Katydid Camouflage

Life Science | Lesson Guide

4th Grade

Photo Description

This image shows a katydid, an insect that looks like a green leaf, resting on grass and plant stems. You can see how the katydid's green wings and body blend in perfectly with the green plants around it, making it very hard to spot. This is an excellent example of how some animals change their appearance to hide from predators.

Scientific Phenomena

Anchoring Phenomenon: Camouflage (or protective coloration)

The katydid in this image demonstrates camouflage—a survival adaptation where an organism's color, pattern, or shape matches its environment. Scientifically, this happens through natural selection over many generations. Katydids with green coloring were more likely to survive predation because predators couldn't see them easily among green plants. These katydids survived to reproduce and passed this green coloring trait to their offspring. Over time, the katydid population became predominantly green. This is not a conscious choice by the katydid; rather, it's an inherited physical trait that helps the species survive in grassy, leafy environments.

Core Science Concepts

* Adaptation: A trait that helps an organism survive and reproduce in its environment. The katydid's green color is an adaptation that helps it hide from predators.

* Camouflage/Protective Coloration: When an animal's color or pattern matches its surroundings so it can hide. The katydid looks like a green leaf, so predators have a harder time seeing it.

* Natural Selection: Over time, organisms with traits that help them survive are more likely to have offspring. Katydids that were green survived better and passed this trait to their babies.

* Predator-Prey Relationships: Predators hunt other animals (prey) for food. Camouflage helps prey animals escape being eaten.

Pedagogical Tip:

When teaching camouflage, avoid the misconception that animals "choose" to change color or intentionally hide. Fourth graders often anthropomorphize animals. Emphasize that camouflage is an inherited trait that develops over many generations through natural selection, not a conscious decision made by individual animals.

UDL Suggestions:

To support diverse learners:
- Representation: Show multiple photos of different animals with camouflage (stick insects, moths, deer) so students see patterns across examples, not just one case.
- Action/Expression: Allow students to demonstrate understanding through drawing, creating a camouflaged animal with craft materials, or playing a "spot the animal" game rather than only through written responses.
- Engagement: Connect to student interests by asking, "What animal would YOU hide from?" to make the predator-prey relationship personal and relevant.

Zoom In / Zoom Out

Zoom In: Cellular Level - Pigment Production
At a microscopic level, the katydid's green color comes from pigments (special colored chemicals) made inside its cells. These pigments absorb certain colors of light and reflect green light back to our eyes. The katydid's body cells produce these green pigments as the insect grows and develops—it's coded in the katydid's DNA (the instruction manual for building living things). Scientists can look at katydid cells under a microscope and see the pigment-producing structures. This is why all katydids in a green environment are born green: their genes tell their cells to make green pigment.

Zoom Out: Ecosystem Level - Food Web & Habitat Balance
When you zoom out, the katydid is one small part of a much larger ecosystem—a community of plants and animals living together and depending on each other. The katydid eats plants (leaves and grasses), birds and spiders eat katydids, and when katydids and their predators die, they return nutrients to the soil. Camouflage plays a big role in keeping this balance healthy. If all katydids were easily spotted and eaten, there would be fewer katydids, fewer predators would have food, and the ecosystem would be out of balance. The grass ecosystem shown in this photo depends on camouflage helping some prey animals survive so the food web stays stable.

Discussion Questions

1. Why do you think the katydid is green instead of red or blue? (Bloom's: Analyze | DOK: 2)
   This question asks students to connect the katydid's color to its environment.

2. If a katydid lived on brown tree bark instead of green grass, what might happen to katydids with green wings over many years? (Bloom's: Evaluate | DOK: 3)
   This pushes students to think about natural selection and adaptation over time.

3. What predators do you think hunt katydids, and how does camouflage help the katydid survive? (Bloom's: Comprehend/Apply | DOK: 2)
   This helps students understand predator-prey relationships.

4. Can you think of another animal that uses camouflage to hide? How is its hiding method similar to or different from the katydid's? (Bloom's: Analyze | DOK: 2)
   This allows for comparative thinking and transfers learning to other organisms.

Potential Student Misconceptions

Misconception 1: "The katydid turned green to match the grass."
Clarification: The katydid was born green because its parents were green. It didn't change color on purpose. Over thousands of years, katydids that were already green survived better and had babies. Katydids that were born a different color got eaten more easily. This is why katydids are green today—not because they decided to be.

Misconception 2: "Camouflage only works if the animal doesn't move."
Clarification: While staying still does help camouflage work better, the katydid's camouflage is mainly about its color and shape matching the plants. Even if a katydid moves a little, its green color still helps hide it. The shape of its wings (which look like leaves) is also important for camouflage.

Misconception 3: "All insects are easy to see."

Clarification: Many insects are actually very hard to see because they blend in with their surroundings. Camouflage is super common in nature. Grasshoppers, moths, stick insects, and caterpillars all use camouflage too. Some insects are brightly colored to warn predators they taste bad, but most insects use camouflage to survive.

Extension Activities

1. Camouflage Hunt Game: Hide paper cutouts of various colored insects (green, red, blue, yellow) on a bulletin board or poster board filled with green leaves, brown bark images, or other natural textures. Have students count how many of each color they can find in 30 seconds. Discuss why green insects were easiest/hardest to find. This demonstrates camouflage's effectiveness firsthand.

2. Design Your Own Camouflaged Animal: Give students a specific habitat (forest floor, snow, ocean sand, or desert) and ask them to draw and color an animal that would be camouflaged there. Have them explain in 2-3 sentences why their animal's colors and patterns would help it hide. This applies the concept creatively and develops predictive thinking.

3. Observational Nature Walk: Take students outside to observe insects and small animals in the school garden or nearby green space. Challenge them to find as many camouflaged creatures as possible (grasshoppers, crickets, moths on tree bark, caterpillars on leaves). Photograph or sketch findings and create a classroom display. This grounds the lesson in real-world observation and builds scientific observation skills.

Cross-Curricular Ideas

ELA Connection: Descriptive Writing
Have students write a "Hide and Seek" story from the perspective of either the katydid or a predator (like a bird) hunting for it. Students should use vivid descriptive language to explain what the katydid sees, feels, and hears in the grass, or how difficult it is for the predator to spot its prey. This builds vocabulary related to camouflage and perspective-taking while practicing narrative writing skills.

Math Connection: Camouflage Success Rate
Conduct a simple probability experiment: Hide green, red, blue, and yellow paper squares in a container of green craft grass or shredded paper. Have students predict how many of each color they can find in 20 seconds. Record data, create a bar graph showing which colors were easiest/hardest to find, and calculate the percentage of each color found. Discuss why the data supports what we know about camouflage.

Art Connection: Habitat Diorama
Students create a small diorama (a 3D scene in a shoebox) showing a katydid camouflaged in a grass or garden habitat. They can draw, paint, or use craft materials to create plants, insects, and predators. This allows creative expression while reinforcing the concept that camouflage works best in specific environments. Display dioramas and have students explain their color and design choices.

Social Studies Connection: Adaptation & Human Survival
Discuss how humans also use camouflage and adaptation concepts—soldiers wear camouflage uniforms, hunters wear brown and orange to blend in with forests, and arctic explorers wear white. Have students research or discuss why humans adapted their clothing to match different environments. This makes the concept personally relevant and shows that adaptation principles apply across the natural world and human society.

STEM Career Connection

Wildlife Biologist
Wildlife biologists study animals in nature to understand how they survive, what they eat, and how they interact with their environment. A wildlife biologist who studies insects might spend time in grass fields and forests observing katydids, counting them, and learning about camouflage and predator-prey relationships. They write reports and teach others what they discover. This job helps protect endangered animals and their habitats.
Average Salary: $65,000–$75,000 per year

Entomologist (Insect Scientist)
An entomologist is a scientist who studies insects—their bodies, behaviors, life cycles, and how they survive. An entomologist might examine a katydid under a microscope to study its eye structure, wing patterns, and the pigments that make it green. They help us understand insects better and can work to protect important insects or control pests that harm crops.
Average Salary: $60,000–$72,000 per year

Camouflage/Pattern Designer (Biomimicry Engineer)
Some engineers and designers study how animals hide in nature and use those ideas to create new products for humans. For example, they might study the katydid's leaf-like wings to design better camouflage fabric for military uniforms or to create patterns for clothing. This field is called biomimicry—copying nature's solutions to solve human problems.
Average Salary: $55,000–$80,000 per year (varies by industry)

NGSS Connections

Performance Expectation:
4-LS1-1: Construct an argument that plants get the materials they need for growth chiefly from air and water. (Note: While this specific PE focuses on plant growth, the camouflage concept is better aligned with the PE below.)

Better-Aligned Performance Expectation:
4-LS4-2: Make observations and write descriptions about the diversity of animal structures that contribute to different functions. (Structures like leaf-like wings contribute to camouflage function.)

Disciplinary Core Ideas:
- 4-LS4.A - Evidence of Common Ancestry and Diversity
- 4-LS4.C - Adaptation

Crosscutting Concepts:
- Structure and Function
- Patterns

Science Vocabulary

* Adaptation: A body part or behavior that helps an animal survive in its environment (the katydid's green color is an adaptation).

* Camouflage: When an animal's color or pattern looks like its surroundings so predators can't see it easily.

* Predator: An animal that hunts and eats other animals (a bird that eats katydids is a predator).

* Prey: An animal that is hunted and eaten by other animals (a katydid is prey for birds and spiders).

* Natural Selection: The process where organisms with helpful traits survive longer and have more babies, passing those traits to the next generation.

External Resources

Children's Books:
The Mixed-Up Chameleon* by Eric Carle (explores color change and adaptation in an engaging, illustrated format)
Who Hides Here?* by Wendy Pfeffer (focuses on animal camouflage across different habitats)
Hiding in Plain Sight: How Animals Disguise Themselves* by Celia Godkin (detailed picture book about various camouflage strategies)

Notes for the Teacher:
This lesson leverages the katydid image as a concrete, observable anchor for abstract concepts like adaptation and natural selection. Fourth graders are developing the ability to think about cause-and-effect relationships and to understand that traits help organisms survive. The discussion questions and activities scaffold from observation to explanation to application, building critical thinking skills in alignment with NGSS expectations.