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The Thing About Bees: A Love Letter

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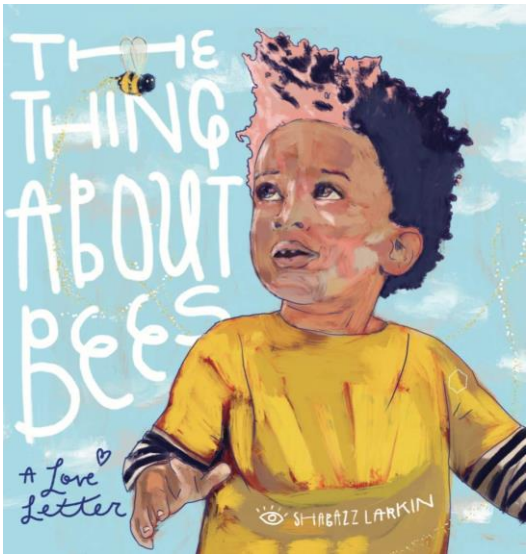
"Sometimes bees can be a bit rude. They fly in your face and prance on your food."

Yet…without bees, we might not have strawberries for shortcakes or avocados for tacos! In this engaging picture book, children are introduced to different kinds of bees, "how not to get stung," and how the things we fear are often things we don't fully understand.[1]



Did You Know? (Ag Facts)

- Honey bees make up 80% of all pollinators.
- During honey production periods, spring and summer, a worker bee's life span is about 6 weeks.
- Honey bees gather around 10 pounds of nectar to make one pound of honey.
- The honeycomb shape is perfect for bees! It's the strongest shape to fit the most honey inside without wasting any precious space or wax.

Discussion Questions

- Why are honey bees important?
- What is pollination?
- What might happen if there were no bees?
- What do beekeepers do?

Grade Level(s): K-5

Purpose: Students will investigate the three types of honey bees in a colony, identify their roles and life cycles, and recognize honey bees as part of a community that works together.

Vocabulary:

- **brood:** the offspring produced by the colony (eggs and larvae)
- **cell:** a hexagonal chamber built of beeswax for brood rearing and storage of honey and pollen
- **crop:** spherically shaped organ in the abdomen of a honey bee that serves as a site for food storage, as a storage place for nectar bees collect from flowers, or as an initial site for the digestion of food; also known as the honey stomach
- **drone:** a male honeybee that is produced from an unfertilized egg
- **egg:** laid by a queen bee, this is the first stage in the life of a honeybee
- **enzyme:** a substance produced by a living organism which acts as a catalyst to bring about a specific biochemical reaction
- **evaporate:** turn from liquid to vapor
- **forage:** search widely for food
- **hive:** a container for housing honeybees; a colony of bees
- **nectar:** a sweet liquid secreted by flowers of various plants
- **pollen:** the fine, powder-like material produced by the anthers of flowering plants
- **pollination:** the transfer of pollen from the anther to the stigma of a plant
- **pollinator:** an animal that moves pollen from the anther to the stigma of a plant
- **proboscis:** straw-like tongue used by honey bees to suck nectar or honey
- **queen:** a female bee that lays eggs
- **regurgitate:** bring swallowed food up again to the mouth
- **workers:** female bees who build and guard the hive, look after the queen and gather food

Background Agricultural Connections: [2]

Honey bees are an important insect that are familiar to many elementary students. Honey bees like to live in dark, enclosed places. In the wild, they can be found in tree limbs and trunks. Beekeepers care for honey bees in wooden **hives**. Three different kinds of honey bees live in the hive:

- **Queen -** One female who lays all of the **eggs**. She has a long, thin body and is the largest bee. Queen bees live from 3-5 years and can lay up to 2,000 eggs each day.
- **Drones -** Drones are male bees. Their job is to mate with the queen so she can lay eggs. Each colony in the hive has about 100 drone bees.
- **Workers -** Worker bees are all females. There are usually hundreds of worker bees in a hive. They are the smallest bees, but they have many important jobs. These jobs include grooming the queen, nursing the **brood** (young bees), creating wax, building the honeycomb, guarding the hive, **foraging** for **nectar** and water, and making honey.

When worker bees are foraging, they collect nectar from flowers using their straw-like mouth part known as a **proboscis**. The nectar is stored in a special part of their body called the **crop**, or honey stomach. **Pollen** is collected on the legs and and body of the forager bees. The pollen is transferred from flower to flower to **pollinate** the plants so seeds, fruits, and vegetables are produced. Over 1,000 different plants that are grown for food, beverages, fiber, species, and medicine need **pollinators** in order to produce the products we need and want.

When the forager worker bees have a full crop, they travel back to the hive. When they are back in the hive, the forager **regurgitates** the nectar and transfers it to a worker bee in the hive. **Enzymes** in the stomach of the bees convert the nectar into a thin, watery form of honey. This liquid is placed in a **cell** in

the honeycomb. The bees use their wings to fan the liquid to **evaporate** the water until it thickens. Finally, the wax-making worker bees seal the honeycomb cell where the honey continues to ripen and develop flavor.

Become a Beehive [3]

Materials:

- Queen, worker, and drone bee images (Link – page 16)
- Bee Job Chart (Link – page 17)
- The Magic School Bus: Inside a Beehive, by Joanna Cole (video link here)
- Life Size Honey Bee (optional)
- Queen Bee getting Royal Jelly
- Visual for size comparison for 3 types of honey bees
- Bee Landing Pad, live cam

Procedures:

1. Read the book, The Magic School Bus: Inside a Beehive by Joanna Cole, to the class.
2. Show students a picture of a queen bee and tell them: only one queen per hive, fed royal jelly when she is a larvae to make her abdomen longer and to enable her to live 3-5 years, no barbs on stinger so she can sting repeatedly without dying, lays up to 2,000 eggs a day, only leaves the hive once for a mating flight.
3. Show students a picture of a drone bee and tell them: male bee, only job is to mate with a queen bee, dies after mating, no stinger, larger body and larger eyes.
4. Show students a picture of a worker bee and tell them: all female bees, work as a team, participate in each job during their short, 6 week lifespan.
5. Show the bee job chart of worker bee jobs throughout their life.
6. Tell the students that you want to turn the classroom into a bee hive! Have students work in groups to suggest how they can act out each part of a working bee hive. Remind students that each hive has one queen, a few drones, and many workers. For example, a cleaner bee can use a broom to sweep the classroom floor "cells", a nurse bee can use a water bottle to feed nectar and pollen to a baby bee, a forager bee can carry pieces of yellow paper and do a waggle dance to show other foragers where to find the pollen, and a guard bee can stand at the classroom door "hive entrance" to make sure only your class bees come in and out.

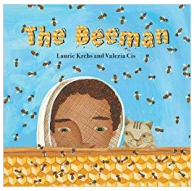
Making Honey [2]

Materials:

- *The Beeman* by Laurie Krebs
- Small cartons or containers of milk
- 3-ounce cups, 1 per student when the class is divided in half
- Instant pudding mix
- Teaspoon
- Spoon or stir stick
- Can of whipped cream

Procedures:

1. Read *The Beeman* by Laurie Krebs. Discuss the roles of the bees, as well as the terms explained in the book—
   - **nectar**
   - **pollen**
   - **hive**
   - **colony**
   - **cell**
   - **eggs**
   - **larva**
   - **pollination**



2. Have the students act out the steps of the honey-making process:
    a. **Forager bees collect nectar from flowers using their straw-like mouth part called a proboscis. As they suck up the nectar, pollen sticks to their legs and body. Forager bees visit up to 100 flowers to fill their stomachs with nectar.** Place small cartons or containers of milk, which represents flowers with nectar, randomly throughout the classroom with a parent volunteer/assistant. Assign half of the students to stand in one corner of the classroom to represent worker bees that stay in the hive. Assign the other half of the students to be foragers. Provide each forager with a 3-ounce cup. Instruct them to visit the flowers where the parent volunteer/assistant will pour a small amount of milk into their cup. When their cup is half-full, they will fly back to the hive.
    b. **When the forager bees are full with nectar, they fly back to the hive and regurgitate the nectar into the mouths of other worker bees. Special enzymes in the stomachs of the bees change the nectar into runny, watery honey. The worker bees spit the honey into the waxy honeycomb.** Have the foragers travel to the "hive" and give their cup of "nectar" (milk) to one of the worker bees. Have parent volunteers/assistants add 1 teaspoon of instant pudding mix to each milk cup. The pudding mix represents the enzymes that turn the nectar into honey.
    c. **The worker bees use their wings as fans to evaporate the water from the honey. This makes the honey thicker.** Provide the worker bees with a spoon or stir-stick to mix the milk and pudding mix for 1 minute. Allow the mixture to sit and thicken for 5 minutes.
    d. **The worker bees close up the honeycomb with wax to protect the honey. They use the honey as food for the winter. Lucky for us, they make about 2-3 times more honey than they need so we get to eat it too!** Have the parent volunteers/assistants use a can of whipped cream to cover the pudding, representing the wax cover. Provide each student with a spoonful of the pudding to show that the bees all share the honey and some is left over. Beekeepers can take some of the honey, but cannot not take all of the honey or the bees will not have enough to eat throughout the winter. The bees all have an important piece in the job of creating honey and all share the product.

Beeswax Life Cycle Models [2]

Materials:

- Honey Bee PowerPoint
- Beeswax Modeling Clay Recipe
- 6 cups beeswax pellets* (available at craft stores)
- 6 tablespoons coconut oil*
- 4 tablespoons lanolin* (available at pharmacies)
- Slow cooker
- Slow cooker plastic liner
- 2-ounce plastic mini condiment cups with lids,* 1 per student or group
- Cardstock or construction paper
- Honeycomb, optional

Procedures:

1. Ask the students if humans use any items made by honey bees.
2. Talk about how honey bees make beeswax. Explain that beeswax is secreted from the wax glands of worker bees to create and cap cells inside the hive. Beeswax is used in the production of candles, cosmetics, artists' materials, electronics, lubricants, polishes, inks, and paints. Bees require the protein from pollen and the carbohydrates from honey to create beeswax. It takes 6-10 pounds of honey to make one pound of wax, which is enough to construct 35,000 cells within a hive. A beekeeper will harvest two pounds of wax cappings for every 100 pounds of honey.
3. If possible, obtain honeycomb so students can observe the wax cells and cappings. Honey in the

comb can be obtained from beekeepers, specialty stores, online stores, and farmers markets.

4. Use the *Honey Bee* PowerPoint to discuss the life cycle of a honey bee.
5. View the Amazing Time-Lapse: Bees Hatch Before Your Eyes video to watch the growth of larvae into bees.
6. Use the Beeswax Modeling Clay Recipe to make beeswax modeling clay. Instruct the students to use the clay to create a honey bee life cycle model by creating an egg, larva, pupa, and adult honeybee. Refer to the *Honey Bee* PowerPoint for photographs of each life stage. Students can work in groups or individually to create their life cycle model.
7. A cell for each life stage can be created out of paper folded into the shape of a hexagon.

Extension Activities:

- Check out the Bee Cause Project and learn about observation hive possibilities at your school.
- Watch the Q&A Webinar with author, Shabazz Larkin – courtesy of the Bee Cause Project!
- Utilize resources from the National Honey Board - https://honey.com/bees-sustainability/educational-materials
- Pollinator partnership also has tools and activities - https://www.pollinator.org/learning-center/education
- Use the following videos to further explore the world of honey bees.
    - In Flight of the Honey Bee (2:15), a commercial beekeeper illustrates how honey bees play an essential role in the crop production process. Give your students a close-up look at a honey bee covered in pollen and hives traveling across the country to pollinate different crops.
    - View the Beekeeping with Maddie (8:47) video to learn more about how backyard beekeepers harvest honey.

Suggested Companion Resources:

- Beebuzz (game)
- A 'Bee-Friendly' Guide to Help Save the Honey Bees (short story)
- Bees and Wasps (book)
- Flight of the Honey Bee (book)
- Honeybee (book)
- The Bee Book (book)
- The Bee Tree (book)
- The Honeybee Man (book)
- The Life and Times of the Honeybee (book)
- Beeswax Lip Balm Kit (activity)
- Anatomy of a Worker Bee (poster)
- Amazing Time-Lapse: Bees Hatch Before Your Eyes (video)
- City of Bees: A Children's Guide to Bees DVD (video)
- How It's Made: Honey (video)
- Introduction to Pollination video (video)
- NMSU Field Trip: Honey (video)
- That's So Sweet! – A Look at Honey Production in the Twin Cities (video)

- The Honey Files (video)
- Wings of Life (video)
- Utah State University Bee Lab (website)

Sources/Credits:

1. Larkin, Shabazz. *The Thing About Bees: A Love Letter*, Readers2Eaters, 2019.
2. Minnesota Agriculture in the Classroom
3. BeeCause Project – Check out full curriculum here: https://www.thebeecause.org/wp-content/uploads/2020/09/bee-cause-6-week-bee-unit-complete-guide.pdf

Suggested SC Standards Met:

English/Language Arts:

- K.RI.5.1 With guidance and support, ask and answer who, what, when, where, why, and how questions about a text; refer to key details to make inferences and draw conclusions in texts heard or read.
- K.RI.5.2 With guidance and support, ask and answer questions to make predictions using prior knowledge, pictures, illustrations, title, and information about author and illustrator.
- K.RI.6.1 With guidance and support, retell the central idea and identify key details to summarize a text heard, read, or viewed.
- 1.RI.5.1 Ask and answer who, what, when, where, why, and how questions to demonstrate understanding of a text; use key details to make inferences and draw conclusions in texts heard or read.
- 1.RI.5.2 Make predictions using prior knowledge, pictures, illustrations, title, and information about author and illustrator.
- 1.RI.6.1 Retell the central idea and key details to summarize a text heard, read, or viewed.
- 2.RI.5.1 Ask and answer literal and inferential questions to demonstrate understanding of a text; use specific details to make inferences and draw conclusions in texts heard or read.
- 2.RI.5.2 Make predictions before and during reading; confirm or modify thinking.
- 2.RI.6.1 Retell the central idea and key details from multi-paragraph texts; summarize the text by stating the topic of each paragraph heard, read, or viewed.
- 2.RI.7.1 Compare and contrast topics, ideas, or concepts across texts in a thematic, author, or genre study heard, read, or viewed.
- 3.RI.5.1 Ask and answer literal and inferential questions to determine meaning; refer explicitly to the text to support inferences and conclusions.
- 3.RI.7.1 Compare and contrast diverse texts on the same topic, idea, or concept.
- 4.RI.5.1 Ask and answer inferential questions to analyze meaning beyond the text; refer to details and examples within a text to support inferences and conclusions.
- 4.RI.8.2 Apply knowledge of text features to gain meaning; describe the relationship between these features and the text.
- 5.RI.6.1 Summarize a text with two or more central ideas; cite key supporting details.

Science:

- K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.
- 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.
- 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.
- 3.L.5 The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.
- 4.L.5: The student will demonstrate an understanding of how the structural characteristics and traits of plants and animals allow them to survive, grow, and reproduce.
- 5.L.4 The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems.