Cicada Shell

Life Science | Lesson Guide

3rd Grade

Photo Description

This image shows a cicada's shed exoskeleton (outer skin) clinging to tree bark surrounded by lichen. The brown, paper-like shell is hollow and includes the insect's former head, legs, and body covering. The cicada has already left this shell behind and moved on to live as an adult insect in the tree.

Scientific Phenomena

Anchoring Phenomenon: A cicada shedding its exoskeleton during metamorphosis

Why This Happens (Scientific Explanation):
Cicadas spend years underground as nymphs (young insects), where they grow larger but stay inside their hard outer skin. Once the nymph is ready to become an adult, it crawls up a tree and molts—splitting its old skin and wiggling out. This process is called ecdysis. The insect leaves behind the hollow shell (called an exuviae) and emerges with a soft, new skin underneath that hardens and darkens. This is a form of incomplete metamorphosis, where the insect gradually transforms from nymph to adult without a dramatic pupal stage like butterflies experience.

Core Science Concepts

1. Life Cycles & Growth: Insects like cicadas go through distinct stages of life. Unlike humans, they must shed their skin to grow because their outer skeleton (exoskeleton) doesn't stretch.

2. Metamorphosis: Cicadas undergo incomplete metamorphosis, changing from a smaller, underground-dwelling nymph into a larger adult with wings and the ability to sing and reproduce.

3. Structural Adaptations: The hard exoskeleton protects the insect's body, but eventually it becomes too small, requiring the insect to shed it and grow a new one.

4. Ecosystem Interactions: The shed shell remains on the tree as evidence of an insect's development and becomes part of the forest ecosystem where it may be used by small creatures or decomposed by microorganisms.

Pedagogical Tip:

When teaching this concept, consider bringing a live cicada shell (exuviae) to class in a sealed container so students can observe the detailed structure with magnifying glasses. This tangible experience is far more memorable than pictures alone. Have students sketch what they observe, labeling the head, legs, and body segments. This builds observational drawing skills while deepening understanding of insect anatomy.

UDL Suggestions:

Multiple Means of Representation: Provide the lesson in visual (images like this), kinesthetic (students act out molting), and verbal (teacher explanation) formats. Use a life cycle diagram with arrows showing the progression from egg !' nymph (underground years) !' nymph climbing tree !' molting !' adult.

Multiple Means of Engagement: Allow students to choose how they demonstrate learning—drawing the life cycle, building a model with craft materials, or recording a short video explanation. This honors diverse learning preferences and interests.

Multiple Means of Expression: Offer sentence frames for written responses (e.g., "The cicada shed its skin because ____.") and allow verbal responses for students who struggle with writing.

Discussion Questions

1. Why do you think the cicada had to leave its old skin behind? What would happen if it tried to stay in the same shell? (Bloom's: Understand | DOK: 2)

2. Compare the cicada's life cycle to your own growth. How are they the same? How are they different? (Bloom's: Analyze | DOK: 2)

3. What do you think happens to this empty shell after the cicada leaves? Where does it go? (Bloom's: Evaluate | DOK: 3)

4. If you found ten of these shells on different trees during the summer, what could you infer about how many cicadas live in that area? (Bloom's: Analyze | DOK: 3)

Extension Activities

1. Cicada Life Cycle Model: Provide students with clay, craft supplies, or a paper-folding template to create a 4-stage life cycle model (egg, nymph in soil, nymph on tree, adult). Students can photograph or draw each stage and arrange them in order, then present to a partner.

2. Molting Simulation: Have students create a "body outline" on craft paper and cover it with tape (exoskeleton). Challenge them to carefully remove the tape without tearing it, representing the molting process. Discuss why it needs to be gentle and what happens to the insect's skin during this time.

3. Shed Shell Investigation: If available, take students on a short nature walk around the school to search for cicada shells on trees, logs, or buildings. Collect shells carefully and observe them with magnifying glasses, recording observations in a science journal. Create a class chart showing where shells were found and why cicadas might choose those locations.

NGSS Connections

Performance Expectation:
3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all animals have in common birth, growth, reproduction, and death.

Disciplinary Core Ideas:
- 3-LS1.B: Growth and Development of Organisms
- 3-LS2.A: Interdependent Relationships in Ecosystems (shed shells as part of ecosystem)

Crosscutting Concepts:
- Patterns: Life cycles follow recognizable patterns across different animal species
- Structure and Function: The exoskeleton's structure allows it to protect but must be shed to allow growth

Science Vocabulary

* Exoskeleton: A hard, protective outer covering that insects wear on the outside of their bodies instead of bones inside like humans have.

* Molt (or Molting): When an animal sheds or gets rid of its old outer skin or shell so it can grow bigger.

* Nymph: A young insect that looks a little like the adult but is smaller and sometimes lives in a different place (like underground for cicadas).

* Metamorphosis: A big change in how an animal looks and where it lives as it grows from baby to adult.

* Exuviae: The name for the empty shell or skin that an insect leaves behind after it molts (you can say "exu-VY-ee").

* Lichen: Tiny living things that grow on rocks and tree bark; they look fuzzy or crusty and often have green, gray, or orange colors.

External Resources

Children's Books:
- Cicadas by Jody Jensen Shaffer (Learn About Animals series)
- The Cicada: Insect Born in the Sun by Gianna Marino (informational picture book)
- Life Cycles by Darlene R. Stille (Rookie Read-About Science series)

YouTube Videos:
- "Cicada Molting Time Lapse" — A 3-minute video showing an actual cicada emerging from its exoskeleton; visually compelling for young learners. https://www.youtube.com/results?search_query=cicada+molting+timelapse

- "Life Cycle of a Cicada" by National Geographic Kids — Clear, age-appropriate explanation of the complete cicada life cycle with colorful animations (approximately 4 minutes). https://www.youtube.com/watch?v=BPZvzH8sJG0

Teacher Note: This phenomenon is excellent for spring or early summer outdoor observation. Pair this lesson with actual cicada listening if your region has cicadas—the connection between the visual evidence (shed skin) and the auditory experience (cicada songs) creates a multi-sensory learning moment that Third Graders find deeply engaging.