



ENVIRONMENTAL LEARNING PROGRAMS CELEBRATE WILDFLOWERS

#11 BEES AS POLLINATORS

CONTENT	Honey bees are one of the most important pollinators.
GRADE LEVEL	K-6
OBJECTIVES	Observe interaction between flowers and honeybees as pollinators.
PROCESS AND RESEARCH SKILLS	Observation, comprehension, application, analysis.
PRODUCT	Understanding.
SUGGESTED LOCATION	Among wildflowers in their native habitat or in a garden full of flowers.
TIME REQUIRED	30 minutes to one hour.
MATERIALS	Paper and pencil, wildflower and native plant field guides, field glasses, Honeybee drawings and diagram, and the newspaper article, "Flower Determines Honey's Taste."
BACKGROUND (READ ALOUD)	<p>Honeybees are amazing insects. Imagine making 60,000 flights to gather nectar for one teaspoon of honey or constructing such perfectly designed cells that architects marvel at them. The bustling activity of a hive seems confusing, but can be broken down into a simple series of tasks.</p> <p>Three different types of bees perform all the tasks within a hive: the queen, female workers and male drones. The queen lays eggs for the hive. She can lay up to 3,000 eggs per day!</p> <p>Female worker bees emerge from the egg as adults. For the first three weeks of her life she produces wax and royal jelly (fed to the queen.) She also stores pollen in cells, cleans and repairs the hive and guards the entrance to the hive. After three weeks she scouts for and collects pollen and nectar.</p> <p>Male drone bees serve only one function: to be the mates of the queen and fertilize her eggs. In autumn, drones are forced out of the hive.</p>



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CAUTION

Be aware of safety when around stinging insects.

1. Bees or wasps are not interested in humans until struck at or startled by sudden movements. Simply move away slowly with your head down.
2. Colors and scents attract insects. Wear subdued colors, not bright colors or black. Don't wear perfumes, hair sprays, lotions, and other scented items that might attract insects.
3. Wear long sleeves and pants to protect you from nettles, grassburrs, and insects.
4. Ward off flying insects with insect repellents safe for humans.
5. Ask parents of children allergic to stings to provide appropriate medication in case children are stung.

ACTIVITY AND DISCUSSION

1. Study the drawings of the three kinds of bees and the diagram of bee body parts. Answer and discuss the following questions:
 - a) How does a honeybee smell? (With its antennae.) Where are these? (On the front of its head.)
 - b) Could a honeybee clearly see a red rose? (No.) Why or why not? (They can't tell red from other colors.)
 - c) How long is a honeybee's tongue? (About twice as long as its head is.)
 - d) Where does a honeybee carry the nectar it has gathered? (In its honey stomach.)
 - e) Where does it carry the pollen it has collected? (In the pollen baskets on the third pair of legs.)
 - f) What do you suppose the bees do with the nectar they collect? (They make honey out of it.) what do you think they do with the pollen they collect? (They eat it!)
 - g) How far can a bee fly? (Up to eight miles.)
 - h) True or false: A honeybee dies if it stings someone. (True.) Explain.
 - i) True or false: All the honeybees you see collecting nectar and pollen are females. (True.)

EVALUATION

Participation in discussion.



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EXTENSION 1

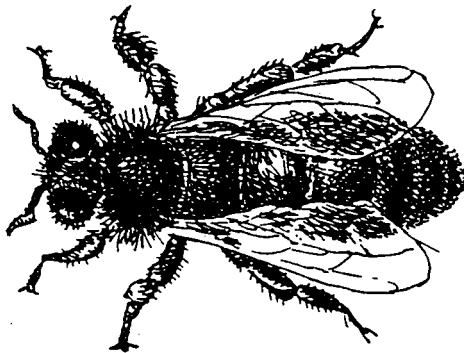
Consider the following: How do you think a honeybee can spot a good honey flower among all the other plants around? (How do you spot a McDonald's sign among all the other signs on the road?)

EXTENSION 2

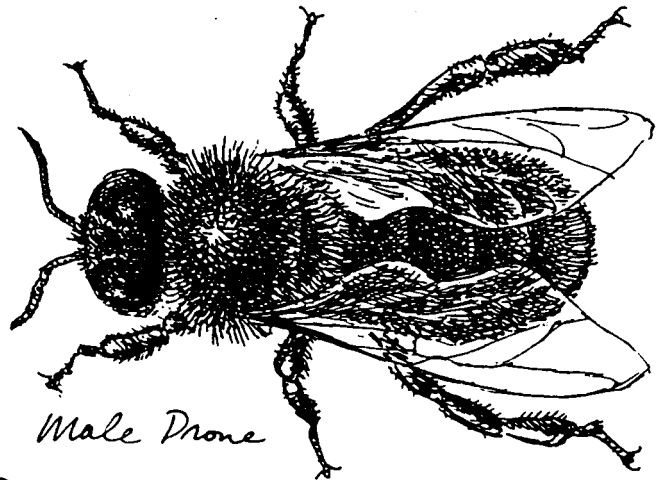
Follow a honeybee on its visits to your neighborhood flowers. Make a map of your neighborhood and mark each stop. How far did the honeybee travel in 15 minutes? Were you able to follow the honeybee back to its hive? How far away from where you first saw the honeybee was her hive?

EXTENSION 3

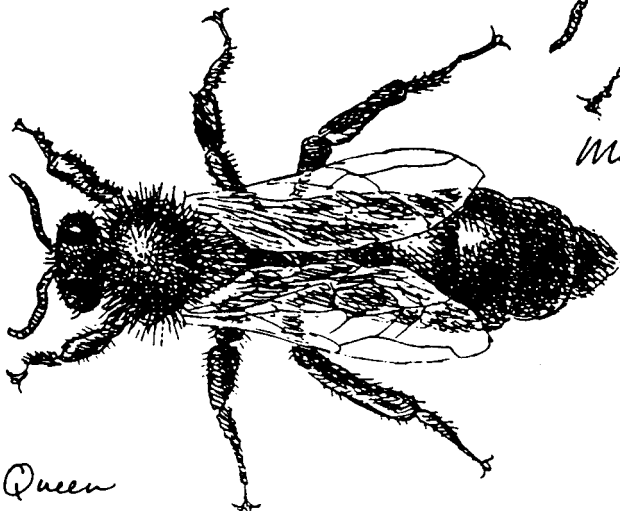
1. Read newspaper article, "Flower Determines Honey's Taste"
2. Purchase some different shades of honey to test taste. (Health food stores commonly have various kinds of honey available.)
3. Discuss.



Female Worker



Male Drone



Queen



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#11 BEES AS POLLINATORS HONEYBEE DIAGRAM

In order to perform its complicated tasks, a bee's body must be very specialized, both internally and externally.

1. **Antennae** Contain many smell-sensitive pits, giving the bee a keen sense of smell
2. **Compound Eyes** Can differentiate colors except red and black
3. **Mandibles** Gather pollen and mold wax
4. **Tongue** Collects nectar and passes it on to the honey stomach
5. **Wings** Two pairs of delicate wings that lock together with fine hooks, enabling the bee to fly distances up to eight miles

Legs

Three pairs of specialized legs:

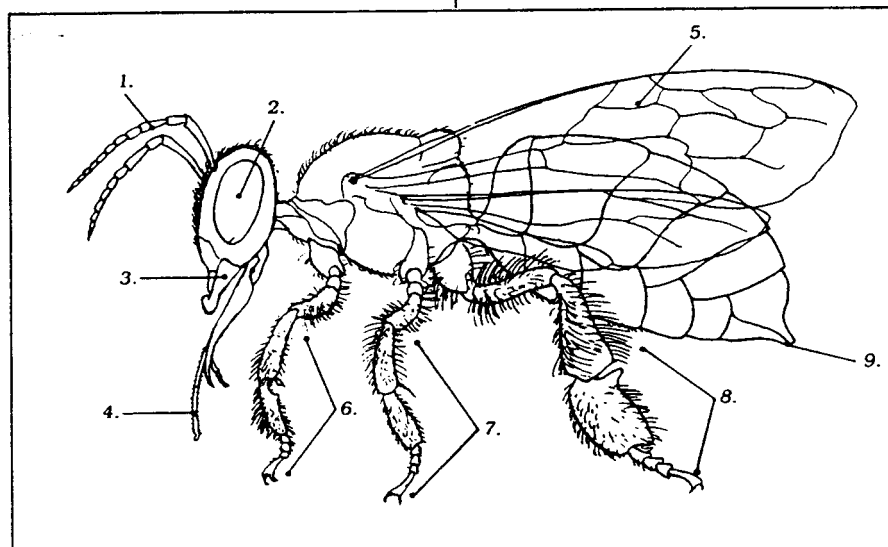
6. *First pair*— each leg has a comb for removing pollen and other materials from the antennae and a pollen brush to gather pollen from the foreparts of the body

7. *Second pair*— each leg has a pollen brush to remove pollen from the first legs and other body parts, and a spur to pick up wax

8. *Third pair*— each leg has a pollen basket for carrying pollen, pollen brush, and pollen comb for cleaning its body and collecting pollen; the wax gland is located just behind this pair of legs

9. **Stinger**

Connected to a gland that secretes stinging fluid; when used, it and other parts of internal organs are pulled out of the bee, causing its death.





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Flower Determines Honey's Taste

Andy sends the Star Wars Question and Answer Book About Space to Nora Douglas, 8, Decatur, Ill., for her question:

How do bees make honey?

Bees make thick, sweet honey from flower nectar. Nectar is a watery fluid.

Bees sip the thin nectar from the blossoms of flowers and carry it to their hives. Each worker bee has a special pouch called a honey bag inside its body. Here the bee stores the nectar it collects.

In the bee's honey bag, the sugar and nectar are broken down by a process called inversion into two simple sugars, levulose and dextrose. After the honeybees deposit the nectar in the hive, they allow most of the water to evaporate and the liquid becomes thick. The bees also add enzymes that enhance the honey's flavor.

Flowers Influence Color

Actually, the flavor and color of the honey is influenced by the kinds of flowers from which the nectar comes. Honey ranges in color from white through dark amber.

The light-colored honeys usually have the mildest flavor. The most common honey plants are alfalfa, alsike clover, sweet clover and white clover.

Many regional plants produce excellent honey. The clovers are common in the North with buckwheat flowers often used in the East. In the South, bees obtain nectar from tupelo, mesquite, sourwood and gallberry.

Among the white honeys, that of California white sage rates first, followed by orange blossom honey. Fall flowers, such as goldenrod and asters, give a dark honey.

Great Energy Food

Nutritionists tell us that honey is an excellent energy food because it contains simple sugars that can be used quickly by the body. It differs chemically from cane sugar, which is also an energy food.

Honey also contains mineral salts and other minerals needed by the

body. It is the only form of sugar that does not need to be refined.

Bakers often use honey in place of sugar for their products. Also, many cough medicines and laxatives are made with honey.

Florida and California are the leading honey-producing states in the United States. Other leading states and Canadian provinces, listed in the order of their importance, include Alberta, Minnesota, South Dakota, Wisconsin, Texas, Iowa, Manitoba and Nebraska.

Keeping Honey Fresh

About 225 million pounds of honey are produced each year in the United States and Canada.

Today, honey suppliers usually

remove the waxy cells or honeycombs that contain the honey and then seal it in airtight containers. This keeps the honey fresh for many months.

Commercial producers place the honeycombs in honey extractors. These machines whirl the honeycombs around, forcing the honey out. The honey is then bottled and sold.

When honey stands for a long time, the liquid may separate to form lumps called crystals. Some people prefer their honey in this form. Honey butter is also available. This product is made by beating honey and butter together.

Honey has been an important sweet diet item with man since ancient days.