Pollination Investigation

Students will dissect a flower to discover the parts used in pollination and fertilization.

Grade Level: 2nd Grade

Phenomena:
Our everyday lives are affected by pollination in some way.

Objectives:
- Students will identify the plant parts involved in pollination.
- Students will describe the process of pollination.
- Students will identify two ways their everyday lives are connected to pollination.

Materials:
Dissection:
- Alstroemeria flowers - 1 per student
- Toothpicks
- Note Card size of paper
- Packaging Tape
- Pollination Poster & Pictures

Be the Bee Game:
- A small dish or container filled with talcum powder
- Cotton swabs
- Fake flowers
- Pollinator Pictures (Pg. 6-10)

Time Considerations:
- Preparations: 10 minutes
- Activity 1: 8-10 minutes
- Activity 2: 5-7 minutes
- Activity 3: 20 minutes
- Activity 4: 5 minutes
- Activity 5: 5 minutes
- Activity 6: 10-14 minutes
- Conclusion: 3-4 minutes

Related Lesson Plans:
Plant Parts, Many Uses of Plants, Worms, Terrariums, Photosynthesis, First Explorers

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Next Generation Science Standards

2-LS2-2.
Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants

Science and Engineering Practices (SEP):
Developing and using models.

Disciplinary Core Ideas:
Interdependent Relationships in Ecosystems.

Crosscutting Concepts:
Structure and Function

Excellence in Environmental Education Guidelines

Strand 2.2—The Living Environment

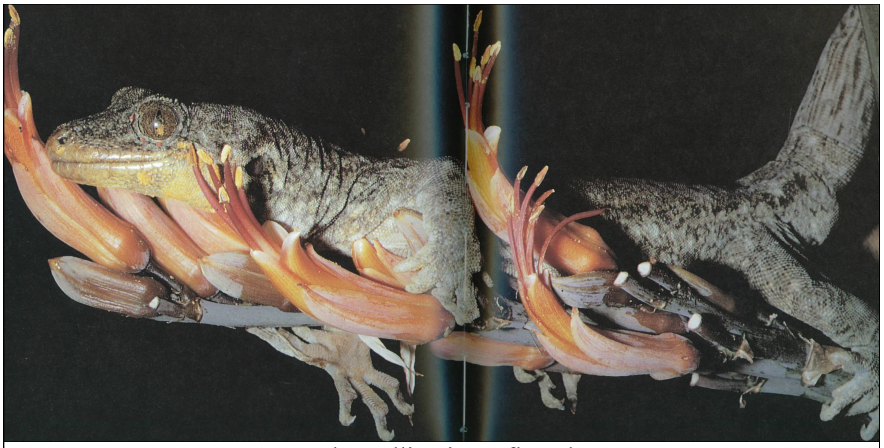
A. Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat.

B. Learners understand basic ways in which organisms are related to their environments and to other organisms.

C. Learners know that living things need some source of energy to live and grow.

Background

On a worldwide scale, animals pollinate more than three-fourths of the staple crop plants that people eat. Scientists estimate that one out of every three bites of food we take is the result of a successful animal-plant pollination system. For instance, consider a hotdog smothered in ketchup, relish, mustard, and onions. Several animal and insect species pollinate the flowers of the plants that produce these condiments: tomatoes, cucumbers, mustard seed, and onions. Other bees were responsible for the side dishes. For example, hardworking bees pollinated the potato plant that eventually became potato chips and French fries. And for dessert, an endless variety of ice cream flavors, such as strawberry, chocolate, and vanilla, are also



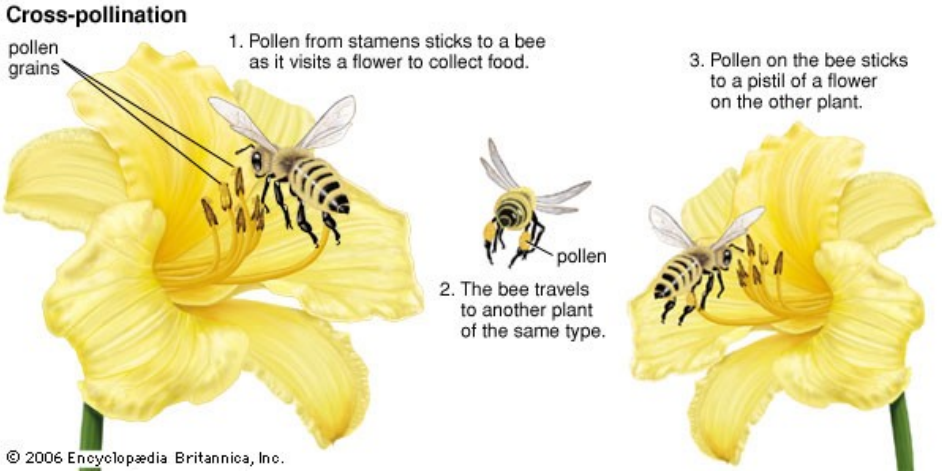
A gecko pollinating a flax plant.

the result of successful plant-animal partnerships.

Preparation

Select pictures that illustrate the process of pollination, plant anatomy, and a variety of pollinators (see page 7-12).

Doing the Activity



Introduction:
Write the word pollination on the board and ask the students if they have ever heard or seen the word before.

Explain that pollination is the transfer of pollen from one plant to another.

Activity 1:
Favorite Foods Discussion

Ask the students if they think that pollination affects our everyday lives?

Instructors: typically students will answer no. Ask the following question to begin this discussion: What is something we do everyday—EAT!

Have students share some of their favorite foods and list them on the board.

From their list, circle 1-2 foods and brainstorm how the ingredients in the food are connected with pollination. For example: cheese pizza is made up of cheese, dough, and tomato sauce. Tomato sauce and dough both come from plants (tomato plants and wheat), which depend on pollination for reproduction. However, cheese doesn't directly come from plants. Cheese, instead, is made from cows milk. **But,** what do cows depend on to grow healthy? GRASS! Therefore, cows do depend on pollination too! Facilitate another discussion about another food to make a strong connection with this thought.

Ask students what other items do people use or eat every day that rely on pollination? Answers could range from types of food to cotton clothing!

FYI: ***Farmers keep bees near their crops to help pollinate. Some crops could include apples, blueberries, cantaloupes, cucumbers, grapes, peaches, pears, plums, strawberries, squash, tomatoes, watermelons and many others!***

Transition—Explain that today we are going to take a closer look at pollination by dissecting and examining the parts of flowers!

Activity 2: Flower Dissection Introduction
Instructors: Prior to handing out materials, state the following goals for this activity and explain what it means to scientifically dissect objects.

Goal: Students will dissect flowers to discover the parts used in pollination.

Ask the class what it means for someone to dissect? Answers include: to look carefully at things; to look closely; or to use tools to separate parts carefully.

•**Instructors! Refrain from saying "today we are going to tear or pull apart flower parts when we dissect".** We want students to think scientifically and these words can lead to unwanted behaviors during this activity.

Explain to the class each person will receive a flower, a toothpick, and a piece of black paper. Students are to use the toothpick to dissect the flower and carefully group similar parts on their black paper.

Once students have their parts neatly laid on their black paper, the instructor will bring around a piece of tape, to secure them to the paper.

Remind students of their goal and to think how each flower part is involved in pollination.

Activity 3:
Flower Dissection Activity
Instructors: Have students hand out tools and paper to their classmates, while you hand out flowers. When dispersing flowers, try to hand students flowers that have distinct stamens (the part containing pollen). This will help students later to distinguish their parts from one another.

Allow students to begin as soon as they receive their materials.

Throughout the dissection, **pause the class to ask thought provoking questions such as** how many different flower parts are there? Are all or some of are used in pollination? etc.

When there is approximately 10 minutes left in the activity, gather the students' attention.

Announce you will bring tape around for students to begin taping their parts to their paper. Remind students, if they haven't already, to group similar parts together on their black paper.

Begin the clean up process and use a count down to help students clean up quickly and be ready for the next activity.

Activity 4:
Dissection Debrief
Bring the class together. Restate the goal of the dissection activity: to discover the parts of a flower that are used in pollination.

First, have students think about this to themselves, then instruct students to turn to their neighbors and share their findings.

List the different flower parts students found in their dissection on the board.

The instructor can either use the pollination poster or draw a cross-section of a flower on the board to identify all the parts to the flower.

As you draw the flower or point out its parts using the poster, identify the correct names to each part. The following are important parts to identify: stigma (female: "ma"), stamen (male: "men"), ovary, eggs, and petals.

Use a flower to show how pollination actually occurs. Gently rub your finger on a stamen to pick up pollen. Then touch the stigma of another flower with your pollen-dusted finger. Refer to the poster/ board drawing to show the path the pollen makes down the style to the ovary. Explain that when the eggs receive the pollen in the ovary, these eggs will develop over time into seeds that will eventually drop and allow a new plant to grow.

Transition: How does pollen move from one flower to another? POLLINATORS!

Activity 5:
Pollinators Brainstorm
Students typically respond to this question by exclaiming bees!

Brainstorm with the class other kinds of pollinators. Answers can include butterflies, the wind, rodents, bats, moths, people, birds, insects, etc.

Use the pollinator pictures on pages 9-12 to help students visualize this.

Ask students if these pollinators eat the pollen from the plants? No! Pollinators are actually seeking the sweet nectar that is also found in flowers.

Review the ways in which pollinators transfer pollen. *Bees, while sipping nectar from flowers, get pollen stuck on various parts of their bodies—the pollen basket. This pollen then rubs off on certain parts of the next flower that they fly to. It is through this process that plant reproduction happens*.

Activity 6: Be the Bee

Weather permitting, this activity can be done outdoors.

Explain that in this last activity students are going to have the chance to be a pollinator!

First, demonstrate the activity. Instructors will need two volunteers to help demonstrate.

Demonstration
Give one volunteer a fake flower and state “this person is a flower!”

Give the other volunteer a Q-tip and state “this person is a pollinator.”

Ask: What does the pollinator first need to start the process of pollination. *Get Pollen!*

Ask: Where would a pollinator get pollen? *The stamen!*

Instruct the pollinator to move to where you (instructor) are. Have this person dip their Q-tip into your container of baby powder, which represents pollen.

Ask: What does the pollinator need to do next? *Move to another flower!*

Ask: What part of the flower collects pollen? *The stigma!*

Lindsey, Rebecca.. (2008, Feb. 14). In Buzzing About Climate Change.

Instruct the pollinator to move to the flower and spread its pollen to the stigma.

Explain that each pollinator may pollinate two flowers. Once students do this, they are to return to their seats.

With that said, divide the class into two groups. Flowers may stand anywhere they want in the classroom. Pollinators may choose any type of pollinator they want to be. Begin the activity!

Once all pollinators have returned to their desks, instruct flowers to trade their flowers with the pollinators Q-Tips and then take a seat.

Have the **new** flowers spread out in the classroom and begin the activity again.

Conclusion

To wrap up this lesson, ask the students about different plant parts; What are the male parts of the plant? The female parts?

Ask the students to name some very important pollinators and what these pollinators do. Throughout this lesson students are informally assessed by their responses to questions

(2008). In Pollinator Friendly Practices

that are related to the topic.

Assessment

To assess students’ understanding of why pollination is vital to people, return to the original question, “does pollination affect our every day lives?”.

Allow students to share their answers out loud or instruct students to record their thoughts in their science journals. Encourage students to draw pictures to support their answers.

Extensions

Time Permitting: In conclusion to the ***Be a Bee activity***, have students identify both the stamen and stigma on their fake flowers in partners. Partners will then describe or act out the movement of pollen via a pollinator from one flower to

another. The instructor will informally move around to groups to asses their knowledge.

Time Permitting: Following the dissection discussion, have students in partners identify their flower parts using the correct terminology. The instructor will move to groups and assess students via their group discussion.

•Ask the students to bring in a flower of their own or supply the class with a variety of flowers. Do all flowers have the same parts? Do all of their parts look the same? In pairs, have students identify the flowers basic parts which includes petals, stem, and leaves. Then challenge groups to identify which parts play a role in pollination which includes petals, stamen, ovary, and stigma.

Vocabulary

Nectar: A sweet liquid secreted by the nectaries of a plant and is the main ingredient in honey.

Ovary: The part of a flowering plant in which seeds are formed.

Pollen: A fine dust found in flowering plants.

Pollinators: Insects and animals that spread pollen to other flowers, enabling reproduction. For example, bees, humming birds, bats, lady bugs, etc.

Reproduction: The process of organisms making another of the same organism.

Stamen: The part of a flower that produces pollen. It consists of a thin stalk, called the filament, and a tip, called the anther, that has pollen on it.

Stigma: The part of a flower that received the pollen in pollination.

Sources

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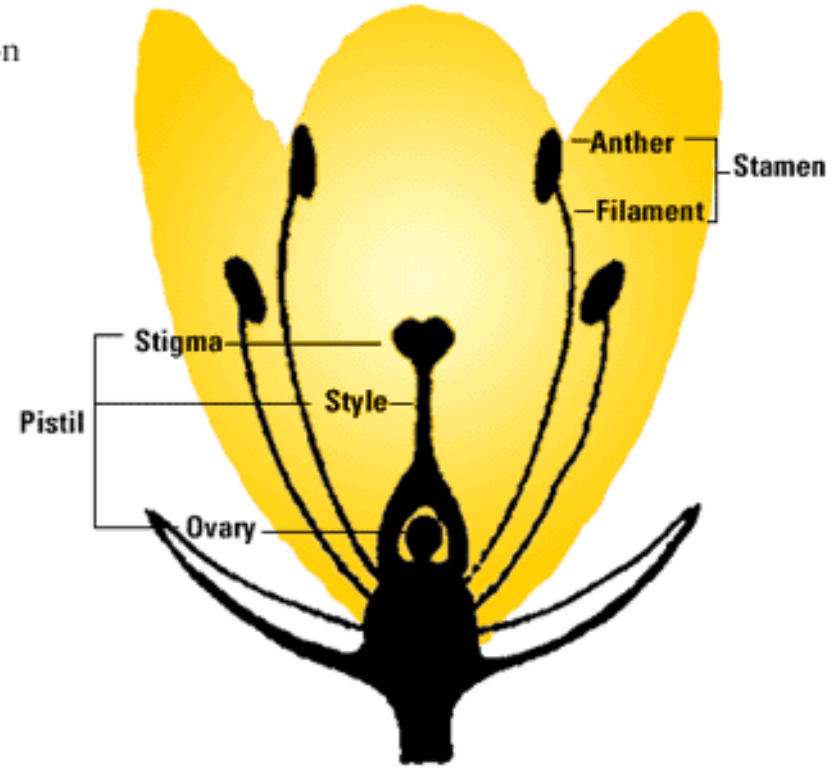
Teacher Page

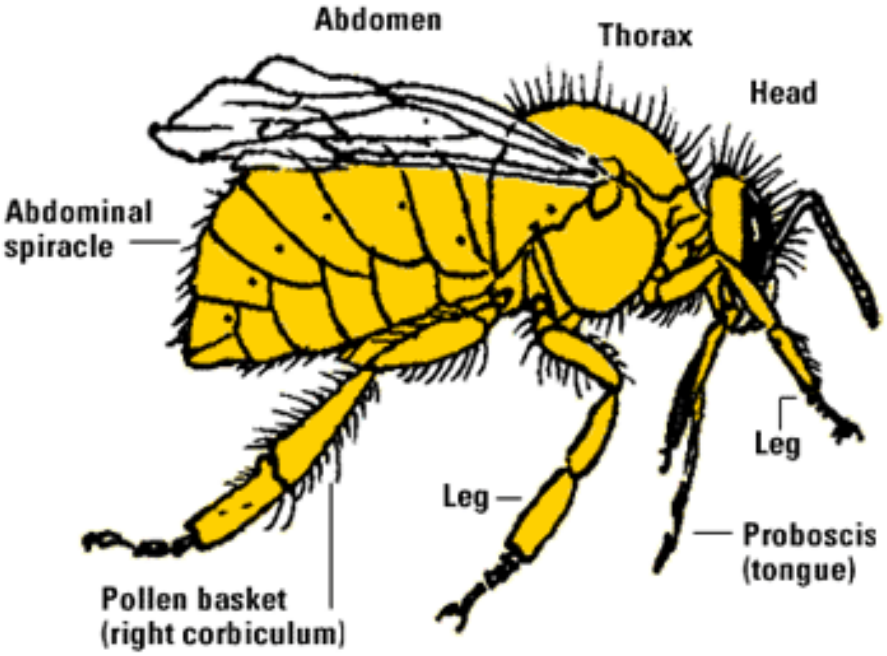
Flower Anatomy

Plants and Animals: Partners in Pollination
Activity 1A



Bee Anatomy

Plants and Animals: Partners in Pollination
Activity 1B



Pollination Song

To the Tune of : This Land is Your Land

Chorus

What does a plant need
To make a new seed?
Three things give flowers
Reproductive powers—
the sticky pollen,
the slender stamen,
and pistils make the flower whole.

Verse 1

What gets the pollen going
To keep new plants growing?
Different kinds of birds do,
Or the wind that's blowing.
Butterflies and bees,
Carry pollen they need
That's what makes pollination work.

Verse 2

When bright colored flowers
Have a sweet perfume
And a sugary nectar
Then chances are good
That birds and insects active
Find the plants attractive
And they'll spread the pollen as they go.