



## **Roads Scholar**

### **Educational Adventures in Our Own Backyard**

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CRIZMAC Art and Cultural Marketplace

## **Going Batty in This Heat?**

### **Escape to Colossal Cave!**

In 1879, Solomon Lick, the owner of the nearby Mountain Springs Hotel and Stage Station, was out searching for stray cows when he came upon what he thought was either “a very extensive old mine or a wonderful cave.” Today we know that his second thought was correct.

Over two miles of passageways in what is now known as Colossal Cave have been explored and mapped, and it is very likely that there are still areas that have never been seen. Tours of the cave, where the temperature is always a comfortable 70 degrees, provide an opportunity to view many of the beautiful formations traditionally found in limestone caves, including some that are quite rare.

The geologic history of Colossal Cave is complicated. Recent research indicates that the Cave had two different sources of water. The first—which is the water that formed the Cave’s passageways—probably occurred 10-15 million years ago. Hot and laden with sulfuric acid, it welled up from below. At some point, it cooled or was cut off and no longer came into the cave system. The water we normally associate with a limestone cave seeps in from above, depositing the crystals that eventually grow into the cave formations: stalactites, stalagmites, and more. In Colossal Cave, this probably occurred several hundred thousand years ago. Then, as the mountains formed and the valley floors dropped below, the cave was left perched on the hillside, where it sits above the water table with little soil or vegetation above to hold moisture. Because of these conditions, coupled with the fact that there are now many openings that allow a high degree of air exchange with the arid climate outside, Colossal Cave is now what is known as a “dry” or “dormant” cave. The cave formations that were formed under the previous “wet” conditions still exist, but they are no longer growing. Cross sections of stalactites, like tree rings, can provide valuable information about past climate conditions. Research done in Colossal Cave indicates it has been dry for the past 2000 to 10,000 years.

The first known human use of the Cave occurred about a thousand years ago. The Hohokam Indians had a thriving farming community in the valley below Colossal Cave. Indications are that they used the Cave for shelter, storage, and for religious purposes. The Cave was later used by the Sobaipuri Indians (around 1440-1850 A.D.), as well as more recently by the Apache and Tohono O’odham. Following the Cave’s re-discovery by Solomon Lick in the late 1800s, it also served as a hideout for bandits and escaped prisoners.

By the 1920s, a German immigrant, Frank Schmidt, was running guided tours of the Cave. He outfitted his intrepid guests with ropes and lanterns before leading them through the unimproved passageways. In 1934, a Civilian Conservation Corps (C.C.C.) company came to Colossal Cave and began an extensive project to construct trails, handrails, and lighting in the cave. Using the limestone blocks found in the area, they also constructed a number of the buildings still in use today.

Now, the cave tour is considerably less strenuous, although you will have to walk up and down about six and a half stories. The half-mile tour takes about 45-50 minutes, during which time your guide will tell you about the Cave’s history, legends, and geology. But the cave tour is only the beginning. A visit to the La Posta Quemada Ranch Museum provides an opportunity to see some of the ancient artifacts that have been found in the Cave, two full color murals about life in the mouth of a cave (with a particular focus on bats), and rare images from the Arkenstone Cave (one of two wild caves within the park boundaries). The two are live (wet)

caves and in order to protect their delicate environments, access is limited to a few researchers. Thus far, seven new species of invertebrate fauna have been identified in Arkenstone Cave.

From the beautiful formations in ancient Colossal Cave to the new discoveries being made in Arkenstone Cave, Colossal Cave Mountain Park is truly a local treasure, with much to teach us about our past—and our present.

## Tune Up Your Mind

### Look for these related books

*Caves and Caverns* by Gail Gibbons (Voyager Books, 1996, \$7.00)

*I Wonder Why Stalactites Hang Down and Other Questions About Caves* by Jackie Gaff (Kingfisher, 2003, \$9.27)

*Limestone Caves* by Roy A. Gallant (F. Watts, 1998, \$6.95)

*Painters of the Caves* by Patricia Lauber (National Geographic Society, 1998, \$17.95)

## Details

**What:** Colossal Cave Mountain Park

**Where:** 16721 E. Old Spanish Trail, Vail

**When:** Summer hours (through September 15)  
Monday through Saturday, 8 a.m.– 6 p.m.  
Sundays and Holidays, 8 a.m.– 7 p.m.



**Admission:** \$5.00 per auto (\$1.00 per person over 6 people)

Cave Tours: \$8.50 Adults  
\$5.00 Children (6-12)  
Children 5 & under are free

**Information:** 647-7275 or [www.colossalcave.com](http://www.colossalcave.com)

## Discovery Detours

### Make a mini stalactite

Most stalactites and stalagmites are made of the mineral calcite, which comes from limestone. Rain water, acidified by carbon dioxide in the soils, seeps downward through millions of tiny cracks and crevices in the limestone layers. As this weak carbonic acid, which is the same acid as in soft drinks (kind of makes you wonder what it's doing inside your stomach, doesn't it?), makes its way through the ground, it dissolves the calcite. When the water drips from the cave ceiling, it re-deposits the calcite in icicle shapes, creating stalactites. Stalagmites are formed at the base of stalactites, and grow upward. Because the drops usually splash when they hit, stalagmites are generally broader than stalactites.

You can recreate this process using Epsom salts. You'll need 2 cups of Epsom salts, 2 cups of hot water, a

pitcher, 2 glass jars, a length of cotton string or yarn (don't use polyester or nylon), two paperclips, and a paper or plastic dish. Wear gloves and goggles when working with the Epsom salts.

1. Put 2 cups of hot water into the pitcher and add Epsom salts until no more will dissolve (there should be a residue of Epsom salts at the bottom of the pitcher)
2. Pour the solution into the two jars. Cut a length of string or yarn, dunk it in a jar and then run it between your fingers to remove excess liquid. Attach a paperclip to each end of the string and put one end in each jar, positioning the jars so that the string sags a bit in the middle. Put the plate underneath to catch the drips.
3. After an hour, a drip of liquid—the beginning of a stalactite—should have formed where the string sags. If the string is dry, you need to replace it with a more absorbent type of string or yarn. If the plate is full of water, you need to remove a little of the solution from the jars or replace the string with a less absorbent type.
4. Let the experiment run for several days, checking the string daily to see how long your stalactite has grown. You may also see the beginnings of a stalagmite forming on the plate below.

Source: Rock and Fossil Hunter (DK Smithsonian, \$9.95)

Handy tip: If you're having trouble remembering the difference between a stalactite and a stalagmite, it might help to think: a stalactite clings "tightly" to the ceiling, and a stalagmite "might" reach the stalactite.

### **If you go...**

As you tour the cave, see if you can identify examples of these formations:

Boxwork	One of the older cave formations, boxwork is created when calcite seeps into cracks and crevices in the limestone. Eventually the limestone deteriorates and only the delicate calcite boxes remain.
Columns	Also known as stalactons; form when stalactites and stalagmites meet to form solid pillars
Draperies	Water seeping along cracks on a sloping ceiling deposits draperies that are often translucent enough to show banding of colors due to traces of different minerals. Cave bacon is a type of drapery. Usually smaller in size, it is distinguished by its light and dark colors.
Flowstone	Can form a variety of structures including cave bacon and drapery
Helictites	Stalactites that have a central canal with twig-like or spiral projections that appear to defy gravity.
Soda Straws	A type of stalactite that forms on the ceiling by slowly dripping water. As each droplet falls, it leaves behind a minute deposit around its border, and a thin, hollow tube slowly grows toward the floor.

### **Think Tank**

#### **Discussion questions for the whole family to consider:**

The most ancient art that has ever been found was in a cave. Lascaux is a complex of caves in southwestern France famous for its cave paintings. Discovered in 1940 by some teenagers and a dog, the caves contain some of the earliest known art, possibly dating back as far as 25,000 B.C. Although there have not been any drawings found on the walls of Colossal Cave, a Hohokam mortar dating from 900-1450 AD was found. Mortars were

used to crush the colored clays for pigments to paint their pottery, suggesting that the Hohokam may have created some works of art while in the cave.

Why do you think ancient art is often found in caves? Consider both the reasons that the ancient people might have had for choosing a cave as a site for their art as well as the conditions needed for preservation over thousands of years.

Here are some ideas to guide your discussion:

Why would people long ago use caves?

- shelter from enemies and weather
- they provided certain mineral resources
- ceremonial purposes

How does the cave environment help to preserve art?

- There are no plants from so leaves would not cover remains
- Dry caves preserve bones, bodies, and art.

Why would people make cave drawings?

- To tell stories
- To keep records
- To represent religious events, worship

Why did the people choose caves for their art?

- To keep the pictures secret
- To shelter them from the weather
- Cave walls provided good surfaces for drawing

## **Fuel for Thought**

### **Did you know...**

Colossal Cave Mountain Park provides a home or refuge for hundreds of species of animals including, of course, bats. There are seven species of bats that live at least part-time (some are “snowbirds”) in the Cave.

If you are near the Cave, especially when the weather is humid, you may notice a not altogether pleasant smell. Obnoxious odor notwithstanding, bat droppings, or “guano,” is a very valuable substance. In addition to providing a source of food for many other cave-dwelling creatures (known as troglobites), guano is highly prized for use as fertilizer. In 1905, a 75-foot tunnel was excavated into Colossal Cave in order to mine bat guano. Over seven train cars were filled before the supply was exhausted. Today the tunnel serves as one of the openings for the bats going in and out of the cave.

## **For the Mouse-bound**

[www.colossalcave.com](http://www.colossalcave.com)

<http://www.goodearthgraphics.com/virtcave/>

[www.cavern.org/acca/kidscave.php](http://www.cavern.org/acca/kidscave.php)

[www.culture.gouv.fr/culture/arcnat/lascaux/en](http://www.culture.gouv.fr/culture/arcnat/lascaux/en)

## **Wheels Are Turning**

Parents and Caregivers: These activities can help your child meet Arizona's educational standards. The standards addressed here include:

1SS-R7. Observe and describe changes in a simple system (K)

1SC-F2. Construct models that illustrate simple concepts and compare those models to what they represent (Grades 1-3)

1SC-E2. Create a model (Grades 4-5)

6SC-F5. Identify major features of natural processes and forces that shape the Earth's surface (Grades 1-3)

6SC-E3. Describe the composition (including the formation of minerals, rocks, and soil) and the structure of the Earth. (Grades 4-5)