Fossil in Sedimentary Rock

Earth & Space Science | Lesson Guide

2nd Grade

Photo Description

This picture shows a fossil of a shell that lived in the ocean long, long ago. The shell has lines that spread out like a fan. The shell is now part of rock because it got buried and turned to stone over millions of years.

Scientific Phenomena

The anchoring phenomenon here is fossilization - the process by which living organisms become preserved in rock over vast periods of time. This occurs when organisms (in this case, a brachiopod or scallop shell) are rapidly buried by sediment, preventing decay. Over millions of years, minerals replace the organic material or create impressions, preserving the shape and structure of the original organism. This fossil provides direct evidence of ancient life forms and demonstrates how Earth's environments have changed over geological time.

Core Science Concepts

1. Fossils as Evidence of Past Life: Fossils are remains or traces of plants and animals that lived long ago, preserved in rock layers.

2. Deep Time: The Earth is very old (billions of years), and life has existed for a very long time before humans appeared.

3. Environmental Change: The presence of marine fossils in areas that are now dry land shows that environments change over time.

4. Preservation Process: Under special conditions, parts of living things can be preserved and become fossils through natural processes.

Pedagogical Tip:

Use concrete time analogies that second graders can understand, such as "If your whole life was one day, this fossil would be from many, many years of days ago - more days than you could ever count!"

UDL Suggestions:

Provide multiple ways for students to engage with fossils: tactile exploration with replica fossils, visual comparison charts showing living animals and their fossil counterparts, and kinesthetic activities like acting out the fossilization process.

Zoom In / Zoom Out

Zoom In: At the microscopic level, minerals slowly replace the original shell material molecule by molecule, or sediments fill in the spaces to create a detailed impression. This process happens so slowly that the shell's intricate details, like the radiating ribs, are perfectly preserved.

Zoom Out: This fossil is part of Earth's rock layers that tell the story of our planet's history. The rock layer containing this fossil represents an ancient sea floor, and when combined with fossils from other layers, scientists can understand how life and environments have changed across Earth's 4.6 billion year history.

Discussion Questions

1. What do you think this animal looked like when it was alive in the ocean? (Bloom's: Create | DOK: 3)

2. How is this fossil shell the same as or different from shells you might find at the beach today? (Bloom's: Analyze | DOK: 2)

3. What do you think had to happen for this shell to become a fossil? (Bloom's: Understand | DOK: 2)

4. If we found many of these fossils in the same rock layer, what might that tell us about this place long ago? (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

1. Misconception: Fossils are just old rocks that look like animals.
   Clarification: Fossils are actual remains or impressions of real animals and plants that lived long ago and were preserved in special ways.

2. Misconception: All dead animals become fossils.
   Clarification: Fossilization is very rare and only happens under special conditions when organisms are quickly buried and protected from decay.

3. Misconception: Fossils are from animals that lived when their grandparents were young.
   Clarification: Most fossils are millions of years old - much, much older than any human has ever lived.

NGSS Connections

Performance Expectation: 2-ESS1-1 - Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Disciplinary Core Ideas:
- 2-ESS1.C - Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

Crosscutting Concepts:
- Patterns - Patterns in the natural world can be observed and used as evidence.

Science Vocabulary

* Fossil: The remains or traces of a plant or animal that lived long ago and is now preserved in rock.
* Ancient: Something that is very, very old from long, long ago.
* Preserve: To keep something safe and unchanged for a very long time.
* Sediment: Small pieces of rock, sand, and dirt that settle in layers.
* Marine: Having to do with the ocean or sea.

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External Resources

Children's Books:
- Fossils Tell of Long Ago by Aliki
- Digging Up Dinosaurs by Aliki
- National Geographic Readers: Fossils by Kathleen Weidner Zoehfeld

YouTube Videos:
- "What is a Fossil? | Natural History Museum" - Simple explanation of fossils with real examples and animations suitable for young learners (https://www.youtube.com/watch?v=1QKF5wKhKWM)
- "Fossils for Kids | Learn about the different types of fossils" - Educational video covering different fossil types with clear visuals and kid-friendly explanations (https://www.youtube.com/watch?v=qOJ_A5tgBKM)

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