



Smithsonian

How to Become a Fossil



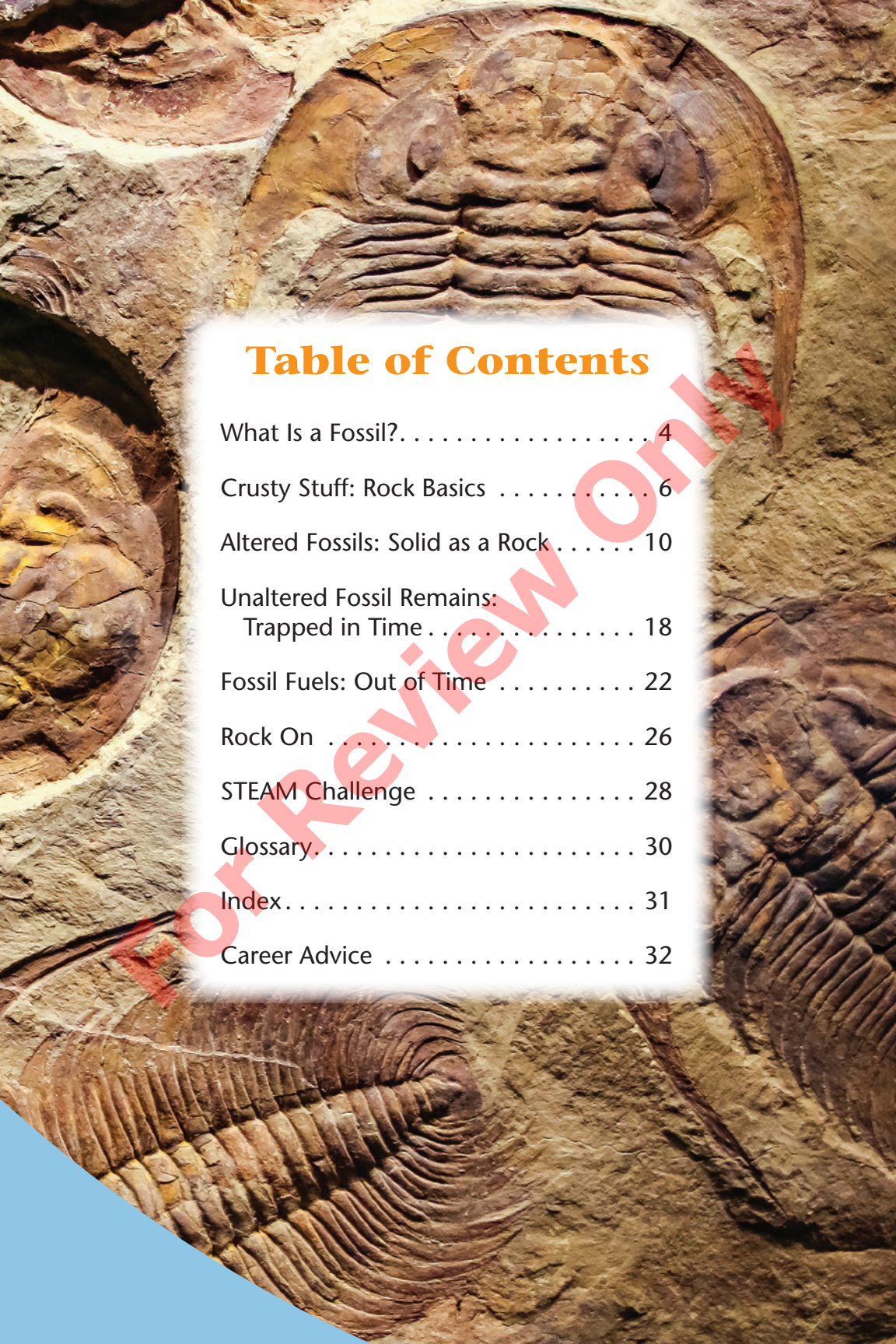


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What Is a Fossil?

A fossil is the preserved remains of a **prehistoric** creature or plant that is at least 10,000 years old. These remains have been partly or totally replaced by minerals. Preserved traces of prehistoric creatures, such as footprints, are also fossils. Fossils have been found all over the world. Some fossils are put on display in museums, giving us a glimpse into the past.

Scientists use the word **fossilization** to describe how fossils form. There are many fossilization processes. They require certain conditions and create different types of fossils. For example, one type of fossilization creates leaves printed on rocks. Another creates preserved animal teeth or bones.

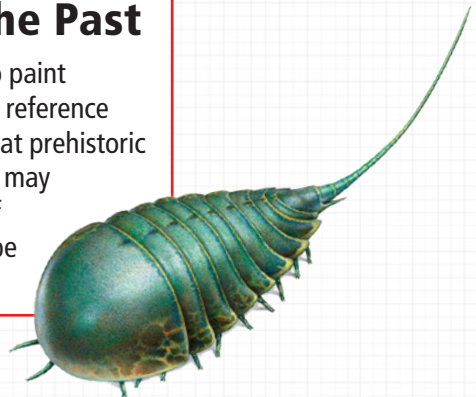


**fossilized
megalodon
teeth**



Drawing from the Past

Some artists use their skills to paint pictures of Earth's past. They reference fossils to create images of what prehistoric animals and their ecosystems may have looked like. This type of art is called *paleoart*. It can be shown in 2D or 3D forms.



Some fossils are a hidden part of everyday life. Have you ever taken a bus? What about cooked on a gas stove? Fossil fuels, such as coal, oil, and natural gas, make those activities possible. However, they are a limited resource. **Extracting** them has a huge environmental impact.

People study fossils to learn about the past. Fossils tell us what kinds of animals and plants lived on Earth long ago. Also, fossils offer clues about Earth's geological cycles and climate changes.

Want to see how a fossil is made? All it takes is **organic** remains, the right set of geological conditions, and at least 10,000 years. But no need to wait—Earth already has a variety of fossils to explore!

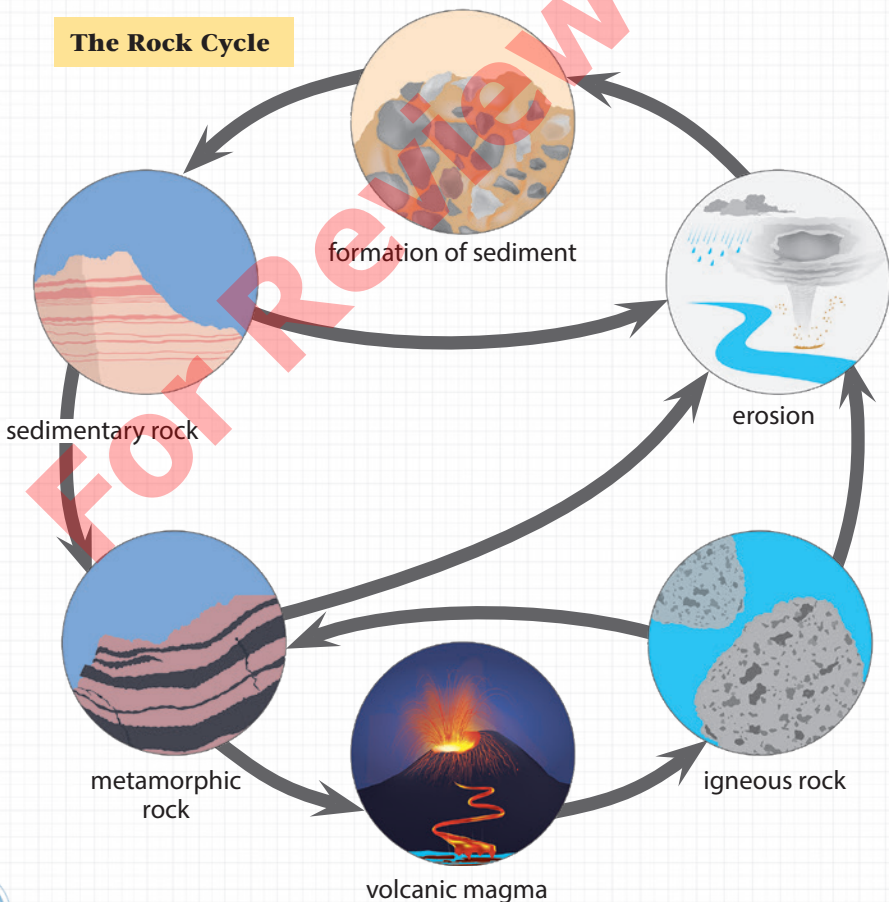


fossilized dinosaur skeleton

Crusty Stuff: Rock Basics

Before learning about how fossils are made, it helps to know about Earth's outermost layer—the crust. Some of the same processes that help make fossils also help shape Earth's crust.

Earth's crust is made of rocks, and rocks are made of minerals. But this doesn't mean the crust never changes. In fact, Earth's crust is constantly recycling its materials. This recycling process is known as the rock cycle. Earth's crust has three types of rocks: igneous, sedimentary, and metamorphic. They're all part of the rock cycle.



Igneous rocks form when magma, the liquid rock under Earth's surface, cools and hardens. Igneous rocks can form in Earth's crust or at volcanoes on the surface.



Basalt is a type of igneous rock.

Sedimentary rocks are made of **sediment**. Sediment is Earth's greatest mash-up. It's made up of rocks, soil, minerals, organic matter, and other debris. Some sedimentary rocks form when sediments are pressed together over time. Other sedimentary rocks form when minerals that were dissolved in water become solid.



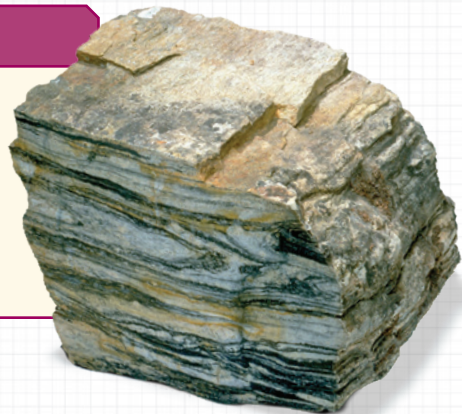
Marble is a type of metamorphic rock.

Metamorphic rocks form when existing rocks, such as sedimentary or igneous rocks, get buried deep in Earth's crust. There, the increased heat and pressure changes the chemicals in the old rocks. The old rocks become new metamorphic rocks.

Earth's crust is a mixture of old rocks, new rocks, and old rocks that become new rocks. This is great news for making fossils. Without the rock cycle, many types of fossils would not exist!

FUN FACT

Scientists can use technology to determine the age of rocks. The oldest rock that has ever been found on Earth is more than four billion years old. It was found in northwestern Canada.



Sedimentation

The rock cycle depends on many forces. Some of these forces are volcanic eruptions, tectonic shifts, erosion, and **sedimentation**. Sedimentation is one of the forces always at work in recycling materials on Earth. It's also an important part of creating many types of fossils.

The process first starts with erosion. Erosion occurs when wind, rain, or ice breaks down rocks and soil into smaller bits of sediment. Then, water and ice move the sediment. Rivers, oceans, lakes, glaciers, and streams all carry sediment from one place to another. When water drops that sediment, it's known as sedimentation.

Sometimes, this process forms layers of sediment. In some places, sediment layers have been preserved for millions of years. Scientists study the layers to understand what Earth was like when the layers were created. But sediment does so much more!

With lots of pressure and time, some sediments become rocks. Sandstone and limestone are two types of sedimentary rocks. Sediments can also become fossil fuels. Crude oil and natural gas are two types of fossil fuels. And sometimes, sediments are deposited around or inside the remains of a plant or an animal. This creates fossils.



sedimentary rocks



fossils in sandstone



These sedimentary rocks in Utah have visible layers.

STEAM CHALLENGE

Define the Problem

Your local natural history museum has run out of educational items to include in their museum store. They have asked you to create a new educational game that is enjoyable, teaches players about fossils, and features models or puzzles. They have suggested making a board game, but they are open to other game ideas if you have them.



Constraints: You may only use the materials provided to you.



Criteria: Your game must have a fossil theme. Players must answer questions about fossils at some point in your game. Players must also be required to build models or complete puzzles about fossils to win the game. Your game should have clear directions that can be followed by other students your age.



CAREER ADVICE

from Smithsonian

Do you dream about finding or working with fossils?

Here are some tips to keep in mind for the future.

"You can learn a lot by going outside and observing nature. All modern life has fossil ancestors, so by learning about the present you also learn about the past. Take notes, photographs, and drawings as you go. Slow down and look for small details. You will soon find yourself recognizing features in living animals and plants that you also see in fossils!"

– Michelle Pinsdorf, Research and Collections Assistant,
Vertebrate Paleontology, National Museum of Natural History

"Be brave and ask questions. Explore your local museums and learn about what kinds of fossils are found where you live."

– Myria Perez, FossilLab Manager and Educator,
National Museum of Natural History



Read and Respond

1. Have you ever seen fossils? If so, what kinds of fossils have you seen and where?
2. What are some things scientists might learn from a trace fossil that they might not learn from a body fossil?
3. What is the difference between altered and unaltered fossil remains?
4. How is water involved in forming different types of fossils?
5. Why is it important to find and use fuel sources that are not fossil fuels?
6. In what ways does reliance on fossil fuels contribute to climate change?

