

Honeybee

Do a honeybee dance.

OBJECTIVES

Students will:

- Î know there are different types of honeybees
- Ï recognize one job the worker bee does
- Ð demonstrate one way worker bees communicate with each other
- Ñ recognize the honeybee as the state insect of Kansas
- Ò know that honeybees are useful insects

MATERIALS FROM TRUNK

Book

The Life and Times of the Honeybee

Graphic

#8 - Honeybee

Object

Honeycomb

OTHER MATERIALS

- ' Some type of beeswax, such as a beeswax candle, that can be passed around for the class to handle.

TEACHER PREPARATION

- ' Think of a holiday, activity, or event the class is familiar with that took place about six weeks ago. Use this to help the class relate to the six-week life span of the worker bee.
- ' Pieces of tape may be used to diagram the dances from pages 18 and 19 of the *Life and Times of the Honeybee* book onto the floor if you feel this is necessary for your class.

HISTORICAL BACKGROUND

In 1976 Kansas schoolchildren collected over two thousand signatures from students across the state to make the honeybee the state insect. As stated in House Bill 2236, "Colonists are believed



to have brought bees from England to the Virginia Colony in 1622 and pioneers migrating west are known to have carried beehives with them. The honeybee is like all Kansans in that it is proud; only fights in defense of something it cherishes; is a friendly bundle of energy; is always helping others throughout its lifetime; is a strong, hard worker with limitless abilities; and is a mirror of virtue, triumph and glory;... The honeybee, by making its honey, gives not only to Kansans but also to all the world's peoples a gift which is sweet and wholesome, something which all Kansans strive to emulate in other ways."

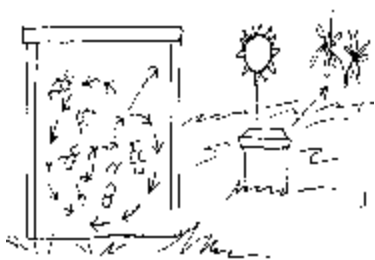
There are three types of honeybees: workers, drones, and queens. **Workers** are the smallest of the three and are all females. The first three weeks of a worker bee's life is spent inside the hive where they make honey, clean the hive, feed larvae, and build the wax comb that makes up the hive. The last three weeks of a worker bee's life are spent visiting flowers. Worker bees are the only bees to visit flowers. **Drones** are male bees, and their job is to mate with the queen. **Queens** are the largest. Each colony has only one queen and her job is to lay eggs.

During the period the worker bee is inside the hive she is referred to as a house bee. A house bee cleans the cell of the hive in which she was born and the cells around it. They feed the larvae bee bread, bee milk, and royal jelly depending on the age of the larvae and whether it is a worker, drone, or queen. Wax glands on the worker bees produce a wax that they shape into honeycomb.

The worker bee is referred to as a field bee during the last three weeks of life. These weeks are spent outside the hive visiting flowers. About ten one-hour trips are made daily. Each trip is usually made within three miles of the hive. During these trips the field bee collects water, nectar, pollen, and bee glue. The water is used to thin honey and cool the hive in the hot summer. Nectar is collected by the bee sucking it up with her tongue. It is made into honey in the hive. Pollen is gathered into pollen baskets on her hind legs. Pollen is high in protein. Bee glue is sap gathered from plant buds. It is used to seal cracks and varnish the inside walls of the hive.

Field bees "talk" or communicate with each other about where flowers can be found. This communication is in the form of dance. Once a bee has located flowers she flies back to the hive, gives the nectar and pollen

to a house bee, and then dances to tell the other field bees where the flowers are located. The Round Dance indicates that the flowers are close to the hive, under one hundred yards away. This dance is made by circling in one direction and then turning around and circling back in the other direction (see the picture to the right). The Tail-Wagging Dance means that the flowers are farther from the hive. The bee uses the dance to draw a map to the flowers. The



bee dances in a half circle in one direction, turns and runs straight while wagging her tail, and then dances a half circle in the other direction.

The direction the bee is headed during the tail wagging part of the dance indicates the location of the flowers in relation to the sun. The number of times she wags her tail in a fifteen-second period indicates the distance the flowers are from the hive (see picture to the left).

Cooperation produces results in a beehive. Making honey takes the work of both house and field bees. Field bees find nectar and bring it back to the hive. At this point the nectar is transferred to a house bee, tongue-to-tongue. The house bee spreads droplets of nectar on the roof of a honey cell. House bees then fan their wings over the honey comb to evaporate the moisture in the nectar. Finally, other house bees cap the honey cells with a thin layer of wax. In the sealed cell the nectar ages and becomes honey.

VOCABULARY

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| Bee Glue | Sap from plant buds is gathered, stored in the pollen baskets on the bee's hind legs, and used to seal cracks and varnish the inside walls of the hive. |
| Cell | The small six sided compartments that make up the hive. |
| Communicate | To exchange or pass along information. Worker bee uses dance to talk to each other without words. |
| Cooperate | To work together. |
| Drones | Male bees. |
| Field Bee | The older worker bees. They leave the hive to visit the flowers. |
| House Bee | The younger worker bees. They work inside the hive. |
| Insect | A group of small animals without a backbone and having three pairs of legs, a body divided into three parts, and usually two pairs of wings. |
| Larvae | The newly hatched form the honeybee takes before becoming an adult. |
| Nectar | A sweet juice that oozes from flowers. Bees use it to make honey. |
| Pollen | A substance produced by flowers. Pollen sticks to the bee's antennae and hair |



and from there the bee brushes it into pollen baskets on her hind legs.

| | |
|----------------|---|
| Pollen baskets | Pouches on the outside of a worker bee's hind legs. They are used for transporting pollen and bee glue from plants to the hive. |
| Queen | Female bees that lay eggs. |
| Symbol | Something that stands for something else. Symbols are used to communicate words, emotions, directions, etc. |
| Worker Bee | Female bees that do not lay eggs and are the only type of bees to visit flowers. |

ACTIVITY

- 1) Show the class graphic #8, the Honeybee. Ask the class if they know what insect this is.
 ® *Honeybee*

Ask the class what they know about honeybees.

After giving the class time to share some of the things they know tell the class that today they are going to learn about honeybees, what they do, and why they are important to us.

- 2) Turn to page 6 in the book, *The Life and Times of the Honeybee*. Read this page and show the class the picture of the three bees.

Emphasize that all three of these have very important roles in the life of the hive. All the bees in a hive must cooperate to produce enough food to feed them and a hive to shelter them. Explain that today you're going to talk about the worker bee, the bee that visits flowers and makes the honey.

- 3) Show the class page 7 of the book. Point out the following:
 - ± the queen
 - ± the drone being fed by the worker bee
 - ± the worker bees repairing the comb, storing food, and feeding the larvae

Show the students the section of the hive. Have them compare the picture in the book with this beehive section. In both the book and the piece of hive the class should be able to see that hives are made up of MANY MANY six-sided cells. Explain that the piece of hive is a small part of an entire hive. (This piece is from a hive of bees raised by a beekeeper for the honey they produce.)



It broke off and had to be replaced.) Pass around the beeswax sample, if one is available, for the class to touch.

- 4) Tell the class that the worker bee only lives six weeks. Note a holiday or activity that the class experienced about six weeks ago as something to compare with this length of time.

Explain that the worker bee is known by two other names, the house bee and the field bee. (This can loosely be compared with young humans being called children and older humans being called adults.)

- ± During the first half of its life it is called a **house bee** and works inside the hive.
- ± During the second half of its life it is called a **field bee** and flies to and from the hive collecting food and water for the bees inside the hive.

- 5) Read about the house bee on pages 12 and 13 of the honeybee book. Make sure the following points are made:

- ± for its first three weeks of life the worker bee is called the house bee and spends her time inside the hive working
- ± house bees make the hive
- ± house bees make honey

- 6) Read about the field bee on pages 14 and 15 of the honeybee book. During the second half of its life the worker bee is called a field bee and spends her time working outside of the hive. Make sure the following points are covered. The field bee collects:

- ± water to cool the hive and thin the honey
- ± nectar to make into honey
- ± pollen for the bees to eat

- 7) Have the class imagine that they are field bees. Have them think about being a little tiny bee flying out into the big world. They find a HUGE garden, get excited, and return to the hive to tell the other field bees about it. There are plenty of flowers for everyone! Ask the students to think about how they might tell the other field bees that all those flowers are out there.

After they have made some guesses open the honeybee book to pages 18 and 19. Read about how field bees communicate (talk without words) to each other through dance.

Let the students take turns doing a field bee dance. You may want to tell each student where the



flowers are that he/she is dancing about. The student then chooses which dance to do. (Flowers located within the school are less than one hundred yards away and those outside the school or down the street are over one hundred yards away.)

Once everyone has had a chance to dance ask if they feel dance is a good way to communicate.

- 8) Have the class reflect on the worker bee's jobs inside and outside the hive. Ask if they think the worker bee has an important role in the hive.

Remind them that there are three types of honeybees: workers, drones, and queen bees. All three have important roles. It takes all of them to keep the hive repaired, feed all the bees, make honey, and pollinate flowers.

Tell the students that some schoolchildren felt the honeybee was so important that they wrote lots of letters asking that the honeybee be made the state insect of Kansas. This means that it is a symbol of Kansas and the schoolchildren hoped that when other people saw the honeybee they would think of Kansas.

EXTENDED ACTIVITIES

- 1) Serve honey and graham crackers as a snack.
- 2) View the Reading Rainbow video *The Life Cycle of the Honeybee*. This video is available through the Media Loan Program of the Kansas State Historical Society, Education/Outreach Division, 6425 SW Sixth Avenue, Topeka, KS 66615-1099; 785-272-8681, ext. 414; FAX 785-272-8682.
- 3) Have the class make a collage of things that use honey. They may want to cut pictures out of magazines or sales papers, use labels from food products they have at home, or draw pictures.

Use magic marker or paint to draw hexagon shapes on top of the collage. Use the bee hive to talk about the hexagon shape.

- 4) Use an experiment about evaporation to explore how bees use the evaporation of water from nectar to make honey. Bees actually speed up the evaporation process by fanning their wings. Mix ½ cup of water with 3 tablespoons of salt. Pour this into a container, preferably glass, so that the liquid is no more than 1/4" deep. Place this on a window sill and monitor the water level over several days as it evaporates. Compare the salt that is left with the honey that is left when the water evaporates from nectar.



- 5) Explain that bee products are important to people as well as other honeybees. Ask if anyone can think of anything that they've used or eaten that comes from honeybees.

® *Honey is used:*

- ± *to sweeten many foods,*
- ± *as a syrup on bread or pancakes, and*
- ± *to make graham crackers, ice cream, cookies, and barbecue sauces.*

® *Beeswax is used to make:*

- ± *candles,*
- ± *artist's crayons,*
- ± *lipstick,*
- ± *floor polishes, and*
- ± *wax for surfboards and skis.*

More important than these products is that bees pollinate plants. Ask if anyone knows what this means.

- ® *When field bees move from one apple blossom to another they transfer or move pollen from one flower or blossom to another. When this happens the apple blossom is able to make an apple. Without the help of honeybees people would grow much fewer fruits and vegetables than they do.*

- 6) Have students list all the words that come to mind when they hear the words "buzzing honeybee." Assist the students in making up alliterative sentences - for example, "The buzzing bumblebee bounded from one beautiful bluebell to another." Post their sentences around the classroom.
- 7) Help students staple or glue together egg cartons without lids, side by side, to create a cross section of a beehive. Three-dimensional bees can be constructed with yellow and black pipe cleaners and placed in the "honeycomb."
- 8) Use the honeybee to talk about "cooperation" and "working together" to produce something. It takes the work of the house bee and the field bee to produce honey.
- 9) Have students make beeswax candles. Supplies are available at many craft stores.

