Bee Tee

Subjects: Art & Language Arts

Objectives:

Art: Gain a basic understanding of design concepts
Language Arts: Write in a variety of formats to record, generate and reflect upon ideas.

Materials:

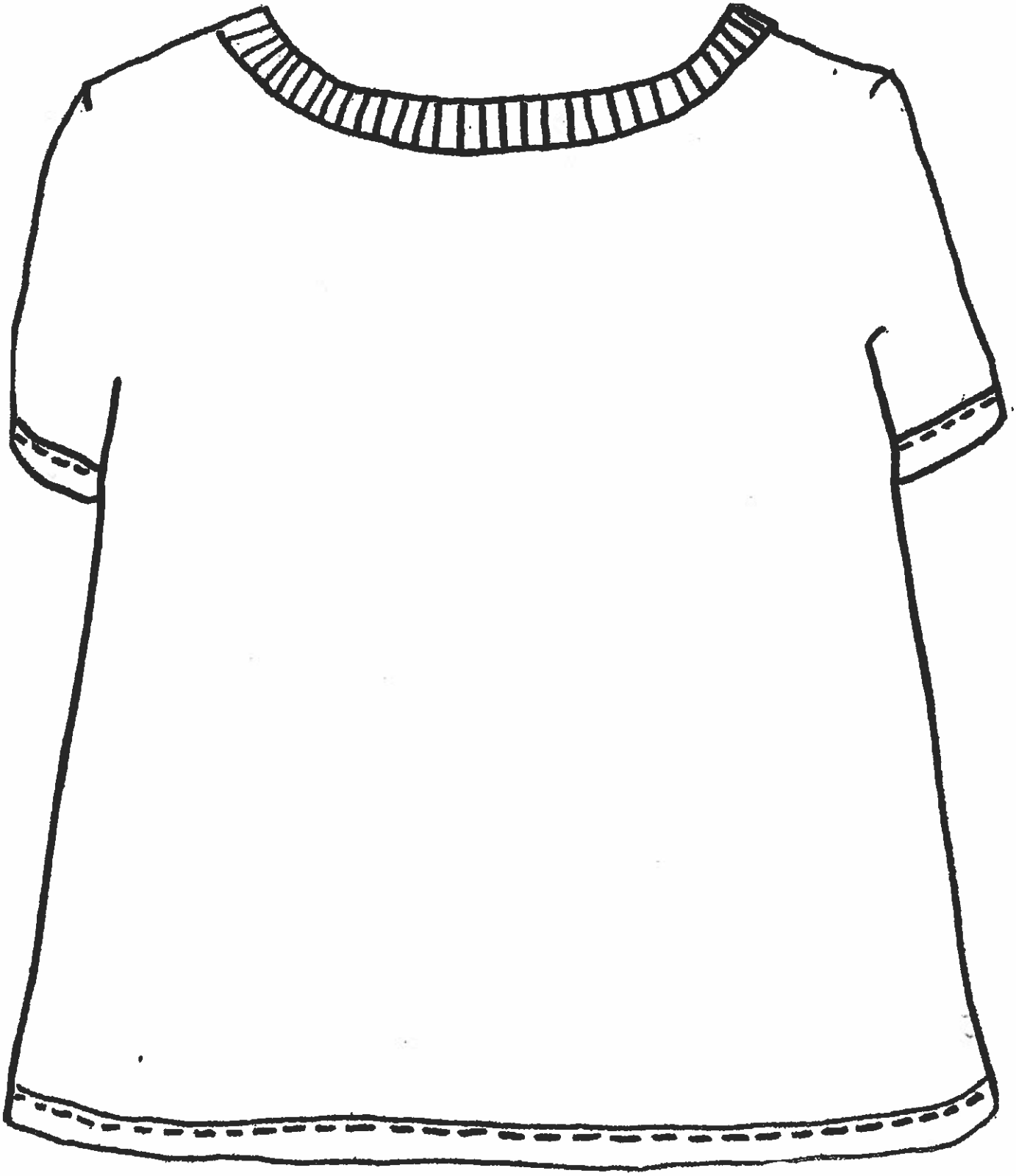
- *Wildlife Worksheet* (Bee Tee)
- Colored pencils or markers

Procedure:

1. Discuss t-shirt logos that students have seen before.
2. Instruct students to design a t-shirt supporting bees with a slogan and picture.
3. When the students' rough drafts meet with your approval, give them the Bee Tee worksheet.
4. Students color the worksheet and cut it out.
5. Hang the t-shirts in the hall, maybe even from a piece of "clothesline."
6. Optional: After students have turned in their t-shirts, have a contest for the most creative or original t-shirt. Ask fellow teachers or students to help select the winner. Give the winner a real t-shirt and some fabric paint so he/she can make the real thing. Hold a drawing for the t-shirt when the t-shirt is completed.

WILDLIFE WORKSHEET

BEE TEE



Design a t-shirt with a slogan and picture supporting native bees and what you know about them.
Color and cut out your t-shirt.

Native Mason Bee Activity

In this activity, children will learn about the native mason bee by creating a replica of a reed that the queen bee fills with eggs. After building nest, learn about bee anatomy by creating an adult bee from fruit. Lastly, watch a video to learn how to make a mason bee house!

Review what all animals need to survive. Habitat: Food, Water, Shelter & Space in suitable arrangement. (For outstanding lessons on Animal Habitats learn about Project WILD and take a class!)

Next talk about bee habitats. **Food:** We know they eat nectar and pollen too! **Water:** a bird bath with rocks or marbles for bees to land on while drinking will help. **Space** is the area they need to live. **Shelter**: This may be something you haven't thought about. Mason bees need a suitable place to build their nests and lay eggs. It's not always easy to find this. Mason bees like thin, hollow, long spots to build the cells to lay an individual egg in.

In this first lesson, we are going to build a replica of a mason bee nest with cells.

Materials you will need for each child (These are suggestions, use what you have!)

Celery stalk cut in half lengthwise
Ideas for "clay" your choice of peanut or other nut butter, or cream cheese
Ideas for "pollen": Crushed peanut or other nut, crushed M&M (yum!), crushed mini chocolate chips, powdered sugar, parmesan cheese
Ideas to represent egg: raisin, shelled sunflower seed, mini M&M, piece of rice, cheerio
Ideas for Nectar: Honey or maple syrup

Once you determine what you'll use for the masterpiece replica, set out items. Explain to children how mason bees construct their nest. Let them build their nests and explain what each step is. Tell them how the mason bee will stay in the nest for 10 – 11 months. Then when it warms up next year, they will emerge as an adult. To review metamorphosis: (again just suggestions)

To represent the larva share a juju treat.

To represent the pupa share a picture of bee

To represent the adult bee – a fruit plate of sorts

Ingredients needed:
3 apple slices (two with 1/4 removed and one cut in half)
2 pineapple slices (one cut out with round cookie cutter, other cut into two strips and two chunks)
1/4 – 1/2 cup blueberries
10-15 mini chocolate chips
2 pieces toasted oats cereal

[Fun Snack Creation: Bee Fruit Plate - 360 Family Nutrition]

Lastly, watch this video to make a mason bee house!

Materials needed:

Two toilet paper tubes
Recycled paper
Pencil
Paint – optional for outside of house (can)
Tape
Clean tin can

Watch the video to learn how!

(337) Build a Beehouse! | Science Project for Kids - YouTube

Supplemental books:

Mason Meets a Mason Bee by Dawn Pape

Bottle Top Beehive and Hand Print Bees!

We found a great way to print patterns onto a beehive – using the tops of small plastic water bottles. They make great beehive shapes – and even though they are not 100% accurate – meaning they are not hexagons, they will do nicely!

Cut out your beehive shape, add some paint to a plate to dip the top of the bottle into and print away! It is that simple. It looks great!

The beehive now needs some bees!

We used our hands to make them. Paint stripes on hands and print by placing hand on paper.

Once the hand prints are dry, shadow cut around them and add wings and eyes and feelers!

(Showcasing the winning bees – including my favorite – backwards feelers!!)

Put it all together and you have a great bee filled beehive!

Bottle Top Painted Bee Hive with Hand Print Bees. This is such a sweet kids craft if you are interested in bees and insects!

Credit to: emmaowl.com

Busy Bees, Busy Blooms

What makes them so busy after all?

Objectives

Students will (1) describe the process of pollination; (2) identify the role wildlife, particularly bees, play in pollination; and (3) describe how physical adaptations of plants and wildlife support pollination.

Background

Reproduction is vital to ensure the survival and continuance of every species. Plants, which are stationary and cannot search for mates, reproduce primarily through pollination. Think for a moment about all the flowers you have seen. Many flowers are fragrant and showy. These traits indicate that the plant is pollinated by an animal such as an insect, bird, or bat. The showy flower is produced by the plant solely to attract a pollinator. Some plants, however, have very small flowers or none at all. These plants either are pollinated by wind or are self-pollinated. Plants that are wind-pollinated do not need a showy flower to attract a pollinator. Instead, wind-pollinated flowers produce huge quantities of pollen, which improves the chance that the wind will carry the pollen to another plant of the same species. Plants that are successfully pollinated will produce seeds.

To understand how pollination is facilitated by animals, one must first understand some of the parts of a flower. Although there are many different kinds of flowers, most flowers have the same basic parts: sepal; petal; stamen (comprised of the anther and filament); and carpel (sometimes used interchangeably with "pistil") comprised of the stigma, style, and ovary. Each part of the flower plays an important role in the process of pollination. The petals (and sometimes sepals) form the brightly colored flower that attracts a pollinator such as a bee, butterfly, wasp, or moth. The anther holds the pollen, which must be transferred to the stigma of a flower for pollination to take place. Most plants rely on cross-pollination, during which the pollen is transferred from a flower on one plant to the stigma on a different plant of the same species. In self-pollinating plants, pollen is transferred to the stigma on the same flower or to a different flower on the

Grade Level: Lower Elementary, Upper Elementary

Content Areas: Science, Environmental Education, Physical Education

Method: Students model the process of insect pollination in an active simulation.

Materials: Stickers to represent pollen (one sheet of any kind of stickers for 75 percent of students); poker chips (about six chips for 25 percent of students) to represent nectar; paper bags (one per student); images of pollinators (suggestions include mason bees, bumble bees, wasps, butterflies, moths, bee flies); images of flowers (suggestions include apple blossoms, morning glories, milkweed, purple coneflower). Visit ***www.projectwild.org*** to download images for this activity.

Activity Time: one 30- to 45-minute session

People Power: ten or more

Setting: indoors and outdoors

Conceptual Framework Topic Reference: IDIB, IDIIA, IDIIB2a, CAIIA1, CAIIA1c

Terms to Know: pollination, pollinator, pollen, nectar, flower, adaptation, proboscis

Appendices: Simulations

To understand how pollination is facilitated by animals, one must first understand some of the parts of a flower. Although there are many different kinds of flowers, most flowers have the same basic parts: sepal; petal; stamen (comprised of the anther and filament); and carpel (sometimes used interchangeably with "pistil") comprised of the stigma, style, and ovary.

same individual plant. Many plants rely on wildlife to aid in these processes of pollination.

Pollinators visit flowers to obtain food in the form of nectar and pollen. Nectar is a good source of energy due to its sweet sugars; pollen is a good source of protein. When pollinators visit a flower to get food, the pollen from the anther sticks to the pollinator's body. As the pollinator moves on to another flower, the pollen from the first flower is often deposited on the sticky surface of the second flower's stigma. If the pollinator happens to visit a plant of the same species, then the pollen from the first plant will travel from the stigma down the style to the ovary of the second plant. When the pollen reaches the ovary, an ovule (egg) is fertilized, and a seed will form. The process of transferring pollen from one plant to another of the same species is called pollination. Without pollination, a flower cannot create seeds in order to reproduce.

Many birds and insects have characteristics that make them great pollinators. A close look at a bee will reveal numerous attributes that make these tiny creatures extremely efficient at pollination. Their legs have tiny hairs all over. This hair helps gather and hold pollen. When the bee lands on a flower, the pollen naturally sticks to the tiny hairs. Bumble bees are also very efficient at pollination because their large size can help "open" flowers to get to the nectar and pollen. Additionally, the wing vibrations or "buzz" of many bee species, including bumble bees, helps to shake pollen loose from a flower's anther. Butterflies also have traits that help with pollination. A butterfly's tongue, called a proboscis, is long and slender like a straw, which helps them drink nectar deep inside some flowers. While accessing nectar from these harder to reach sources, butterflies then become an important means for transporting pollen for many flowering plants. All of these physical characteristics reveal that pollinators are uniquely suited to gathering and spreading pollen.

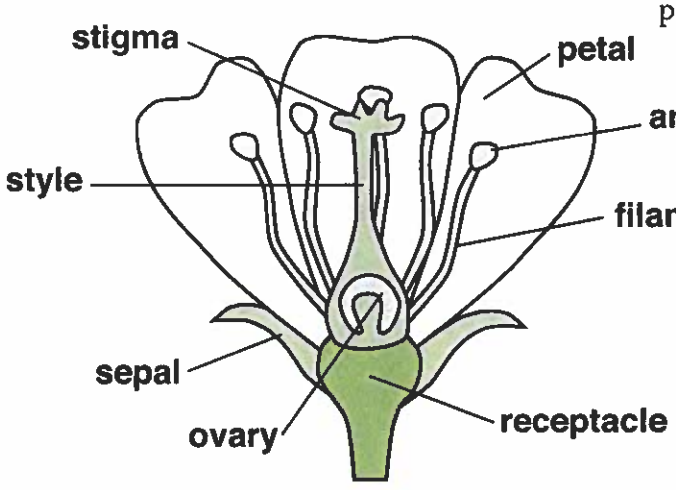


Diagram: Parts of a Flower

Flowers come in all shapes and sizes, and they have varying fragrances. Certain characteristics of flowers attract different pollinators. Of the numerous insect pollinators, bees are extremely efficient and well-known. Bees tend to prefer flowers that are yellow, purple, or blue in coloring with ultraviolet nectar guides. These guides, which are invisible to human eyes, act as landing strips that direct bees straight to the nectar while putting the bee in contact with pollen. Flowers that are aromatic, usually with a sweet smell, are attractive to bees. Flowers that are bee-pollinated also will tend to have a shape or landing platform designed for specific bee species.

There are over 25,000 species of bees in the world. North America is home to over 4,000 native bee species, including mason bees, leaf cutter bees, bumble bees, carpenter bees, digger bees, sweat bees, and more. These species are responsible for pollinating wildflowers as well as many of our agricultural crops. Because native bees have co-evolved with plants such as tomatoes, eggplant, pumpkins, zucchini, cherries, blueberries, cranberries, and melons like watermelon and cantaloupe, native bees are often more efficient at pollinating these crops when compared to non-native species, such as the honey bee. Additionally, native bees are better than non-native bees at pollinating crops such as clover and alfalfa that are critical for cattle production.

The European honey bee (*Apis mellifera*) is often mentioned when talking about pollination. This non-native bee was imported from Europe over 400 years ago to aid in crop production. Today, honey bees remain an important aspect of agricultural production. Honey bees are able to live in man-made hives, allowing them to be transported from field to field to aid in pollination. A single worker bee will pollinate thousands of flowers in its lifetime and can fly up to 4 miles per day, totaling hundreds of miles in a lifetime. Similarly, the southeastern blueberry bee (*Habropoda laboriosa*), can visit up to 50,000 blueberry flowers in its short life. They are not called "busy bees" for nothing!

Populations of native bees as well as honey bees have been declining in recent years. Causes of this decline include habitat loss, degradation, and fragmentation; parasites; exposure to pesticides; and infections from pathogens. People can help bees by using less pesticides and planting native flowering plants including flowers, flowering trees, and herbs to provide bees with a healthy and diverse food supply.

WILD Work

Entomologists are scientists who study insects. Areas of study may include: insect behavior, classification, life cycles, ecology, population dynamics, physiology, pest management, and more.

Professional Beekeepers or **Apiarists** raise bees professionally and care for beehives to produce honey, wax, or other products. Bee keepers also provide their bee hives to farmers and other agricultural professionals who need pollination services for their crops.

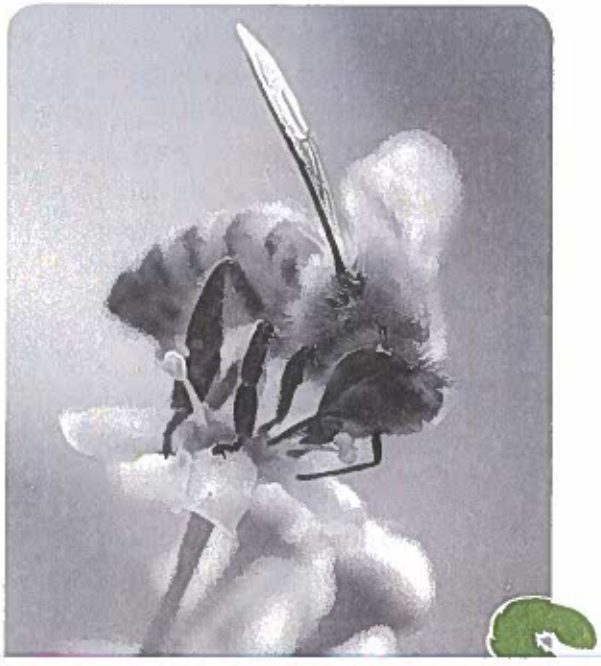
Horticulturists practice the science and art of cultivating fruits, flowers, vegetables, and ornamental plants. They may be employed by parks, zoos, botanic gardens, recreational facilities, universities, government agencies, and other organizations.

For more information on these occupations, see the "WILD Work" link at ***www.projectwild.org***.

Procedure

1. Start the activity by showing students images of flowers with a pollinator on each flower. Include a variety of flower types and pollinators to aid in later discussion about physical adaptations. Examples include a bee on a coneflower, a beetle on goldenrod, a butterfly on milkweed, or a hummingbird at a cardinal flower. **NOTE:** Visit ***www.projectwild.org*** to download images for this activity.

2. Ask students what is similar about each image. Students should mention that each image contains an animal (insect or bird) on the flower. Ask students what these animals are doing (eating). What are they eating? Explain to students that these animals are visiting flowers to obtain food, primarily in the form of nectar but also in the form of pollen. Nectar is a sugary liquid, and pollen is a yellow powder that is rich in nutrients. By visiting flowers, these animals often get pollen stuck to their legs, bodies,



In Step with STEM

- Challenge students to design and create their own flower using a variety of materials such as modeling clay, chenille stems, foam sheets, construction paper, fabric, pastels, etc. Bring in real examples of flowers for students to observe, touch, and smell as they create their designs. Since flowers and their pollinators are often adapted to suit each other, students may also design a pollinator. What related features do the flower and pollinator have that help the process of pollination? (For example, many flowers with tube-like shapes are pollinated exclusively by hummingbirds with their long, narrow beaks.)
- Honey bees communicate the location of food to fellow bees by dancing. Certain movements indicate the distance and direction of a food source. Have students make their own "bee dance code" and communicate the location of a hidden flower (real, fake, photo, etc.) through a bee dance. Groups can take turns hiding the flower and dancing to communicate its location to other students.
- Students can take part in citizen science projects to gather data and assist professional scientists with researching issues related to plants and wildlife. For example, Project BudBurst enlists citizens to collect data that monitors seasonal changes in plants, and Bumble Bee Watch collects data to help track and conserve bumble bees. Visit ***www.projectwild.org*** for more information and other recommended citizen science projects.

feathers, etc. What foods can students think of that sometimes stick to people's hands? Ask students to take a close look at the images. Have students point to the pollen stuck to the animal. Where else do they see pollen in the picture?

3. Inform students that plants produce nectar primarily so that an animal will visit a flower and then leave covered in pollen. Why is it so important for a plant to cover an animal in pollen? Why is pollen so important to the plant?

4. Explain to students that when the animal moves to another flower, this pollen is transported from the first flower to the second. This process is called pollination (specifically, the transfer of pollen from the anther of a flower to the stigma). When plants are pollinated, the plants produce seeds. An animal that moves pollen from one flower to another is called a pollinator.

5. Once students have been introduced to the concepts of pollen, pollination, and pollinators, establish boundaries for a playing field either in a classroom or an outdoor area.

6. Inform students that they will be modeling the process of pollination. Although pollination can be done by many different kinds of animals, this demonstration will focus on bees. Divide students into two groups – flowers (75 percent of group) and bee pollinators (25 percent of group). It is important that there are more flowers than bees.

7. Give each "flower student" a paper bag filled with five or six poker chips to represent their source of nectar. Also provide flower students with a sheet of stickers (simple dot stickers work well). Stickers will represent their pollen.

8. Give each "bee pollinator student" a paper bag to represent his or her stomach.

9. Explain to students that flowers do not move on their own, so flower students will remain rooted in one location. The goal of the flower students is to trade as much pollen as possible with other flowers. To do this, flower students put their pollen (stickers) on a bee's back as bees bend over to pick up nectar chips; flower students also collect other flowers' pollen stickers that are already on the bee. When flower students take a pollen sticker off a bee, the flower students should put the sticker on themselves.

10. Allow flower students to scatter themselves around the playing field. They will be representing flowers in a field, meadow, or forest. Align bee pollinator students in a line on the edge of the playing field.

11. The job of the bees is to visit as many flowers as they can to collect nectar (poker chips). It is important to note that bees can only collect one nectar chip from each flower. Explain that bees must move around and not visit the same flower twice in a row.

12. Once flowers and bees are ready, start the activity. Allow the activity to continue for several minutes.

13. When the activity ends, ask bees to look inside their "stomachs" to determine if they have at least three nectar chips. If they do not, they did not receive enough food and will be hungry. Ask flowers to see if they have at least three pollen stickers on themselves. If they do, they have been pollinated and will produce seeds. If they do not, they have not been pollinated and will not make seeds. With older students, educators may go into detail about the process of pollination. Pollen must be deposited on the stigma of a flower for pollination to occur successfully. The more pollen that is transported from one flower to another flower (of a plant of the same species), the greater the chance that successful pollination and fertilization will take place.

14. Ask flower students to explain what their job was (to trade pollen with other flowers). What was the most difficult part of this job?

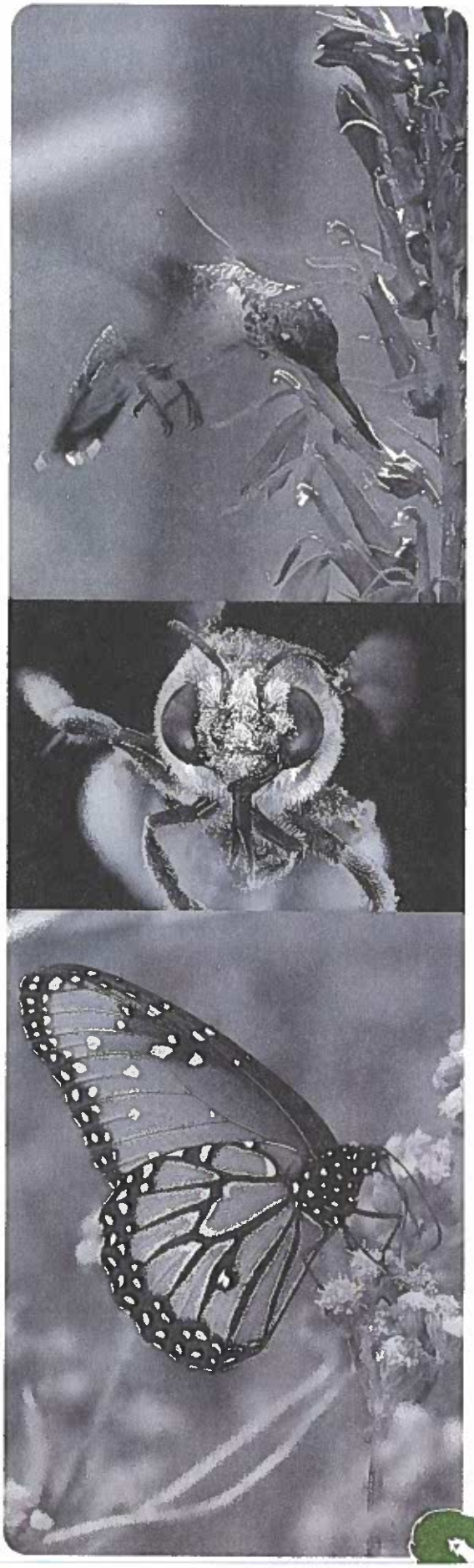
15. Ask bees to explain what their job was (to find enough food or nectar). What was the most difficult part of their job?

16. Did students observe any differences in how pollen (stickers) stuck to the bees' clothes? Students should notice that stickers attach better to smooth clothing versus bumpy or fuzzy clothing. This is actually the opposite of bees and pollen in the real world.

17. Ask students to take another close look at the images from the beginning of the activity. Ask them guiding questions to help focus their thinking on physical characteristics that aid in pollination:

- Where on the animal is the pollen sticking? Where is it not sticking?
- Why is pollen sticking to these areas of the animal? Students should notice that the animals have structures (hairy legs, feathers, antennae, fuzzy body) that help pollen stick.
- Where is the nectar located? Where is the pollen located on the flower?
- Could a pollinator get the nectar without picking up pollen along the way?

Explain to students that the structure of the flowers and pollinators support pollination and ultimately reproduction and survival. Some adaptations make certain animals better pollinators than others. Encourage older students to consider whether all the pollinators shown would be equally good at pollinating each type of flower in the photos. Why or why not?



A close look at a bee will reveal numerous attributes that make these tiny creatures extremely efficient at pollination. Their legs have tiny hairs all over. This hair helps gather and hold pollen. When the bee lands on a flower, the pollen naturally sticks to the tiny hairs. Bumble bees are also very efficient at pollination because their large size can help "open" flowers to get to the nectar and pollen.

Extensions

1. If time permits, play the game several times, each time rotating the roles that the students are playing until each student has been both a flower and a bee at least once. With older students, rather than exchanging roles, have students model natural processes by decreasing the flower population with each round of game play. Flowers that are not pollinated are eliminated from the next round. After several times, discuss with the students the changes they observed in the bee population when the flower population decreased.

2. Develop a pollinator-friendly garden with native plants in your schoolyard or outdoor area.

3. Head outside to observe flowers and pollinator visitors. Have students draw and label pictures of what they see. Compare and contrast flowers by color, shape, number of petals, size, and fragrance. Use the examples to further discuss how flowers with different features attract (and are adapted to pollination by) different pollinators.

4. Bring in a real variety of flowers to the classroom. Have students try to use different objects (cotton balls, bouncy balls, fleece fabric, silk fabric, etc.) to try to collect the pollen from the flowers. What types of material are better at collecting pollen? Are certain objects better at collecting pollen based on the shape of the flower? Have students describe the relationships they observe.

5. Discuss a world without pollinators—how would a student's daily life be impacted?

Assessment

1. Describe the process of pollination.

2. Explain how the action of pollinators collecting nectar and pollen is beneficial for both bees and plants.

3. List a part of a flower and of a bee that aids in pollination. Explain.