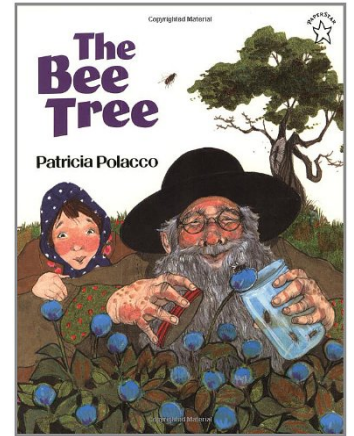


May 2017 Book of the Month

The Bee Tree

By: Patricia Polacco

Mary Ellen gets bored with her reading, so her “Grampa” decides its time for Mary Ellen to see the bee tree. To find the bee tree, they must follow a bee, and eventually the whole town joins in! They collect some honey from the tree, and Mary Ellen learns that sometimes the sweetest treats require a little work. She learns that adventure, knowledge and wisdom do not come easily; that they must be pursued, just as they pursued the bee to the bee tree and collected the honey.



Fun Facts:

- It is thought that microwaving honey destroys the beneficial enzymes found in honey, so most experts advise against microwaving it. ¹
- A medical honey called *Medihoney* can be used as a topical treatment for wounds or burns. ¹
- Pollination is crucial to the success of North Carolina’s agricultural economy. ²
- The color and flavor of honey differ depending on the bees’ nectar source (the blossoms). Lighter colored honeys are mild in flavor, while darker honeys are usually more robust in flavor. ³
- There are more than 300 unique kinds of honey in the United States, such as clover, eucalyptus, and orange blossom. ³
- There were 24,000 reported bee colonies in North Carolina in January 2015. ⁴
- The top two bee-pollinated commodities grown in North Carolina are cucumbers and blueberries. ⁶

Activities

We are Bees! ⁵

Group the students into “colonies.” For each colony, place an eyedropper and cup of water at one end of the room and a plastic medicine cup (marked with teaspoon and tablespoon increments) across the room. The students will take turns transferring water across the room to the medicine cups, one drop at a time. As the “bees” deposit their honey into the “hives,” a recorder keeps count of the drops needed to produce the amounts of water, from 1 teaspoon to 2 tablespoons. When finished, explain that the drop count for each measurement equals the number of bee flights taken to produce that amount of honey. Tell the students that each bee produces about one twelfth of a teaspoon of honey in its lifetime.

A Bee or Not a Bee? ⁶

All animals are classified according to how they look, how they behave, and how their bodies work in comparison with the bodies of other organisms. Honey bees are insects. All insects have six legs, and

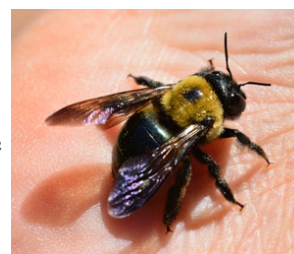
three body sections. Insects usually have antennae and wings. Honey bees are often mistaken for other types of flying, stinging insects. Provide the students with the pictures and definitions below. Then, using the information they have learned, ask them to answer questions following the definitions.

Honey bees are hairy insects that are brownish-orange and black. They have pollen baskets on their legs to carry pollen. They are social insects that feed on pollen and nectar. Honey bees are generally not aggressive and will only sting if feeling threatened.



Bumblebees are big, hairy, yellow and black, square-shaped bees. Their colonies last for just a few months, and all of the bees except the new queen die at the end of summer. All females can sting more than once, but are relatively unaggressive.

Carpenter bees are large and resemble bumblebees. Males do not have stingers. Carpenter bees have powerful jaw muscles that they use to bore tunnels into dead trees or wooden buildings where they live. They are unlikely to sting unless handled.



Sweat bees are solitary bees and are metallic blue or green. They often nest in the soil. They are known for hovering near people or animals. They are much smaller than honey bees.

Paper wasps are brightly colored black and yellow and are smooth and somewhat shiny. They have two sets of dusky-colored wings, and never carry pollen on their legs. Paper wasps build nests that usually hang in hollow trees, in the ground, or under eaves of houses. They are predators that eat insects and spiders. Females are aggressive and can sting repeatedly.



Yellow jackets are a type of short, stocky wasp. They have yellow and black striped abdomens. Their heads and middle section (thorax) are black with yellow spots. Their abdomen tapers off to a point which is where their stingers are. Females can sting repeatedly, and are quick to attack when disturbed. They nest in weedy brush areas on the ground or underground in a crevice.

Questions:

- What are two common characteristics of all insects?
- What other flying insects are black and yellow and therefore often mistaken for honey bees?
- What flying insects tend to be aggressive? What are the differences in the appearance of honeybees and aggressive insects?
- Why are honeybees important to us? Why are other types of bees and flying insects important to us?
- Is it right or wrong to kill an insect that is flying around you? Explain your answer.

Honey, I'd Love to Dance ⁶

Honey bees communicate with each other by dancing. After a honey bee has found food she tells the other bees when she returns to the hive. The bee will dance on the honeycomb, while the other bees feel the dancing bee and learn where the food is. By smelling the dancing bee and getting a taste of her load of nectar, the other bees can tell what type of flower she has visited. Different dances are used when the food is close to or far away from the hive. Bees have receptors on their feelers and legs which they use to feel the dance.

- **Round Dance:** performed when food is close to the hive (less than 100 yards) by workers bees. The bee will start going round and round, first one way and then the other.
- **Waggle Dance:** If the flowers are more than 100 yards away from the hive, the returning bee performs the waggle dance by moving one half circle in one direction, turning, and running straight while wiggling her abdomen.

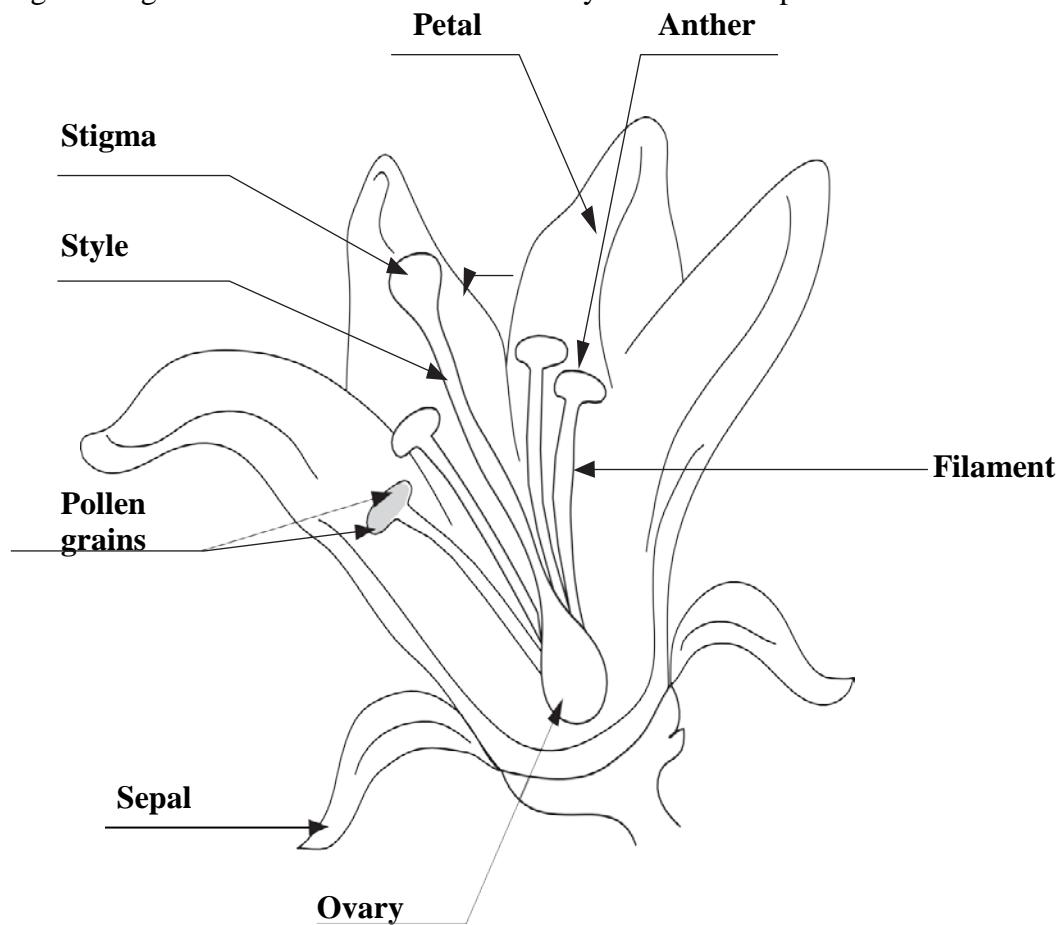
If the food is in the same direction as the sun, the central run of the dance is straight up the comb. If the food is to the left or right of the sun, the bee alters the direction of the dance by the correct amount to the left or right of the upright line. The distance between the hive and the food is communicated by the speed of the dance and the buzzing sound made by the dancing bee. The faster the bee dances, the closer the food. The waggle dance shows both location and distance of the flowers, so the bees know where to fly.

1. Start a discussion by asking students how humans communicate with each other without talking (body language, hand signals, facial expressions, etc.). Have a few students demonstrate in a charades-type manner. Review the messages bees communicate through their dances. Review both dances and what each movement means.
2. Divide the class into teams (2-4 students).
3. Have each team choose a scout (the bee that will originally find the food source and communicate its whereabouts through bee dances to the team members).
4. Give each scout written directions to a different treat bag that you have prepared and hidden in the room. Treat bags can contain candy, cookies, honey sticks, raisins, pencils, desk decorations, etc. Do not let the other team members see the scout's search.
5. When the scouts return, have them communicate the direction and distance of the treat bag to their team members using either the round dance or the waggle dance. No verbal or "human" body language allowed!

- Once all of the teams have found their reward, follow-up with a class discussion about the ease or difficulty of communicating through dance. Is it difficult to judge distance without a tape measurer or other tools? Are honey bees intelligent creatures? How can humans communicate with one another without talking?

Flower Power ⁷

When a bee collects nectar and pollen from a flower, some pollen from the stamens (the male reproductive organ of the flower) sticks to the hairs of the bee's body. When that bee visits the next flower, some of the pollen is rubbed off onto the stigma or tip of the pistil (the female reproductive organ of the flower). When this happens, fertilization is possible, and a fruit, which carries seeds, can develop. ⁸ Using the diagram below have the students study and learn the parts of a flower.



Materials:

- Cut flowers, 1 per student. Contact a local florist and ask if they have some old flowers they will be discarding. Look for flowers that exhibit easily identifiable parts, such as lilies, roses, tulips, columbines, irises, petunias, snapdragons, and sunflowers. A variety of flowers can be attained and dissected and used as a compare/contrast activity during the discussion after the activity.

- Bucket of water to store the flowers
- Clear tape
- Card stock paper
- Scissors (may not be necessary, depending on the flower)

Instructions:

1. Dissect a few flowers in advance and place them on card stock or a sheet of paper, label the parts.
2. Discuss the background information with the class. Explain to the students that they are going to examine, dissect and label the parts of the flower that are associated with pollination and seed formation.
3. Give each student a piece of card stock paper.
4. Show the students the previously dissected flowers. Explain that flower dissection requires precision and a “light touch.” Rough handling the flower will destroy the parts that need to be labeled. Typically, they can use their hands to break apart the flower, but allow them to gently cut the flower open if they are unable to do so with their hands.
5. Give each student a flower. Have the students carefully dissect the flower and tape the parts onto their card stock paper.
6. Ask the students to label each flower part.
7. Discuss the following questions:
 - a. Are some flowers easier to dissect than others?
 - b. Were some parts easier to identify than others?
 - c. Did every flower contain pollen? Why or why not?
 - d. How do you think a flower is pollinated?
 - e. Can you predict the size and shape of the seeds that may be produced by the flower based on how the flower looks?

Links:

- North Carolina State Beekeepers Association Web Games
<https://www.quia.com/rr/1126583.html>
- Pollinator Bloom Schedule
<https://www.ncbeekeepers.org/honey/floral-sourceswhats-blooming>
- Bee Ag Mag
<https://www.dmsfulfillment.com/FarmBureau/DMSStore/Product/ProductDetail/20145>
- North Carolina Department of Agriculture’s Commissioner, Steve Troxler, discussing pollinators
<https://youtu.be/q4fcq0a4D-M>
- Interactive pictures of North Carolina pollinator research stations
<https://spark.adobe.com/page/vCrYjLmACRwu8/>

Sources:

1. <https://www.ncbeekeepers.org/honey/faqs-about-honey>.
2. <http://www.ncagr.gov/pollinators/>
3. <https://www.honey.com/honey-at-home/learn-about-honey/>
4. <http://usda.mannlib.cornell.edu/usda/current/BeeColonies/BeeColonies-05-12-2016.pdf>
5. <https://www.jumpintoabook.com/2013/05/the-bee-tree-by-patricia-polacco/>
6. <http://www.honey.com/images/downloads/HoneyFilesWeb.pdf>
7. https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=223&author_state=0&search_term_lp=honey
8. <http://www.bees.techno-science.ca/english/bees/pollination/default.php>