

BEE BODIES

HONEY BEE ANATOMY



Essential Question:

**HOW DOES A HONEY BEE'S
STRUCTURE SUPPORT ITS FUNCTION
IN THE ECOSYSTEM?**

LEARNING OBJECTIVES

- Distinguish between the structural and behavioral adaptations of the honey bee.
- Investigate and infer the function of basic adaptations.
- Explain how different organisms use their unique adaptations to meet their needs.

RESOURCES

- Image, *Bee Pollen Baskets*
- Image, *Bee Body*
- Reading, *Bee Bodies*
- Assessment, *Which Bee Body Part?*

MATERIALS

- Chart Paper
- Markers
- Journals, Paper, or Digital Notebooks
- Writing Utensils

OVERVIEW OF LESSON / BACKGROUND

Most people can describe or draw a basic bee: black and yellow stripes, wings, a 3-part body. This lesson will take students beyond the basics by bringing the honey bee's amazing anatomy and structures alive. From the pollen basket to the hairy eyes, bees are creatures that inspire wonder and curiosity.

Although each of the 20,000 species of bees in the world has something in common with the next, this lesson focuses on honey bees: the only insects that produce food for humans. In order to survive, thrive, and perform their work in the world, honey bees have evolved with a fascinating anatomy and specific adaptations. This detailed, up-close look at both the structures and the functions of honey bee anatomy will help students understand the bee's place in the world.

Honey bees have many parts that are easily recognizable: a head, thorax, abdomen, legs, antennae, eyes, wings, etc. They also have a corbiculae (or pollen basket), tiny hairs on their eyes, a proboscis, and hooks (or hamuli) that hold their wings together in flight. Students will learn about and label these parts.

LESSON ACTIVITY

INTRODUCTION

1. Project, display, or distribute the image **Bee Body**.
2. Lead a discussion about the image. What do students notice? Why is the bee on a flower? Can students name any parts of the bee?
3. Project, display, or distribute the image **Bee Pollen Baskets**.
4. Ask students what they think the big yellow structures are for and record their ideas on a chart.
5. Tell students that bees collect pollen. The pollen sticks to their bodies and they brush it into the pollen baskets on their legs (seen in first image).
6. Tell students they will be studying bee bodies and, in a later lesson, you may study the ways bees process and use pollen.
7. **Paper Chat:** Begin the inquiry cycle by asking students to respond in writing to the questions you have written in the middle of four sheets of chart paper placed around the room. Students should be encouraged to have silent discussions about these questions in writing—asking new questions of each other and responding in writing. Use the paper chat to assess your students' knowledge before you continue with the lesson.
 - a. What do you know about bees?
 - b. Why would a bee visit a flower?
 - c. What questions do you have about bees?
 - d. Are bees cool? Why or why not?
8. Show the **Amazing Time-Lapse: Bees Hatch Before Your Eyes** to ready the students to learn about bee anatomy.



READING

1. Distribute the text **Bee Bodies**.
2. Have students read the text through once, from start to finish.
3. Ask students to read the text again, highlighting or underlining words that are specific bee parts.
(The words are in bold in the text.)
4. Have students go through the text one more time, highlighting or underlining the specific function of each part.
5. Distribute one index card to each student (this will be their exit card, too) and have each student write the word for the bee body part they find the most interesting on one side. Tell the students to memorize the information about the body part they have chosen and give them a few minutes to reread and solidify their understanding.
6. Have students get up and mingle in the room, testing each others' knowledge by showing their cards and seeing if their fellow students know the corresponding functions.



ACTIVITY

1. Using the readings and images as a guide, have students draw an entire bee as accurately as possible, including all the parts. Be sure to give them plenty of space (blank sheets of paper) and time to draw carefully.



WRITING

1. Have the students label the parts on the bee they have drawn and write a one-sentence description of each part's function.
2. If time and interest allow, encourage the students to color and name their bees.



GAME

BEE MACHINE

Use this short, improv-style game to help students solidify their understanding of honey bee anatomy using kinesthetic representation. The object of the game is to represent a living bee, using students as its body parts.

1. Divide students into groups of 8-12.
2. Tell the students that each group is responsible for representing a complete bee using only their bodies. Every student should represent a specific part of the bee and the student who represents the head should be able to describe what everyone is doing.
3. Give the groups about 5 minutes to plan their bee representation.
4. Have the groups present their bees, one at a time, by getting into their formations and having the "head" explain their demonstration.
5. Take a photo of each group and project and analyze the accuracy of each representation.



ASSESSMENT

VERSION 1 Use the assessment **Which Bee Body Part?** and distribute one copy to each student. Have the students complete the right column: describing in writing and/or in drawings the specific anatomical structures that allow for each action.

VERSION 2 Ask students to make a list of at least 4 things that bees do and then exchange their lists. (This activity can be done individually, in pairs, or in small groups.) Have students describe, in writing and/or in drawings, the specific anatomical structures that allow for each action.

EXIT CARD

Have the students revisit the index card from the reading activity with their favorite part and finish this sentence starter on the back: "If the honey bee didn't have a _____ (part), it couldn't..." Have the students turn the cards in to you as they leave the room.

DIFFERENTIATION

SUPPORTS

- Provide multiple choice list of possibilities for mystery photo.
- Provide pre-highlighted **Bee Bodies** text.
- Read **Bee Bodies** text out loud or have students read in pairs/groups.
- Discuss and highlight key vocabulary in **Bee Bodies** prior to reading.
- Provide completed images of the bee and have students only label and describe the parts, or provide images with labels already attached and have students only describe or draw the parts, or provide images with descriptions done and have students only label the parts.

EXTENSIONS

- Find the famous *Photo of Bee Voiding Water* online and allow students to read about and discuss the famous photo.
- Play "What If..." with students regarding the parts of a bee (e.g., "What if a bee didn't have a pollen basket?") and let them think about far-reaching ramifications.

VIRGINIA STANDARDS OF LEARNING (SOL) SCIENCE

- 4.5: The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem.
- Organisms have structural adaptations or physical attributes that help them meet a life need.
 - Organisms also have behavioral adaptations, or certain types of activities they perform, which help them meet a life need.

READING

- 4.4: The student will expand vocabulary when reading.
- d) Develop vocabulary by listening to and reading a variety of texts.
- 4.6: The student will read and demonstrate comprehension of nonfiction texts.
- d) Identify the main idea
 - e) Summarize supporting details.
 - j) Identify new information gained from reading.

WRITING

- 4.7: The student will write cohesively for a variety of purposes.
- b) Focus on one aspect of a topic.

What the body part does

Name of body part and drawing

Allows the bee's wings to fly together

Hamuli

Collects nectar

Produces wax for the hive

Lets the bee smell

Senses movement

Creates the buzzing sound

Collects pollen

Stores nectar for the trip back to the hive

RESOURCE **BEE BODY**





If you were asked to draw a bee, what would you draw? You might draw an oval and a couple of antennae and then color the whole thing with black and yellow stripes. That would be a good general drawing, but you would be missing all the amazing details. Bees' bodies are complicated structures that allow them to do fascinating things.

Bees can fly. Bees can dance. Bees can scrape pollen off their bodies and into little baskets on their legs. All the parts of a bee's body help the bee do what it needs to do to live and work in the colony.

Bee bodies are made up of three main parts: the head, the thorax, and the abdomen. The **head** has a pair of compound eyes, simple eyes, antennae, mandibles, and a proboscis. The **thorax** has the bee's wings, all six legs, and muscles that help the bee fly. The **abdomen** has special glands that produce the wax bees use to form the hive and female bees have a stinger.

Every bee has special parts that allow them to live and work as part of the colony. Some structures are familiar. They have four **wings** for flight (at up to 15 miles per hour) and also fan the nectar to dehydrate it and transform it into honey. They have three **simple eyes** (or ocelli) that let the bees detect changes in light. They also have two **compound eyes** to detect color and movement. Bees' jaws are called **mandibles** and are used for chewing. And bees have two **antennae** used for gathering sensory information.

Other structures of the bee are a little more unusual. The **glossa** (or proboscis) is a long tongue that acts like a straw to suck up nectar from flowers. A **honey stomach** is a special organ that stores the nectar collected by the bee until it can be unloaded in the hive. The **pollen baskets** are structures on the hind legs that are used to hold the pollen from flowers. And, the wings of a bee are connected by **hamuli**, tiny hooks that hold the wings together so the bee can fly.

Each part of a bee serves a special purpose. From the tips of their antennae to the end of the stinger, bees are built to be a productive part of our ecosystem.

RESOURCE

POLLEN BASKETS

