

MAGS EXPLORER



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How Are Caves Formed?

Have you ever been in a cave before? What comes to mind when you hear the word? Have you ever wondered how caves are formed? Depending on what kind a cave is, it could have been formed by water erosion, chemical processes, or even by molten rock from a volcano. There are sea caves and other



Photo credit: NPS

caves hollowed out by erosion from water pressure, and volcanic caves formed by empty lava tubes.

And then there's the other way for caves to be made: acidic water trickling through cracks in rock will gradually dissolve limestone and similar rocks. Carbon dioxide from rotting plants in soil, and sulfuric acid from underground gases or acid rain, can combine with water to make an acidic solution that will dissolve limestone. Gradually, this acidic

water will wear out underground hollows. When the water finds an outlet and drains away, it leaves a cave.

A karst is an area of limestone in which erosion has caused caves, sinkholes, natural bridges, fissures, and underground streams in the landscape. (Sinkholes occur when the roof of a

cave wears too thin and collapses.) Note that canyons are made in a similar way as karst topography--by erosion--but have deep sides of exposed rock, carved out by rivers or streams.

You can demonstrate how erosion forms karsts, using a container of moist, packed sand and a squirt gun with water. What happens when you spray a steady stream of water at a point on the

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sand? Try to make tunnels, holes, and bridges using the water. Can you figure out a way to make a sinkhole?

Caves have long been regarded as places of mystery and intrigue. Prehistoric people used them for shelter and decorated them with some of the earliest-known works of art. Pirates used them to hide their ill-gotten booty. By definition, a cave is simply a natural open space found underground. Sometimes caves form when large rocks get stacked up after a landslide, but most often they're the result of the chemical solution of limestone by subsurface water.

In pure water, limestone is actually quite stable. However, when water gets a little acidic, the limestone dissolves. When water percolates through the soil, it picks up carbon dioxide from rotting plants. This forms carbonic acid, the same acid found in soda pop. As this acid water flows through the soil, it eats away at the underlying limestone rock and a cave is formed. Some larger caves are formed by sulfuric acid -- the same acid found in battery acid. Sulfuric acid is created when the percolating water mixes with hydrogen sulfide from underground oil and gas and from acid rain.

Over time, small caves can grow to become elaborate systems of caverns containing large, needlelike structures that seem to grow down from the ceiling (stalactites) and up from the floor (stalagmites). These structures are formed by the slow, steady accumulation of calcium carbonate precipitating from the chemical-rich water dripping off the stones. Sometimes, these two "dripstones" meet, creating large pillars with spectacular colors.

Very few plants can grow in a cave because of the lack of light. Instead, fungi, algae, and even some simple mosses dominate caves. Insects, reptiles, and bats also are uniquely adapted to the cave environment. One of the most unusual cave dwellers is the "cave fish." Totally blind, this colorless creature navigates by touch, using tactile

sensors on its body.

Sometimes, so much solution takes place inside a cave that the caprock can no longer support the weight of the surface above. The roof caves in and a feature known as a sinkhole forms. Each year, there are news stories about people returning home from work to find a large hole in the ground where their house once stood. By understanding the dynamics of what's happening inside a cave, scientists hope to minimize the risk of sinkholes in populated areas.



Photo credit: NPS

Ref:

[01] [How Are Caves Formed?](#); Teaching Tips: Earth Science: Geology; Home Training Tools, Ltd; <http://www.hometrainingtools.com/articles/how-caves-are-formed-science-teaching-tip.html>; 08.26.03.

[02] [Cave and Karst Program](#); National Park Service; US Department of the Interior; Geologic Resources Division; <http://www2.nature.nps.gov/geology/caves//program.htm>; 05.26.04.

[03] [How Are Caves Formed?](#); Spelunking; Newton's Apple; <http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/newton/spelunk01.html>; 06.10.04.

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