

Reflect

Seashells seem to be everywhere. Most of the time, you will find them on beaches, but every now and then, you may find them far from the sea. For example, you may find a shell stuck in a rock high on a mountain. What does your discovery tell you?

How can fossils tell us which organisms lived millions of years ago? Fossils are preserved parts or traces of animals or plants that lived in the past. Fossils are clues into the past. They tell us what organisms lived in a certain place. They can tell what the organism looked like and what the environment was like in the place where the organism lived. If you find fossils of



seashells high in a mountain, you might be able to conclude that the mountain used to be underwater at some point in the past. Fossils can also show how organisms have changed over time.

Fossils do not have dates printed on them. Yet scientists have ways to tell two things about the organisms that became the fossils—the order in which the organisms lived on Earth and when the organisms lived on Earth (or its age)—by dating particles found around or in the fossil.

Figuring out the order is relatively simple. Look at the photo of the canyon on the right. It shows layers of rock. The layers of rock were formed one on top of the other. The bottom is the oldest layer, so it was laid down first. The top layer was laid down last, so it is the youngest layer. Water is located at the bottom of the



canyon. Why is that? Imagine that you baked layers of a cake on Monday, Tuesday, Wednesday, and Thursday. Each day you used a different special ingredient: Monday was walnuts, Tuesday was raisins, Wednesday was cranberries, and Thursday was chocolate chips. Monday's walnut layer is at the bottom. The Tuesday layer with raisins and Wednesday's layer with cranberries would be next, and the chocolate chips in Thursday's layer would be on top. Monday's layer would be the oldest. Thursday's layer would be the youngest. What could your friend conclude about the ingredients? The walnuts were first because they were in the oldest layer. The raisins were added second, cranberries were added third, and the chocolate chips were added last because they were in the youngest, top layer.

Reflect

What does this have to do with the age of fossils? Think of the walnuts, raisins, cranberries, and chocolate chips as fossils. The rock layers (cake layers) in which fossils (special ingredients) are found indicate the order of the ages of the fossils. Fossils in the bottom layer are older than fossils in higher layers. Scientists also have ways to find the actual age of fossils.

Determining the age of fossils.

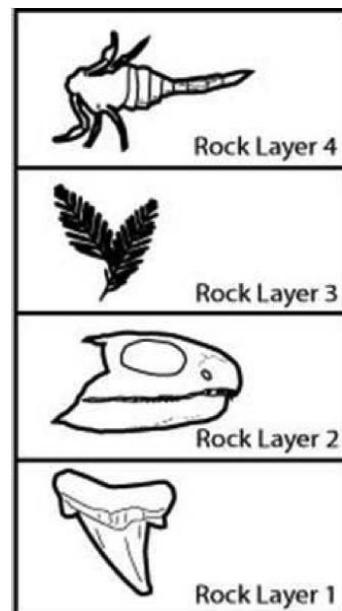
One way to find the actual age of a fossil is to find the age of the rock layer in which the fossil is found. This makes sense because the organism that produced the fossil was trapped in the rock when it formed. How long ago did the last dinosaurs become extinct, or die out forever? The youngest dinosaur fossils are found in rock layers that are about 65 million years old. Therefore, we can use that evidence to conclude that dinosaurs became extinct about 65 million years ago. You may be wondering how scientists figure out the actual age of rock layers and fossils. The process is a bit complex, but if you are curious, do an Internet search using the keywords “radioactive dating.”



Evidence from fossils shows that dinosaurs became extinct about 65 million years ago.

What Do You Think?

Take a look at the illustrations on the right. They show fossils found in different layers of rock. What is the order of these fossils from oldest to youngest? Remember that these fossils are not the actual organisms themselves. Rather, their body parts have been replaced with mineral solutions that hardened into rock. Do you think all of the fossils formed on land or were some in water?



Look Out!

When looking for fossils, we also look at the rock formations where they are found. These rock formations reveal changes over time. The fossils can show us how fast or slow these changes were. When we look at how the layers form, we know that they are formed over a long period of time. Sometimes, though, rock formations happen fast due to sudden earth forces, such as earthquakes or volcanoes. Do you think there is any way to tell if a fossil such as the one in the picture below died from an earth force such as an earthquake?



Try Now

Collect a variety of small objects, such as stones, leaves, coins, or marbles. Make an imprint of each object by pressing one side of the object into a piece of modeling clay. These imprints represent fossils. Label each imprint with a number, and create a key to identify each imprint. Ask your classmates to try to identify the source of each “fossil”—that is, the object that made each imprint. Ask your classmates to explain their answers.

What Do You Think?

The following chart lists five different locations on Earth today. Suppose that scientists find a fossil of an ancient organism in each location. Based on the type of fossil found there, think about how the location has changed over time. In particular, determine whether each location:

- Used to be a forest
- Used to be underwater
- Used to be a tropical island
- Has not changed since the fossil was formed

Fossil	Where was it found?	How has the location changed?
Sea shell	The side of a mountain	
Palm branch	An ice sheet in the arctic	
The imprint of a cactus leaf	A desert	
Insect trapped in tree sap	Under the ocean floor	
Shark tooth	A wide open grassland	



Connecting With Your Child

Fossil Safari

There are a number of ways to give your child a first-hand experience with fossils. If your community or a nearby community has a museum of natural history, or if you are planning a family trip to such an area, be sure to visit exhibits that include fossils or organisms reconstructed from fossils. Alternatively, arrange for a visit to a local college or university where fossils are kept. Check with the geology and biology departments, which are most likely to maintain collections of fossils. In either case, try to arrange a visit with a curator or an educator who can identify a particular fossil and explain where it was found and how it is significant. Ask your child to prepare for such an experience by making a list of questions concerning fossils.

Here are some questions to discuss with your child:

- What is a fossil?
- What parts of ancient organisms are most likely to become fossils?
- In what materials are most fossils found?
- If you found two different fossils, what is one way you might be able to tell which is older?
- What can a fossil tell you about ancient organisms?