Life Cyle

Life Science | Lesson Guide

5th Grade

Photo Description

This image shows eggshell halves on soil with green plant seedlings growing nearby. The broken eggshells are beginning to decompose and return nutrients to the soil, while fresh green stems and leaves of young plants are visible growing in the same garden bed. This captures a moment where one organism's remains are becoming food and resources for new life.

Scientific Phenomena

Anchoring Phenomenon: Recycling of matter in ecosystems—specifically, how dead or discarded materials (eggshells) decompose and return essential nutrients to soil, which plants then use to grow.

Why This Happens (Scientific Explanation): Eggshells are made primarily of calcium carbonate. When exposed to soil, water, and microorganisms (bacteria and fungi), they break down into smaller pieces over time. As eggshells decompose, they release calcium and other minerals back into the soil. Plant roots absorb these nutrients through the soil, using them to build new cells, strengthen stems, and grow leaves. This demonstrates the cycling of matter—nothing is truly "wasted" in nature; materials are continuously recycled from one form to another, supporting new life.

Core Science Concepts

1. Decomposition & Nutrient Cycling: Dead or discarded organic materials break down over time and release nutrients back into the soil where living plants can use them.

2. Plant Growth & Resource Needs: Plants need water, sunlight, and nutrients (including minerals like calcium from soil) to grow. Decomposing eggshells provide these mineral nutrients.

3. Ecosystems & Energy Flow: Living things in an ecosystem depend on each other and on nonliving things (soil, water, air). Materials move between living and nonliving parts in cycles.

4. Weathering & Physical Breakdown: Eggshells break into smaller pieces through physical forces (rain, temperature changes, soil movement) and chemical breakdown by acidic soil and decomposer organisms.

Pedagogical Tip:

Encourage students to observe decomposition over time by creating a classroom "eggshell garden" where they can measure plant growth weekly while eggshells visibly break down. This transforms an abstract concept into a concrete, observable process that students can track and sketch in science journals. Having students predict what they'll see builds scientific reasoning.

UDL Suggestions:

Multiple Means of Representation: Provide labeled diagrams showing the decomposition process step-by-step, and use time-lapse videos (see resources below) so students with different learning preferences can understand the cycle. Multiple Means of Engagement: Allow students to choose whether they want to observe a classroom garden, draw life cycle diagrams, or build a 3D model showing how eggshells become nutrients. Multiple Means of Expression: Let students demonstrate understanding through sketches, written explanations, or by creating a comic strip showing the "life" of an eggshell from kitchen to garden.

Discussion Questions

1. What do you think happens to the eggshell over the next few months? (Bloom's: Predict | DOK: 2)

2. Why might a gardener intentionally add crushed eggshells to their soil instead of throwing them away? (Bloom's: Analyze | DOK: 3)

3. If eggshells provide nutrients to plants, where do you think the eggshell's nutrients came from originally? (Bloom's: Evaluate | DOK: 3)

4. How is the eggshell in this photo part of both a "life cycle" and a "nutrient cycle"? (Bloom's: Synthesize | DOK: 4)

Extension Activities

1. Eggshell Garden Experiment: Have students plant fast-growing seeds (like bean or pea seeds) in soil with crushed eggshell pieces and in soil without eggshells. Over 4-6 weeks, students measure plant height, count leaves, and observe soil changes. They record observations in a science journal and create a graph comparing growth in both conditions. This directly shows the impact of nutrient cycling.

2. Decomposition Timeline Poster: Students create a visual timeline showing what happens to an eggshell from the moment it breaks in the kitchen to when it fully decomposes (over several weeks or months). They can draw, collage with real eggshell pieces, or use photographs from your classroom garden. Label each stage with what organisms and processes are at work.

3. Design a "Waste Cycle" Game: Students work in pairs to create a simple board game or card game that shows how everyday "waste" items (eggshells, leaves, food scraps, paper) can cycle through an ecosystem. Include spaces that show decomposition, nutrient absorption, and plant growth. This helps reinforce the concept that "waste" is part of natural cycles.

NGSS Connections

Performance Expectation: 5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Disciplinary Core Ideas:
- 5-LS1.C - Organization for matter and energy flow in organisms
- 5-LS2.B - Cycle of matter and energy transfer in ecosystems

Crosscutting Concepts:
- Patterns - Patterns of nutrient cycling repeat in ecosystems
- Systems and System Models - An ecosystem is a system where matter cycles between living and nonliving parts
- Energy and Matter - Matter is conserved; it cycles through different forms and locations

Science Vocabulary

* Decompose: To break down into smaller pieces; when dead things rot and return to the soil.

* Nutrient: A substance that living things need to grow and stay healthy, such as calcium, nitrogen, or phosphorus found in soil.

* Ecosystem: A community of living things (like plants and animals) and nonliving things (like soil and water) that interact with each other.

* Organic Material: Things that come from living organisms or were once alive, like eggshells, leaves, and food scraps.

* Decomposer: A tiny living thing (like bacteria or fungi) that breaks down dead material and returns nutrients to soil.

* Matter: Anything that has weight and takes up space; it can change form but is never destroyed in nature.

External Resources

Children's Books:
- Compost Stew: An A to Z Recipe for the Earth by Mary McKenna Siddals (teaches decomposition and recycling in an engaging, rhythmic way)
- The Worm Family by Tony Johnston (explores how worms and decomposers help soil)
- Seed, Soil, Sun: Earth's Recipe for Food by Cora Lee (connects soil nutrients to plant growth)

YouTube Videos:
- "Decomposition Process - How Dead Things Return to Soil" by Crash Course Kids — A clear, 5-minute animation explaining how organic matter breaks down and cycles through ecosystems. https://www.youtube.com/watch?v=8K-LqWcBLYw

- "What Are Decomposers?" by National Geographic Kids — A 3-minute video showing bacteria, fungi, and decomposers at work, with engaging visuals of real organisms breaking down materials. https://www.youtube.com/watch?v=O3l9WjS8dkU

Teacher Notes: This lesson bridges the abstract concept of nutrient cycling with concrete, observable phenomena. By using eggshells—a familiar household material—you make ecology personally relevant to students and show them that science happens everywhere, even in the kitchen garden.