Build Your Own Flower

ACTIVITY

Background:

See "Flower Power" for complete flower anatomy overview.

The intricate process called **pollination** relies heavily on the participation of animals, including many different kinds of insects, (honeybees, butterflies, common flies, etc.), hummingbirds, and even some bats. Pollination occurs when **pollen grains** from the **anther** of one flower reach the **stigma** of (generally speaking) another flower from the same species.

For this transfer of pollen grains to be accomplished, animals cannot just land on a flower, but must go inside the flower where they actually come in contact with the anther or stamen. Over time, flowers have developed adaptations to ensure that the best pollinator for their species will continue to return. These adaptations include flower shape, scent, and color. At the same time, various pollinators have also adapted to ensure that they will have a plentiful food supply. Animal adaptations include sense of smell, color preference, and tongue length.

This flower-animal relationship is mutually beneficial. Flowering plants receive assistance in propagating their species, while animals receive food, usually in the form of nectar.

What to Do:

1. Ask participants, *Would you like to make your own flower?* Tell participants that they will have a chance to make a flower, but before they start, they will explore different flower parts and what those parts do. That way, they will have some great ideas to work with when they build their flowers.

2. Review the different parts of a flower with a poster-sized diagram of flower parts (see the "Flower Power" activity). Explain that over time flowers have developed adaptations to ensure that the best pollinator (one that will carry pollen onto another flower of the same species) will return again and again. Pollinators, including hummingbirds, butterflies, and honeybees have also adapted to ensure that they will have a plentiful food supply.

3. Have participants study pictures or drawings of a trumpet flower, a honeybee, a butterfly, and a hummingbird while providing the following background for each:

- The trumpet flower is red in color, has a "tube" shape, has no "landing" spot, and has little fragrance. It often grows upside-down, but it can also grow upright or facing out.

Summary:

Participants design their own flowers for attracting certain pollinators, using art materials.

Grade Level:

2-6

Time:

45 minutes

Learning Objectives::

Participants will be able to:

- Describe the complementary relationships between pollinators and the plants they pollinate
- Identify adaptations that flowers have developed to "encourage" pollination from different pollinators.
- Identify major flower anatomy.

Materials Needed:

- A large diagram of the basic parts of a flower
- Pictures, drawings, or models of: a trumpet flower, a honeybee, a butterfly, and a hummingbird
- Pictures, drawings, or silk/plastic flowers
- Markers, pencils, crayons
- Construction paper
- Glue, scissors, staplers

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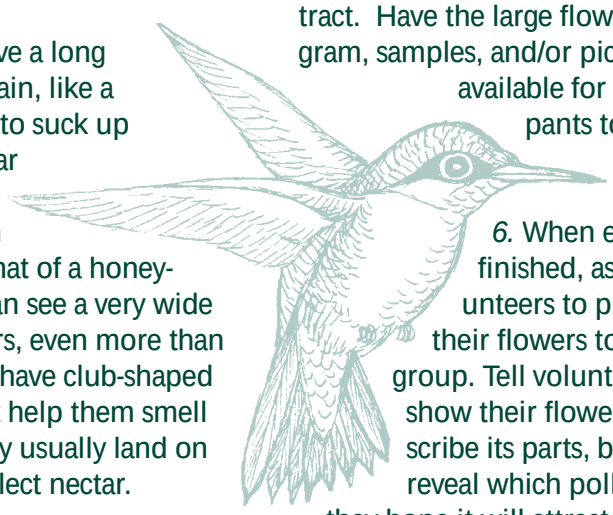
- Hummingbirds have a poorly developed sense of smell; are attracted to the colors red, pink, orange, and yellow; "hover" at, rather than land on, their flowers; and have a long bill and tongue.

- Honeybees have a short proboscis (this is like a tongue, used to suck up nectar and water), cannot see red, must land and crawl to get to nectar, and are attracted to sweet fragrances.

- Butterflies have a long proboscis (again, like a tongue, used to suck up water or nectar from flowers, but much longer than that of a honeybee). They can see a very wide range of colors, even more than humans, and have club-shaped antennae that help them smell and feel. They usually land on flowers to collect nectar.



4. After participants have had time to look at the pictures and process the information, ask them which of the three pollinators is more likely to access the trumpet flower's nectar. Ask the following questions as part of the discussion: *Is the shape of this flower more easily accessible to a honeybee, a butterfly, or a hummingbird? Which pollinator would be more attracted to the flower's color? Would a honeybee be lured by the trumpet flower's scent? Is there a place for a honeybee to land? Which animal would make the best pollinator for the trumpet flower?*

5. Once the participants have reached a conclusion, have them create flowers, using construction paper, markers, scissors, pipe cleaners, and/or other art materials. Ask them to keep in mind the different parts they have learned and what kind of pollinator they want to attract. Have the large flower diagram, samples, and/or pictures available for participants to use for reference.

6. When everyone is finished, ask for volunteers to present their flowers to the group. Tell volunteers to show their flower and describe its parts, but do not reveal which pollinator they hope it will attract. Have participants ask questions of the presenter and try to guess what pollinator would be best.

7. Another option is to have participants work in pairs and create a flower for their partner to reflect their "pollinator preferences." Have the participants interview each other for information including favorite color, shape, scent, and snack. Then have participants draw or create their partner's "dream flower." For fun, have them make it as unreal as possible. For example, one might create a clear, square-shaped flower that smells like vanilla and has chocolate nectar. Have each pair present their "dream flowers" to the class.

For Younger Participants (Grades 1-2):

Before the activity, create super-sized models of the flower parts out of felt or construction paper or cardboard. Make enough so there is at least one part for everyone or for every pair. Try to do this outside, if feasible. Have participants come up to the front of the group and assemble a large group flower, bringing their part with them. Call participants up by function, e.g., *What do the petals do? Where do they go?* All children with petals come up now. When the whole flower is assembled, take a photograph so everyone can see the amazing flower they created together!

For Older Participants (Grades 7 and Up):

1. Follow Steps 1-3, above.

2. Assign the group a particular kind of flower and provide a picture and some very basic information about it, but do not mention any pollinators.

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3. Break participants into small groups. If possible, have volunteers oversee small groups. Assign each group a different pollinator, at least one of which should be particularly adapted to the flower assigned in Step 2, above. For example, if the flower of the organ pipe cactus in Arizona was assigned, the pollinators to research should include either the greater or lesser long-nosed bat, which are the primary pollinators of the cactus. Have each group find out as much information as they can about their pollinator. They can find such information in field guides (Audubon Field Guides, Peterson Field Guides, etc.), encyclopedias, or websites, including NWF's site, www.nwf.org, the Arizona-Sonoran Desert Museum at www.desertmuseum.org, and many links found under "Resources" at the Xerces Society's site, www.xerces.org.

4. Based on their research, participants should decide whether or not their group's pollinator is suited to the flower assigned. They should be able to supply at least three characteristics of the pollinator or the flower to support their decision. Have them report their findings to the group. Encourage groups to use pictures or drawings of their pollinator.

5. After everyone has presented their findings, discuss with the whole group whether they agreed or disagreed with each finding.

6. Have the group create their own flowers as in steps 6-8, above. They should include at least three characteristics that would make pollination easier for a certain type of animal.

Questions:

- What are the parts of a flower?
- How do flowers attract pollinators?
- How do they differ to attract different pollinators?

Adaptations:

Refer to general adaptations on pages 11-16.

Hearing Disabilities:

- Use pictures and hands-on examples to illustrate your points. Have a variety of hands-on examples for participants to smell and touch to illustrate each of the examples in Step 4. For example, use a plastic/silk cone-shaped flower to help illustrate the trumpet flower. Create a hummingbird out of pipe cleaners or use an object such as a ping-pong ball to simulate a hummingbird; have participants simulate the pollination process to help reinforce learning. Scent cotton balls with different extracts or essential oils for participants to smell. If possible, have real flowers for participants to explore.
- Create an interactive display of a flower to help illustrate the discussion. Make and label flower part "puzzle pieces" out of cardboard and secure them to a piece of poster board with Velcro. Draw the outline of the flower on the poster board as a guide. Give participants a labeled part and have them add these to the poster board as the functions of each part are discussed. (To make a more permanent version, put pieces of Velcro on the back of the cardboard parts and use a felt-covered board.)
- Have participants who have difficulty speaking write down the answers to their partners' questions or work with the interpreter if possible. Encourage participants to actively participate in the discussion.

Learning/Cognitive Disabilities:

- Use pictures and hands-on examples to illustrate your points. Have a variety of examples for participants to smell and touch to illustrate each of the examples in Step 4. For example, use a plastic/silk cone shaped flower to help illustrate the trumpet flower. Create a hummingbird out of pipe cleaners or use an object such as a ping-pong ball to simulate a hummingbird; have participants simulate

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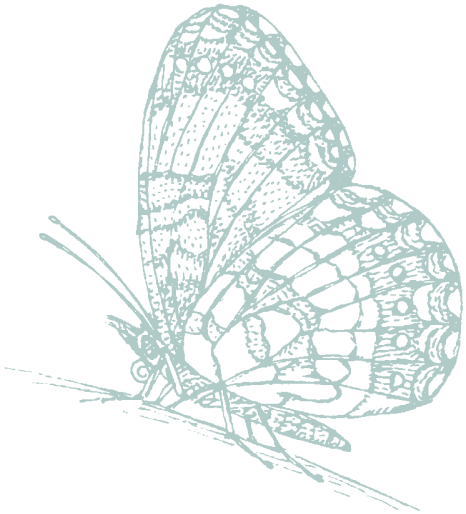
- Have pre-printed labels available for participants who have difficulty writing.
- Have pre-cut flower pieces available for participants who have difficulty cutting.

Motor Disabilities:

For participants with limited muscle strength, coordination, or dexterity of the hands:
- Have adaptive scissors available.
- Provide large glue sticks in addition to traditional bottles of glue.
- Have pre-printed labels available for participants who have difficulty writing.
- Have pre-cut flower pieces available for participants who have difficulty cutting.

Visual Disabilities:

Overall:
- Have a variety of hands-on examples for participants to smell and touch to illustrate each of the examples in Step 4. For example, use a plastic/silk cone shaped flower to help illustrate the trumpet flower. Create a hummingbird out of pipe cleaners or use an object such as a



ping-pong ball to simulate a hummingbird; have participants simulate the pollination process to help reinforce learning. If possible, have real flowers for participants to explore. Scent cotton balls with different extracts or essential oils for participants to smell.
- Create a tactile flower poster using different fabrics (e.g., corduroy, silk, felt, etc.) for each of the parts. Label the poster in large print and Braille. Connect labels to parts with raised lines of glue or yarn.

For participants who are blind:
- Allow participants to make a clay model of a flower or to create one out of tissue paper and pipe cleaners. If desired, have extracts or oils available to scent their flowers.
- If possible, have a Braille labeler available for participants to use.

Adapted with permission from the "Partners in Pollination" lesson plans, created by the Smithsonian Center for Education and Museum Studies. Look for Partners in Pollination under science lesson plans on the Internet at http://educate.si.edu