Bumble Bee

Life Science | Lesson Guide

5th Grade

Photo Description

This image shows a bumblebee visiting a bright magenta flower with yellow stamens. You can see the bee's fuzzy yellow and black body, its dark wings, and pollen clinging to its legs. The bee is collecting nectar and pollen from the flower's center, which will help the plant make seeds.

Scientific Phenomena

Anchoring Phenomenon: Why do bees visit flowers, and what happens because of it?

When a bumblebee lands on a flower to drink nectar (a sweet liquid), pollen grains stick to the fuzzy hairs covering its body. As the bee flies to the next flower, some of that pollen rubs off onto the new flower's stigma (the female part). This process, called pollination, allows plants to reproduce and make seeds. The bee benefits by getting food (nectar and pollen), and the plant benefits by spreading its pollen—this is called a mutualistic relationship.

Core Science Concepts

* Pollination and Plant Reproduction: Plants depend on pollinators like bees to transfer pollen between flowers so they can produce seeds and fruit. Without pollinators, many plants cannot reproduce successfully.

* Flower Structure and Function: Flowers have specialized parts (stamens produce pollen, stigmas receive pollen) designed to attract pollinators. Bright colors, sweet nectar, and patterns guide insects to the pollen and nectar.

* Adaptation: Bumblebees have adapted features—fuzzy bodies, long tongues, and specialized legs with pollen baskets—that make them excellent pollinators. Flowers have adapted bright colors and sweet smells to attract bees.

* Food Chains and Ecosystems: Bees are part of food chains and ecosystems. Plants provide food for bees; bees pollinate plants so they produce seeds and fruit that feed many animals, including humans.

Pedagogical Tip:

Start this lesson by asking students to predict: "If all the bees disappeared, what would happen to the flowers and fruits we eat?" This activates prior knowledge and creates curiosity. Then reveal that about 1 out of every 3 bites of food we eat depends on pollinators. This real-world connection increases engagement and relevance.

UDL Suggestions:

Multiple Means of Representation: Provide a labeled diagram of a flower's parts alongside the photo. Some students benefit from seeing the structure labeled (stamen, stigma, pistil, petal). Use both visual images and verbal descriptions.

Multiple Means of Action & Expression: Allow students to demonstrate understanding through drawing, building a model flower from craft materials, or creating a diagram showing pollen transfer—not just writing or verbal responses.

Multiple Means of Engagement: Invite a local beekeeper or show a short video of bees pollinating to increase emotional connection and real-world relevance.

Zoom In / Zoom Out

Zoom In: Pollen Grain Structure
If we could shrink down and look at a single pollen grain under a microscope, we'd see it's a tiny, solid particle with a hard outer shell. Inside each pollen grain is the male cell that will help make seeds. When a pollen grain lands on a flower's stigma (the sticky female part), it grows a long tube down into the flower. The male cell travels through this tube to meet the female cell—this is how the flower makes a seed! This all happens in just hours, but it's invisible to our eyes.

Zoom Out: Global Food Systems and Ecosystems
When we zoom out and look at the big picture, pollinators like bumblebees are connected to our entire food system and world ecosystems. About one-third of the food humans eat—including apples, almonds, cucumbers, and chocolate—depends on animal pollinators. Bees also pollinate wild plants that feed birds, bears, and other animals. If pollinator populations decline (which is happening in many places due to habitat loss, pesticides, and climate change), entire food webs could collapse, affecting not just bees and flowers, but humans, wildlife, and farms all around the world. This shows how one small creature—a bumblebee—is connected to global ecosystems and human survival.

Discussion Questions

1. What do you think the bee is doing on the flower, and why does the flower need the bee? (Bloom's: Understand | DOK: 1-2)

2. Why do you think flowers are bright colors and smell sweet? How does this help both the flower and the bee? (Bloom's: Analyze | DOK: 2-3)

3. If bumblebees could not visit flowers, what would happen to the plant's ability to make seeds? Explain your thinking. (Bloom's: Evaluate | DOK: 3)

4. Look at the bee's fuzzy body and legs in the photo. How is the bee's body specially designed (adapted) to be a good pollinator? (Bloom's: Analyze | DOK: 2-3)

Potential Student Misconceptions

Misconception 1: "Bees go to flowers just to eat pollen."
Clarification: While bees do eat pollen for protein, they visit flowers mainly to drink nectar (the sweet liquid) for energy. Pollen sticks to their fuzzy bodies by accident as they collect nectar. Pollination happens as a side effect of the bee's search for food, not as the bee's main goal. Both the bee and the plant benefit from this interaction—it's a win-win!

Misconception 2: "All insects that visit flowers are bees, and all bees look the same."
Clarification: Many different insects pollinate flowers—butterflies, moths, beetles, and flies also do important pollination work. And there are many types of bees! Bumblebees (like the one in the photo) are fuzzy and round, but honeybees are smaller and more orange-gold, and some bees are metallic green or blue. Each type is adapted to different flowers. Also, not all insects that visit flowers are pollinators—some are just feeding on nectar without helping the flower reproduce.

Misconception 3: "Flowers are pretty and colorful just to look nice for humans."
Clarification: Flowers didn't evolve to be beautiful for people—they evolved to attract pollinators! The bright magenta color, yellow center, and sweet smell of the flower in this photo are all "advertisements" designed by nature to say "Come here, bee!" to insects. The flower's beauty is actually a tool for survival and reproduction, not decoration. This is a great example of how form follows function in nature.

Extension Activities

1. Create a Model Flower: Provide students with craft materials (pipe cleaners, tissue paper, beads, paint) to build a 3D flower model. Have them label the main parts (petals, stamens, stigma) and explain how a bee would interact with their model. This kinesthetic activity reinforces flower structure and function.

2. Pollinator Observation Walk: If weather permits, take students on a short outdoor walk to observe real flowers and pollinators (bees, butterflies, etc.). Have students sketch what they see, note the colors and types of flowers, and count how many different pollinators they observe. Back in the classroom, create a class chart of findings.

3. What Would Happen If...? Scenario Cards: Give small groups scenario cards (e.g., "All the bees disappear," "Flowers stopped making nectar," "Flowers turned gray instead of colorful"). Have each group discuss and predict consequences using evidence from the lesson. Groups can present findings and debate their predictions.

Cross-Curricular Ideas

Mathematics: Pollination Data Collection and Graphing
Have students conduct a "flower survey" in the schoolyard or a local park. They can tally how many different types of pollinators visit different types of flowers over 10-minute intervals. Students then create bar graphs or pictographs showing which flowers attracted the most visitors and which pollinators visited most often. This integrates data collection, counting, and graphing skills while reinforcing the science content.

English Language Arts: Persuasive Writing & Pollinator Advocacy
Ask students to write a persuasive letter to their principal or local community explaining why it's important to protect pollinators and plant native flowers on school grounds. They can use evidence from the lesson (e.g., "1 in 3 foods depends on pollinators") and emotional appeals ("Bees help us have healthy food"). This builds persuasive writing skills and gives students a sense of agency in environmental stewardship.

Social Studies: Human Dependence on Nature & Local Agriculture
Connect pollination to local and global food systems. Students can research what crops are grown in their state or region and determine which ones depend on pollinators (apples in Washington, almonds in California, blueberries in Maine, etc.). They could interview a local farmer or visit a farmer's market to learn how pollination affects what food is available and affordable. This connects ecology to economics, agriculture, and community.

Art: Nature-Inspired Design & Color Study
Students can create their own flower designs using bright colors and patterns inspired by real flowers, thinking about what patterns and colors would attract a bee. They could also create a mixed-media collage of flowers and pollinators using colored paper, paint, and natural materials like leaves or seeds. Display these alongside the original photo and discuss why the students chose certain colors and patterns—connecting artistic choice to scientific adaptation.

STEM Career Connection

Beekeeper / Apiarist
A beekeeper cares for honeybee colonies, manages beehives, and harvests honey and beeswax. They also help pollinate crops by placing their hives near farms. Beekeepers monitor bee health, prevent disease, and work to keep bee populations strong. Many beekeepers also teach people about the importance of bees. This job combines biology, ecology, and hands-on work with living things. Average salary: $50,000–$70,000 per year (many beekeepers also earn income from honey sales).

Pollinator Biologist / Conservation Scientist
A pollinator biologist studies how bees, butterflies, and other pollinators interact with plants and ecosystems. They research ways to protect pollinator populations, design habitat restoration projects, and teach farmers sustainable practices that help pollinators thrive. This job involves fieldwork, lab research, and problem-solving to protect nature. Average salary: $62,000–$85,000 per year.

Agricultural Scientist / Crop Specialist
An agricultural scientist studies how to grow healthy crops and works to understand relationships between plants, pollinators, and soil health. They help farmers use practices that support both crop production and pollinator populations. Some agricultural scientists work for universities, government agencies, or seed companies. Average salary: $68,000–$95,000 per year.

NGSS Connections

Performance Expectation: 5-LS1-1 – Support an argument that plants get the materials they need for growth chiefly from air and water.

Disciplinary Core Ideas:
- 5-LS1.A – Structures and Functions: Plants have different structures to accomplish growth, reproduction, and nutrient transport.
- 5-LS2.A – Interdependent Relationships in Ecosystems: Organisms interact with their environment and other organisms.

Crosscutting Concepts:
- Structure and Function – The fuzzy body structure of the bee functions to collect pollen; flower structures function to attract pollinators.
- Systems and System Models – Pollination is part of a larger plant reproduction system; it's also part of an ecosystem.

Science Vocabulary

* Pollination: The process of moving pollen from one flower to another, which allows plants to make seeds.

* Pollen: Tiny grains produced by flowers that contain the male cells needed to make seeds.

* Nectar: A sweet liquid made by flowers that bees drink for energy and food.

* Pollinator: An animal (like a bee, butterfly, or bird) that helps move pollen from flower to flower.

* Adaptation: A special body part or behavior that helps an animal or plant survive and do its job in nature.

* Stamen: The male part of a flower that produces pollen.

* Stigma: The female part of a flower that receives pollen.

External Resources

Children's Books:
- The Bee Tree by Patricia Polacco – A charming story about a girl learning the importance of bees and flowers from her grandfather.
- Bee and Me by Alison Jay – An illustrated exploration of bee anatomy, life cycles, and the bee-flower relationship.
- The Reason for a Flower by Ruth Heller – A beautifully illustrated rhyming book explaining why flowers exist (pollination and reproduction).

Teacher Note: This lesson naturally scaffolds into discussions about food security, ecosystem health, and human impact on pollinator populations—all age-appropriate extensions for engaged Fifth Grade students.