



Geology: Studying the Story of Rocks

Imagine a canyon of rock one-mile deep, up to 18 miles wide, and 277 miles long. That is a big slice through the ground! Grand Canyon displays more than 20 layers of rocks, and each layer is like a page in Earth's history book. *Geology*, the study of Earth, helps tell the story of rocks.

Creating a Canyon

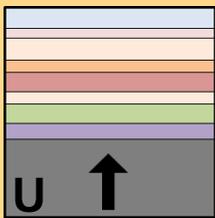
Carving a canyon like Grand Canyon takes many layers of rock, lots of water, and a long, long time.

Geologists have found evidence that Grand Canyon formed in four main steps over millions of years. Use the word **DUDE** to remember how it formed.



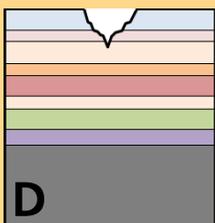
Deposition

Layers of *sediment* (sand, dirt, and mud) hardened over time and turned into rocks.



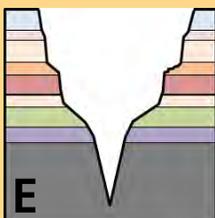
Uplift

Pieces of Earth's crust collided and lifted the rock layers up thousands of feet.



Downcutting

The Colorado River carved through the layers like a knife cutting through cake.



Erosion

Water and wind carried sediment from the sides of the canyon to the bottom, widening its walls. Erosion and downcutting still happen today.

Grand Canyon's Rock Layers

What does Grand Canyon have in common with pancakes? The oldest layers, which formed first, are usually at the bottom, while the younger layers are stacked on top.



Layers of sedimentary rock compared to a stack of pancakes

Sedimentary rocks form the middle and top layers of Grand Canyon. Layers of sediment hardened into sedimentary rocks over time.



Pink igneous rock and gray metamorphic rock near the river

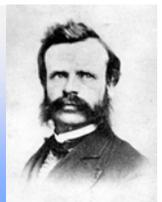
Most of the canyon's *igneous* and *metamorphic* rocks make up the bottom layers of Grand Canyon, near the Colorado River.

Igneous rocks formed when liquid magma cooled. Metamorphic rocks formed when heat and pressure changed igneous, sedimentary, or other metamorphic rocks.

One of Grand Canyon's oldest rocks, *Vishnu schist*, is about 1.7 billion years old, more than one-third the age of Earth!

Did You Know?

In 1869, Major John Wesley Powell became the first person known to explore the entire Colorado River through Grand Canyon. He studied the canyon's geology and investigated how the river carved through rocks.

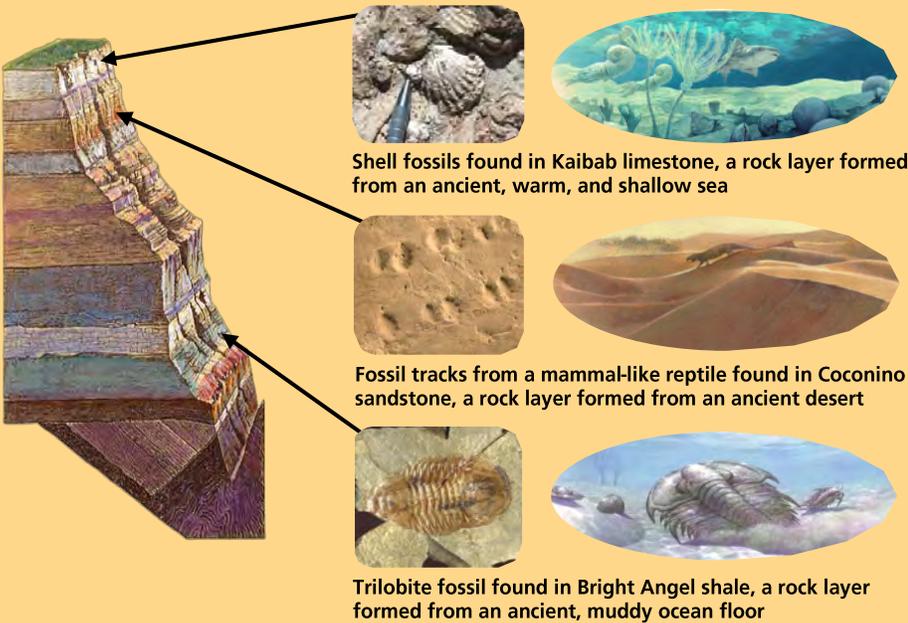


Fossils Tell Stories of Ancient Life

Many rock layers in Grand Canyon contain fossils. Fossils give scientists clues about Earth's past environments and the animals and plants that lived in them.

How Fossils Form

Fossils often form in sedimentary rocks. When layers of sediment harden into rock, they sometimes trap the remains of animals and plants that have died. Over millions of years, these bones, shells, footprints, leaves, and other remains turn into stone.



Stories in Stone

By studying fossils and comparing them to similar animals and plants that live today, scientists can find out what the environment was like before the canyon was carved.

Not all of Grand Canyon's fossils have been found in rock. Some fossils from the Ice Age have been discovered in caves, where animal and plant remains dried out and preserved over time.



Ice Age fossil of a Shasta Ground Sloth skull

Learn More

Check out these cool tools:



- [Learn](#) the Rock-a-rena dance
- [Watch](#) a fly-through animation of Grand Canyon
- [Listen](#) to a Ranger Minute about "How Grand Canyon was Shaped"
- [Explore](#) more facts and photos
- Become a [Junior Ranger](#) or [WebRanger](#)

Do a Rock Scavenger Hunt!

Whether at Grand Canyon or at home, geology is all around us.



Go on a rock scavenger hunt to **find rocks** in your community. They could be in houses, buildings, sidewalks, and even your own backyard!

Invite a friend and an adult, and begin:

- A gray rock
- A smooth rock
- A rock with many colors
- A rock with crystals in it
- A diamond or gem
- Cement with small pebbles in it
- Soil with rocks in it
- A big rock being broken into smaller pieces
- A place where water has moved rocks or sand
- A rock that looks like it could be from Grand Canyon
- Does your state have an official rock or fossil?



Hey Kids!
You can help protect Grand Canyon during your visit by leaving rocks and fossils where you find them.

