

Caves Rock! Junior Badge



For Girl Scout Juniors

Created by Ann Wescott

Cave of the Mounds, National Natural Landmark

For Scientists, caves are among nature's unique workshops. They are natural laboratories where you can observe and study almost any science – geology, biology, paleontology, hydrology and many more. The study of caves has its own branch within science called *Speleology*, and a person who studies caves is called (you guessed it) a *Speleologist*. Let's find out more about this fascinating underground world filled with amazing formations and specialized animals, uniquely adapted to live where most creatures could not.

To earn this badge, you must complete 6 of the 10 areas of inquiry listed below.

1. Plotting the places

You can find caves on every continent, in almost every country and in practically every state of this country. Search for answers to the following questions. Use a map of the US and of Wisconsin to plot your findings.

- Where are caves located in the United States?
- Where are caves located in Wisconsin?
- Where did glaciers cover the surface of Wisconsin?
- What is the name of the area of Wisconsin not covered by glaciers?

2. What's in a name

We often say that words matter. How you define a geologic feature is important to understanding how it came to be. Use the web, books or ask a guide to find out what's in these names.

- What is a cave?
- What are the names of the different types of caves?
- Does the name of the cave help you to understand how the cave was formed?

3. Tales of the Dead

Most sedimentary rocks are formed from the shells of things that lived in the past. These shells combine with other sediments at the bottom of the oceans or seas and form layers. Limestone is a good example of this type of rock.

- If you had special eyes and could look below the surface of the ground in your area, what would you see?
- Find out what type of animals shell's make up limestone in your area.
- Start your own fossil collection

4. Acid Rock

Limestone caves are formed by the dissolution of the limestone rock by acids. Carbonic acid is the most common type of acid that forms caves. A common example of a weak carbonic acid is soda pop.

- Learn the chemical equation for carbonic acid
- Stream carved sections develop when water begins to flow rapidly through the rock (mechanical erosion)
- Cave of the Mounds is a local example of a cave formed from both chemical and mechanical erosion.

Acid Rock:

1. The Chemistry of Erosion:

Water (H_2O) dissolves carbon dioxide (CO_2) and becomes carbonic acid (H_2CO_3).

2. The Chemistry of Speleothems

Carbonic acid (H_2CO_3) dissolves calcium carbonate ($2CaCO_3$) in the limestone to form calcite crystals ($2CaHCO_3$).

5. Make your own speleothem

Speleothem is the term used to describe all of the decorative formations found in a cave. They develop from the precipitation of dissolved minerals in the acidic water that drips into the cave. It can take a long time for a cave formation to grow.

- How long does it take for one inch of growth on a stalactite?
- Make your own stalactite (see sidebar)
- What are the different types of speleothems found in caves?

Make Your Own Speleothems!

Materials (per student, pair or group):

2 glass jars
2 nails
2 15in. pieces of heavy string
Epsom salts or sucrose solution
water
food coloring
sheets of cardboard or tag board (1 sq. ft. each)

Procedure:

Make a saturated solution of Epsom salts and water. Add a drop of food coloring to this solution. Fill both of your jars with the solution. Now, securely tie the two pieces of string together. Tie a nail to each end of the string. Put one nail into one of your glass jars and the other nail into the other jar. Carefully place your set-up so that the glass jars are separated enough to make the strings taut. Make sure the nails are completely submerged in the solution. Place your cardboard sheet under your string. Evenly place it between your two jars so that any solution that drips off the string will land onto the cardboard. Record your observations daily.

6. World of Wonder

Cave formations turn underground worlds into fairylands of color, shape and imagination. Many people can see, or imagine they see, shapes in the cave formations – just as when you lay on your back and look up at the clouds. Use the websites listed to look closer at the many formations. Do any remind you of other things? Draw some of your favorites and answer the following question:

- Ribbon stalactites are often called *bacon strip* stalactites. Why?
- www.caveofthemounds.com
- www.virtualcave.com
- www.crystalcave.com

7. Go see a cave

Nothing compares to seeing the real thing. Take a tour of a cave in your area and discover the excitement and beauty of the world down under! See if you can identify what type of cave it is. Do you see any speleothems (the beautiful formations found in most caves)? What are the rules of behavior in the cave you visited?

8. A place protected

- Zoos, aquariums and botanical gardens are places that help to manage and protect *endangered* species of plants and animals. They *recreate* the habitat in which these species are found. State and National Parks are places that help protect species in their *native* habitat. They help to keep species alive in their natural environment rather than trying to replicate one.
- Caves are “parks” below ground. They are places that preserve rare formations and animal species of many types. Some caves are protected from humans, whose very presence can harm the fragile ecosystem. Other caves are developed for wild caving or cave crawling. Often, these types of caves have very few fragile formations that can be broken. Still other caves are developed for people to walk through, often with a guide who “shows” them the cave. This allows people to see the formations and living things either close-up or from a distance.
- Compare the protected places you’ve been. Are the rules the same? Different? How? Make a list of some of the common similarities and differences in how you behave in the protected places you’ve been.
- What does a guide, interpreter or ranger do? Describe a tour or program you were on at a “protected place”.

9. Findings from the field

In Columbus’ day, people believed that the earth was flat, not round. When Columbus set sail, many people predicted that his ship would fall off the edge of the earth. Columbus and other explorers and scientists eventually proved that the earth was round. Likewise, cave scientists seek to help people understand that the world is three dimensional. The surface of the earth is only a small part of planet earth’s environment. Understanding underground features like caves is an important part of understanding our world.

- Approximately 20% of the United States is considered a **karst** landscape. Karst areas are characterized by **sinkholes**, caves, springs and surface streams which disappear underground. Karst develops on or in water-soluble rock such as limestone.
- Tour a karst landscape. What surface features do you see? Compare an active sinkhole to an inactive sinkhole. How are they different?

10. Career Explorations

Use a Venn diagram (See Attached) to explore all of the skills necessary to study caves (Speleology). Label each circle with a branch of science, then fill in each circle with the definition of that science. Next, make a list of how this area of science relates to caves.

Resources

Cave of the Mounds – offers 'Caves Rock!' badge programs for Girl Scouts

2975 Cave of the Mounds Road, Blue Mounds, WI 53517 phone: 608.437.3038 (Southwest of Madison)

Carolyn's Caverns and Mother's Cave – Calumet County

A real get down and dirty crawling tour!

Ledge View Nature Center, W2348 Short Road, Chilton, WI 53014 phone: 920.849.7094 (near Fond du Lac, Oshkosh, Green Bay)

http://www.co.calumet.wi.us/departments2.iml?dept_id=70#203

Crystal Cave

W965 State Road 29, Spring Valley, WI 54767 phone: 800.236.cave (west of Eau Claire)

Eagle Cave

16320 Cavern Lane, Blue River, WI 53518, phone: 608.537.2988 (near Richland Center)

Niagara Cave

Harmony, MN, 800.837.6606 or 507.886.6606 or www.niagaracave.com (near Harmony, MN)

Kickapoo Indian Caverns

Scenic Highway 60, Wauzeka, WI phone 608-875-7723 (15 southwest of Prairie Du Chein)

<http://www.kickapooindiancaverns.com/>

To order badges and patches from Badgerland Council Contact the Madison Girl Scout Center Trefoil Shop at 608.237.1173.

Career Explorations in Speleology

