

## 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.

### Cross-Curricular Ideas

1. Math - Patterns & Symmetry: Have students observe the radiating lines on the fossil shell and create their own fan or shell patterns using paper, markers, and rulers. Count the number of lines or ridges and compare different fossils. This connects to 2.G.A.1 (recognizing and drawing shapes with attributes).
2. ELA - Storytelling & Writing: Students can write or dictate a short story about "A Day in the Life of a Shell" - imagining what the animal experienced in the ancient ocean before it became a fossil. This builds narrative writing skills and helps students engage emotionally with the science content.
3. Art - Fossil Rubbings & Impressions: Create fossil replicas using clay, playdough, or salt dough. Students can press objects into the material to make impressions, mirroring the natural fossilization process. Display these creations alongside photos of real fossils for comparison.
4. Social Studies - Local Geology & Community: Invite students to explore what fossils (if any) have been found in your local area. Connect this to understanding how their own community's landscape has changed over time, building awareness of place and Earth's history.

### STEM Career Connection

1. Paleontologist - A paleontologist is a scientist who studies fossils and learns about animals and plants that lived a very long time ago. They dig carefully in rocks to find fossils, clean them, and study them to understand what life was like long ago. Average Annual Salary: \$65,000 - \$75,000 USD
2. Geologist - A geologist is a scientist who studies rocks and Earth. They learn how rocks form, why fossils are found in certain places, and how Earth has changed over millions of years. Geologists help us understand the layers of rock beneath our feet. Average Annual Salary: \$70,000 - \$85,000 USD
3. Museum Educator or Exhibit Designer - These professionals work at natural history museums and science centers to help visitors (like you!) learn about fossils and Earth's history. They create fun, hands-on displays and teach people of all ages about paleontology and geology. Average Annual Salary: \$45,000 - \$60,000 USD

### 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.

### 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