

Earth's Systems: What are fossils?

By Encyclopaedia Britannica, adapted by Newsela staff

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The fossil of a fish called Priscacara that lived more than 33 million years ago. It is now extinct. The fossil was found in Wyoming. Photo from: Wikimedia Commons.

Fossils are the remains of ancient life that have been preserved in Earth's crust. Most people think of fossils as preserved bones or shells of ancient animals. However, there are many forms of fossils. Scientists have even found fossils of early forms of bacteria.

Not all remains of living things become fossils. To form a fossil, an organism must be preserved soon after it dies. If it is not preserved, its tissues will quickly decay. Moist areas such as riverbeds are good places for fossils to form. The most common fossils come from hard tissues, such as shells, bones and tree trunks. Soft

tissues can become fossils if they are preserved quickly after the organism dies. However, this is relatively rare.

Scientists have found fossil remains of thousands of organisms that lived in the past. Together these fossils make up the fossil record. This is the main source of information about the history of life on Earth. But the fossil record does not include everything, because fossils form only under certain conditions. The record reflects just a small part of all the organisms that have ever lived.



How Fossils Form

There are several ways that fossils can form. One way is called permineralization. This begins when an organism dies in an area such as a wetland and its body is buried under layers of sediment. Sediment includes material like silt, sand and gravel. Over time, more and more sediment presses down on

the organism's tissues. The tissues are gradually replaced with minerals from the water that leaks through the sediment. Eventually the remains become petrified, or stone-like. This can take thousands to millions of years. Bones, teeth, shells and tree trunks are generally preserved through permineralization.

Casts and molds preserve a 3-D impression of remains buried in sediment. Water moving through the sediment gradually dissolves the original tissue of the organism. The mineralized impression of the organism left in the sediment is called a mold. The sediment that fills the mold also becomes mineralized. In this way the sediment recreates the shape of the remains. This is called a cast. Ancient sea creatures were

Fossil mold and cast



mold



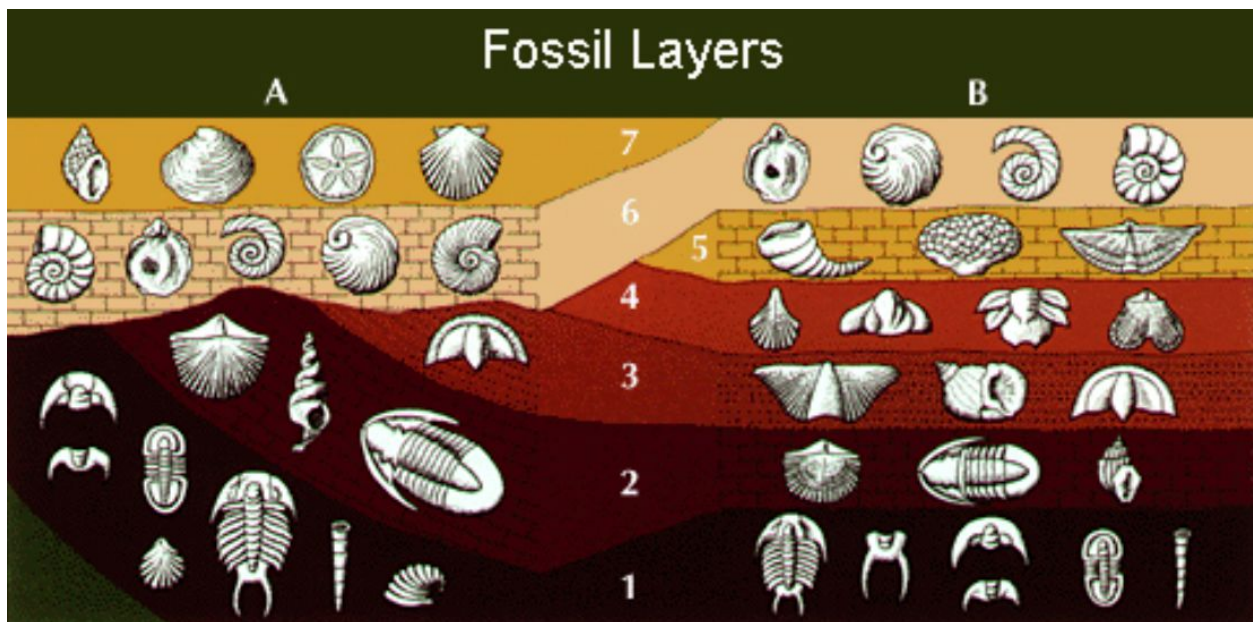
cast

commonly preserved as molds and casts.

Trace fossils provide evidence of an organism's activity. Preserved footprints, trails and nests are trace fossils.

Soft tissues may be preserved through carbonization. These include tissues such as leaves, stems, seeds, insects and feathers. During carbonization, the remains are squeezed between two layers of rock. Chemical changes produce a print-like carbon film on one layer of rock. An impression of the remains occurs on the opposite rock layer.

An object trapped inside a preserved material forms an inclusion fossil. Insects preserved in amber are examples of such fossils. They occur when insects become trapped in the sticky resin of a tree. Over time, the resin hardens into amber.



The Fossil Record

The fossil record shows us what organisms looked like a long time ago. Many of these organisms are no longer alive today. The fossil record shows how the animals evolved over time from one animal into another.

The fossil record goes back more than 3 billion years. The oldest known fossils are tiny creatures that look like bacteria. Other ancient fossils look like jellyfish, sea anemones and worms.

What Fossils Teach



Scientists use fossils to learn about ancient organisms and the ancient world. Fossils provide evidence of ancient climates and ecosystems. They also show how the land has changed over time. For example, there are fossils of sea creatures high up in the Himalayas, Alps and Rocky Mountains. This shows that these great mountains

were once under the sea.

Some scientists study certain kinds of fossils. Paleozoologists study the fossils of ancient animals, while paleobotanists study the fossils of ancient plants. The fossil record helps paleogeographers study landforms. It shows them how Earth's geographical features have changed over time.