

Photo Description



This rock shows the shape of an old sea animal called a shell. The white pattern on the brown rock looks like a fan with many lines. This is called a fossil, which is what's left when very old plants or animals get stuck in rock for a very long time.

Scientific Phenomena

The anchoring phenomenon here is fossilization - the process by which ancient organisms become preserved in rock over millions of years. This particular fossil appears to be a brachiopod or similar marine organism that lived in ancient seas. When the organism died, it was quickly buried by sediment (sand, mud, or silt). Over vast periods of time, the sediment hardened into rock while the organism's hard parts were replaced by minerals or left impressions, creating the fossil we see today. This process requires specific conditions: rapid burial, lack of oxygen, and the presence of hard parts that can be preserved.

Core Science Concepts

1. Fossils as Evidence of Past Life: Fossils are remains or traces of organisms that lived long ago, providing direct evidence that different types of life existed in Earth's past.
2. Rock Formation and Geological Time: Sedimentary rocks form in layers over very long periods, and fossils found within these rocks help us understand when different organisms lived.
3. Environmental Change Over Time: Marine fossils found on land indicate that areas that are now dry land were once covered by ancient seas.
4. Preservation Conditions: Only certain organisms in specific environments become fossils, which is why the fossil record represents just a small fraction of all life that ever existed.

Pedagogical Tip:

Use concrete analogies when teaching about geological time. Compare a million years to stacking pennies - one million pennies would make a stack about 5,000 feet tall! This helps students grasp the immense time scales involved in fossil formation.

UDL Suggestions:

Provide multiple ways for students to engage with fossils: actual fossil specimens to touch, fossil rubbing activities with crayons and paper, and digital microscope views projected on screens. This supports learners who benefit from tactile, visual, and kinesthetic experiences.

Zoom In / Zoom Out

Zoom In: At the microscopic level, fossilization involves the replacement of organic molecules in shells and bones with minerals like silica, calcite, or pyrite. Water carrying dissolved minerals seeps through rock layers and gradually replaces the original material atom by atom, preserving the structure while changing the composition.

Zoom Out: This fossil is part of the larger rock cycle and Earth's geological history. The sedimentary rock containing this fossil was formed in an ancient marine environment, then uplifted through tectonic processes to become part of dry land. It connects to global systems including plate tectonics, climate change over geological time, and the evolution of life on Earth.

Discussion Questions

1. What do you think this animal needed to live when it was alive millions of years ago? (Bloom's: Analyze | DOK: 2)
2. How is this fossil different from animals we see in the ocean today? (Bloom's: Compare | DOK: 2)
3. What might have happened to the environment where this fossil was found between when the animal was alive and now? (Bloom's: Evaluate | DOK: 3)
4. If you found this fossil, what questions would you want to ask a scientist about it? (Bloom's: Create | DOK: 2)

Potential Student Misconceptions

1. "Fossils are made of the same stuff as the original animal" - Students may think fossils are actual bones or shells, when they're usually rock that formed in the shape of the original organism.
2. "All dead animals become fossils" - Students might believe fossilization is common, when it actually requires very specific conditions and is quite rare.
3. "Fossils are only a few hundred or thousand years old" - Young students often struggle with geological time scales and may not understand that most fossils are millions of years old.

Cross-Curricular Ideas

1. **Math - Measuring and Comparing:** Have students measure the fossil with rulers and compare its size to other classroom objects. They can create a simple bar graph showing "How many paperclips long is the fossil?" This connects to measurement and data representation standards.
2. **ELA - Fossil Story Writing:** Students can write or dictate a short story imagining what life was like for this sea animal millions of years ago. "What did you eat? Where did you live? What other animals did you see?" This connects narrative writing to science content and helps students use their imagination while learning.
3. **Art - Fossil Rubbings and Impressions:** Students can create fossil rubbings using crayons and paper placed over the fossil, or make their own "fossils" by pressing shells or leaves into clay. This hands-on art activity reinforces the concept of how fossils form through impressions left in sediment.
4. **Social Studies - Then and Now:** Compare maps showing where oceans were millions of years ago versus where they are today. Discuss how the land where students live might have been different long ago, connecting to community geography and environmental change over time.

STEM Career Connection

1. Paleontologist - A scientist who studies fossils and learns about animals and plants that lived millions of years ago. Paleontologists carefully dig up fossils, clean them, and try to figure out what the animals looked like and how they lived. They work in museums, universities, and dig sites around the world. Average Annual Salary: \$65,000 - \$75,000 USD
2. Geologist - A scientist who studies rocks and the Earth. Geologists examine rocks like the one in this photo to understand how they formed, what they're made of, and what fossils they contain. They help us learn about Earth's history and find valuable resources. Average Annual Salary: \$70,000 - \$85,000 USD
3. Museum Educator or Exhibit Designer - A professional who helps people (like your class!) learn about fossils and science by creating displays, leading tours, and planning activities in museums. They bring fossils to life by telling the stories of ancient animals and making science exciting for visitors of all ages. 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 - The History of Planet Earth

Crosscutting Concepts:

- Patterns
- Scale, Proportion, and Quantity

Science Vocabulary

- * Fossil: The remains or traces of plants and animals that lived long ago and are now preserved in rock.
- * Sediment: Small pieces of rock, sand, and mud that settle in layers.
- * Ancient: Something that is very, very old, from long before people lived on Earth.
- * Marine: Having to do with the ocean or sea.
- * Preserved: Kept safe and protected so it doesn't break down or disappear.
- * Evidence: Proof or clues that help us understand what happened.

External Resources

Children's Books:

- Fossils Tell of Long Ago by Alikei
- Dinosaur Bones by Bob Barner
- National Geographic Readers: Fossils by Laura Marsh