollinate them. This is true of birdsfoot trefoil. Birdsfoot trefoil is a common pea plant grown all over North America for feeding livestock and covering farm fields. Though common, it has a complicated flower, making it difficult to get inside to collect nectar or pollinate. Only bees can figure out how to enter a birdsfoot trefoil blossom and the honeybee is especially good at it.

When a honeybee lands on a birdsfoot trefoil blossom, it looks for nectar inside the top petal, called the flag, because it has guiding lines pointing to its base, but the nectar isn't there. While it stands on the fused side petals looking for nectar, the bee's feet work the petals open exposing a keel petal inside. When the bee steps down onto the keel, its weight triggers the keel to bounce down – like a trampoline, and the petals spread. Then the stamens inside the keel that are covered with pollen will pop up and dust the bee's belly. If the bee has been to another blossom already, the pistol, which also touches the bees belly, gets a dose of the pollen already stuck there. Pollination has occurred!

Some might wonder what the advantage is of having only one kind of insect to pollinate a plant. Why wouldn't the plant want every insect that lands on it to pollinate it? Some scientists hypothesize that when a honeybee finds a flower where the nectar is ready, it signals the other bees and they all come to collect nectar at once so a lot of pollination occurs. A difficult flower makes it more likely that the nectar will be there for a visiting honeybee.

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Procedure

Flower Dissection Activity: This activity and photos are taken from Edventures with Kids, <https://www.kcedventures.com/blog/exploring-parts-of-a-flower-a-pollination-activity-for-kids>

First, pair students up for the dissection activity. Once in their pairs, pass out flowers and supplies to each group.

Supplies per pair: Flower, Paring knife or other sharp object, Cutting Board or Thick Paper Plate, Paper Towel, Magnifying Glass, and Worksheet. Here are some free worksheets that you can use:

- Parts of a Flower Worksheet From Education.com:
<https://www.education.com/worksheet/article/complete-flower-fill-in/>
- Flower Anatomy Worksheet From Education.com:
<https://www.education.com/download/worksheet/85159/anatomy-of-flower.pdf>
- Flower Anatomy From Teacher Pay Teachers:
<https://www.teacherspayteachers.com/Product/Parts-of-a-Plant-and-Flower-2924816>
- Flower Dissection Worksheet From Teachers Pay Teachers:
<https://www.teacherspayteachers.com/Product/Flower-Dissection-Freebie-2636221>

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Next, have your students identify the outside parts of the flower (petals, stem, etc) using the worksheets listed above for help.

Once you've gone over the outside parts of a flower, we want to cut open the flower.

Carefully take your paring knife and begin at the bloom on the flower -- with medium pressure, make a cut into the petals and base and then pull your knife down the flower and continue cutting through the top layer of the stem.

Now begin at the top of the flower and gently pull apart the petals on either side of your cut.

When you first open the flower, you'll see the male parts which are called the stamen. They are the long tubes and on the ends (the anthers) are where you'll find the pollen. It looks like yellow powder in our flower.

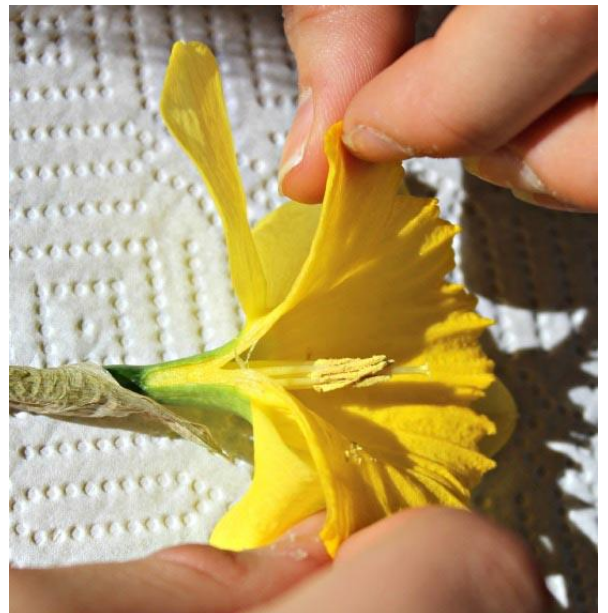
If you carefully pull back the petals and separate the stamen, you'll find one long tube in the center - this is the female part of the flower -- called the pistil.

The top of the pistil is called the stigma and is usually sticky. The pistil is usually taller than the stamens.

I'm sure the kids will immediately begin to play with the pollen. Just be sure to wash their fingers off so they don't get any in their eyes or near their face when they are done.

You can see that the anthers look all fuzzy -- that's the pollen that's collecting on the tips.

For pollination to take place, the pollen needs to be transferred from the anthers to the



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stigma of another plant like itself.

Now I know what you're thinking -- can you take the pollen from one flower and move it to the stigma of the same flower (basically, can a flower self-pollinate)?

It depends on the plant -- for example, these flowers have the male and female parts in the same bloom. But if you've ever seen a pumpkin vine grow, you'll see that the vine produces both male and female BLOOMS. So the pollen from the male bloom has to somehow get to the female blooms in order for a pumpkin to begin to grow.

If you look at the base where all the stamen and stigma come together, there is a small bulge in the flower. This is the ovary (yep, another female part).

Carefully peel back the greenery surrounding it and you will reveal the egg cells!!

I know -- totally cool!!!

Even though I magnified the photo to the right, the students can easily see them and carefully remove them. This is another great reason to have a magnifying glass!



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Pollination Experiment:

Activity Idea from JDaniel4's Mom: <http://jdaniel4smom.com/2015/04/fun-science-experiments-pollination.html>

Begin with a discussion on flower pollination. You may want to make a 3-D flower model to illustrate all the parts and their functions. For this activity students will make pollinator models to visit “flowers” around the classroom or outdoor playing space. After visiting all of the “flowers”, students will examine the flowers for traces of pollen transfer.

Materials:

1. Pollinators attached to popsicle sticks. You can print out photos or have students draw the pollinators. You can choose to use only one type of pollinator like a honey bee or have students choose and research their own. Place strips of clear plastic tape on the back of the Pollinators' wings and body. While pollen might have stuck to the example bee without it, it makes it easier to collect. By using clear tape for this experiment it was really easy to see the pollen.
2. Flowers with pollen. You will need to make several flowers for the students to visit. It is more fun if the students have to visit 3 or 4 flowers each. You can make the flowers out of paper, paper plates or bowls. Color the petals of the flowers with colored construction paper or crayon and place a small pile of pollen in the center of each flower. Your pollen can be different colors of powdered Kool-Aid.



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Getting Started: Once students have made their pollinators, set out the flowers with pollen. Spread the flowers out in a large open area either inside or outside. This may get a little messy so you may want to be outside.

Explain to the students that they will be acting as pollinators. They are to visit several flowers and dip the taped side of their pollinator into the “pollen” and do that at each flower.

Once every student has visited a few flowers have them gather together to examine their pollinators. You will also want to gather up the flowers to see if they were cross-pollinated too.

Students should notice that they have several different colors on their pollinator and several different colors on the flowers. Explain that in real life a flower would need the pollen from the same type of flower to be pollinated, but that using different colors in this experiment helped us see where the pollen traveled.



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Pollinators, Meet Your Plants! Activity: From Nebraska Game and Parks Commission

Download free activity instructions and pollinator and flower cards here:

<http://outdoornebraska.gov/wp-content/uploads/2016/09/Lesson-Plan-Pollinators-Meet-Your-Plants-WITH-CARDS.pdf>

Before the Activity

- gather a wide variety of flowers in different sizes, shapes and colors.
- print each of the pollinator and flower pages. Fold in half to create a card with a picture on one side and information written on the other. Laminate cards if possible.

During the Activity

1. Show students the different flowers you have gathered. Ask them which one is their favorite. Go around the room and have several students share which flower is their favorite and why. Remember that students are providing their opinion and as long as they can justify their answer, there are no wrong answers.
2. Explain to students that just like they prefer some flowers over others, so do pollinators. For example, because a butterfly has a long, slender mouth part (proboscis), they prefer flowers that are long and tube like. Some flies, on the other hand, have short, round mouth parts much like a sponge. For these pollinators, a wide-open flower is preferred. Or, for other pollinators, like moths, a flower that is open at night is preferred because that is when moths are active. The concept of pollinators preferring some plants over others is known as Pollinator Syndromes.

Just like we have symptoms or characteristics which are specific to a syndrome or illness, pollinators have characteristics that are specific to their preferred plants.

3. Brainstorm with students all the different kinds of pollinators we have - bees, butterflies, moths, beetles, ants, birds, bats (although bats are not pollinators in North Carolina, they are in other parts of the world).
4. Give each student one card (either a pollinator card or a plant card). Explain to them that they are to use the characteristics of their pollinator or plant to find their match - each plant

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has a specific pollinator. (NOTE: for several plants, the matching pollinator is not the only pollinator in the wild to help pollinate this plant).



Supplemental Reading

[What If There Were No Bees? A Book About the Grassland Ecosystem](#) By Suzanne Slade

A great book for older students, this book shows how all living things depend on each other and what can happen if bees were to disappear.



Extensions

Making a Model Brassica Flower & Seed

<http://www.saps.org.uk/primary/beyond-the-classroom/305-making-a-model-brassica-flower>



Resources

Article on Pollination Adaptations: <http://www1.biologie.uni-hamburg.de/b-online/ibc99/koning/pollenadapt.html>