

Photo Description



This image shows a brown, papery shell left behind on a tree trunk surrounded by lichen. The shell looks like a hollow bug case that has split open down the middle. Around it, you can see colorful green and gray lichen growing on the bark, which are special living things that grow on trees.

Scientific Phenomena

Anchoring Phenomenon: This is a cicada exoskeleton (or molt/shed skin)—the empty shell left behind when a cicada grows too big for its outer skin.

Why This Happens: Cicadas are insects that grow by shedding their hard outer skin several times during their life. When a cicada gets too large for its exoskeleton, it splits the shell open and crawls out, leaving behind the empty case. This process is called ecdysis or molting. The cicada grows new, larger skin underneath before crawling out. This is a form of incomplete metamorphosis and is part of the cicada's natural life cycle. Young cicadas spend years underground before emerging as adults, and this shell-shedding happens multiple times during their development.

Core Science Concepts

1. **Growth and Life Cycles:** Living things grow and change over time. Insects like cicadas grow by shedding their outer skin when it becomes too small.
2. **Structures and Functions:** The exoskeleton protects the soft body inside and gives the insect its shape. Once the insect outgrows it, a new skeleton forms underneath.
3. **Habitats and Ecosystems:** Trees provide homes and places for insects to go through their life changes. Lichen also grows on trees, showing multiple living things sharing the same space.
4. **Observable Evidence of Life:** Finding shed shells helps us see that insects are living in our environment, even if we don't always see the insects themselves.

Pedagogical Tip:

Kinesthetic Connection: Let students act out the molting process by having them crouch inside a "shell" (a hula hoop or circle on the floor) and then "grow" by slowly stepping out and standing tall. This embodied learning helps young learners understand the concept concretely before discussing the abstract idea.

UDL Suggestions:

Multiple Means of Engagement: Provide both real cicada shells (if available, sanitized) and high-quality images for students to observe. Some children learn best through tactile exploration, while others benefit from visual focus. Label key parts of the shell with simple words and corresponding pictures to support emerging readers and English language learners.

Zoom In / Zoom Out

Zoom In: Inside the Shell (Cellular Level)

Beneath the papery exoskeleton is a whole new skin growing! Underneath the old shell, the cicada's body is making a brand-new, larger exoskeleton cell by cell. The old shell is made of a special material called chitin (say: KY-tin) that is hard like plastic but lighter. As the new skin forms underneath, the cicada's body pumps fluid into itself to split the old shell open—like blowing up a balloon inside a tight box. Once the old shell cracks, the cicada wiggles out, and the new skin underneath hardens in the sun and air, ready to protect its bigger body.

Zoom Out: The Forest Ecosystem

This cicada shell is one tiny piece of a whole forest community! Trees like the one in this photo are homes for hundreds of creatures—cicadas, beetles, spiders, birds, and fungi. The lichen growing on the bark feeds on air and rain. When the cicada molts, it leaves behind a shell that small insects and decomposers (like fungi and bacteria) will break down, turning it back into soil that feeds the tree. The tree feeds the cicadas with sap. Birds eat the cicadas. Everything is connected! This one shed shell shows how a forest is a living system where every creature, big or small, has an important job.

Discussion Questions

1. What do you think happened to the bug that was inside this shell? (Bloom's: Remember | DOK: 1)
2. Why do you think the shell split open in the middle? (Bloom's: Analyze | DOK: 2)
3. If you could touch this shell, what do you think it would feel like, and why? (Bloom's: Infer | DOK: 2)
4. Can you find other evidence on this tree that shows bugs or animals live here? (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

Misconception 1: "The cicada died and that's its body."

Clarification: The shell is NOT the cicada's body—it's just the skin the cicada left behind, like when you shed dead skin cells every day (but cicadas shed it all at once in one big piece!). The cicada is alive and healthy inside a new, bigger skin underneath. It crawled right out and walked away!

Misconception 2: "All bugs grow the same way by shedding their skin."

Clarification: Different insects grow in different ways. Cicadas molt many times and stay mostly the same shape as they grow bigger. But caterpillars change completely into butterflies—a totally different look! Some insects don't molt at all. There are many ways to grow.

Misconception 3: "The cicada needs help to get out of its shell."

Clarification: The cicada is very strong and can crack its own shell open! It knows exactly what to do because it's part of its life cycle. No one has to help it—it's natural and instinctive, like how baby birds peck their way out of eggs.

Extension Activities

1. Cicada Shell Hunt: Take students on a nature walk around the school grounds or playground in late spring/summer to search for cicada shells on trees, fences, or structures. Create a classroom display of found shells (sanitized) with labels and student drawings. This builds observation skills and gets students moving outdoors.

2. Growth and Shedding Role-Play: Provide each student with a large paper bag to decorate as their "exoskeleton." Have them practice stepping out of the bag while you read a simple cicada story aloud. Follow up with a group discussion about why cicadas need to molt and how they feel when they grow.

3. Comparing Life Changes: Create a simple picture chart showing different ways animals grow and change (caterpillar to butterfly, tadpole to frog, baby to child, cicada shedding skin). Have students sort and match pictures, helping them understand that all living things grow in different ways.

Cross-Curricular Ideas

Math Connection: Counting and Patterns

Create a simple counting activity by drawing circles on a paper to represent the cicada's life stages. Students count: egg !' nymph (stage 1) !' nymph (stage 2) !' nymph (stage 3) !' adult !' molt. How many times does a cicada shed? Use fingers to show "5 molts" or "6 molts." Extend by graphing how many cicada shells students find on a nature walk.

ELA Connection: Storytelling and Sequencing

Have students create a "story" of the cicada's journey using pictures and simple words. Sequence the events: "First, the cicada is small and underground. Next, it climbs up the tree. Then, it splits its shell. Finally, it flies away as a grown-up!" Create a simple book with four pictures, one for each stage. Students can dictate or write captions using sight words.

Art Connection: Natural Collage and Texture

Provide students with sanitized cicada shells (or images), tree bark rubbings, leaves, and lichen samples. Have them create a mixed-media collage showing "where the cicada lives." This tactile art project helps students feel the textures they observe in nature and understand habitat in a creative way.

Social Studies Connection: Cycles and Responsibility

Connect molting to human growth and change: "We grow too! We get taller and need bigger clothes, just like the cicada needs a bigger shell." Discuss how we take care of ourselves as we grow (eat healthy food, sleep, exercise). Then discuss caring for nature: "If we want to see cicadas and other bugs, we need to take care of trees and forests." This builds environmental citizenship for young learners.

STEM Career Connection

Entomologist (Bug Scientist)

An entomologist studies insects like cicadas! They observe bugs in nature, learn about their life cycles, and figure out how insects help or harm our world. Some entomologists help protect crops or discover medicines from insects. They use magnifying glasses, cameras, and notebooks to watch bugs carefully—just like you do when you explore nature!

Average Salary: \$68,000/year

Forest Ecologist

A forest ecologist is a scientist who studies how all the living things in a forest—trees, bugs, birds, fungi, and lichen—work together. They care for forests and help them stay healthy so insects like cicadas have good homes. They hike through forests, take measurements, and help protect nature.

Average Salary: \$72,000/year

Naturalist / Nature Guide

A naturalist is someone who teaches people about animals, plants, and nature by taking them on walks and showing them interesting things like cicada shells, lichen, and animal homes. They help kids and grown-ups understand and love nature. Some work in parks, zoos, or nature centers!

Average Salary: \$45,000–\$55,000/year

NGSS Connections

Performance Expectation: K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

Disciplinary Core Ideas:

- K-LS1.B Growth and Development of Organisms
- K-LS1.D Information Needed to Determine if Something Is Alive

Crosscutting Concepts:

- Patterns (Life cycles follow patterns; molting happens in cycles)
- Structure and Function (The exoskeleton's structure protects and shapes the insect)

Science Vocabulary

- * Exoskeleton: A hard outer shell that protects an insect's body on the outside, like a suit of armor.
- * Molt (or Shed): When an animal gets too big for its skin and leaves it behind to grow a new, bigger one.
- * Life Cycle: All the stages a living thing goes through from birth to becoming an adult and having babies.
- * Lichen: A living thing that grows on rocks and trees and looks fuzzy or crusty; it is made of two organisms working together.
- * Insect: A small animal with six legs, a body in three parts, and usually wings.

External Resources

Children's Books:

- The Very Hungry Caterpillar by Eric Carle (introduces life cycles and growth)
- Bugs by Gail Gibbons (informational text about insects, including cicadas)
- From Caterpillar to Butterfly by Deborah Heiligman (simple life cycle narrative)