Welcome

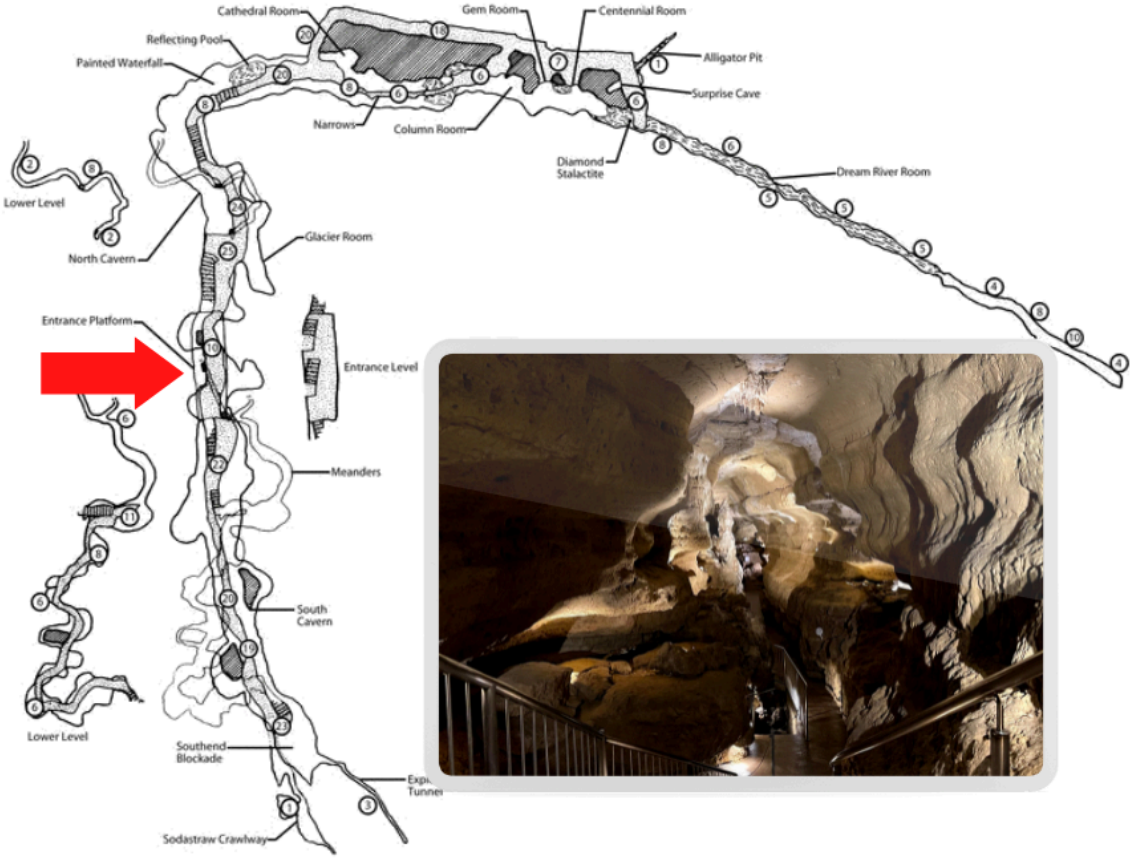
Welcome to **Cave of the Mounds** National Natural Landmark! We hope you enjoy your time here today. Here is some information about the cave as you travel along.

The tour route follows a one way, figure-8 looped path. You will loop around one half of the cave and then the other, ending where you began. The easiest way to navigate the cave is to keep moving forward, following the signs along the way. A tour guide is always available to answer questions, interpret rooms, and provide assistance as needed.

Please follow these rules to protect the cave:

- Please do not touch rocks, walls, and formations
- No large bags or bags worn on the back
- No gum chewing, eating, drinking, vaping, or smoking within the cave
- Cameras are welcome and flash photography is allowed

Stop 1 - Discovery Site



"When the smoke and dust cleared… Charles Brigham, Lance Dodge, Wayne Lampman, and Stacy Collins were the first to climb over the fallen rock… Theirs were the first human eyes to see the wonders and spectacular beauty…"

– Alonzo Pond, from the original guidebook

Cave of the Mounds was accidentally discovered on August 4, 1939, after quarry workers completed a blast to harvest the rock in the hillside. Just 3 hours later, the first explorers entered the cave.

Now you are entering the cave through the same entrance as the first explorers did on August 4, 1939–this opening was created after the routine blast in a limestone quarry that was situated on the surface above our heads. A crew was working in the quarry, mining limestone from the area to make gravel for nearby roads. 1,600 pounds of blasting powder was pumped into 8 holes on the top of the quarry wall before being detonated around 11:30am that Friday. After the blast, the rock and dust slowly settled revealing a hole in the rock.

Interview Quotes from Previous Recordings:

"As Lance Dodge and Wayne Lampman drilled the final holes and loaded it with 1600 pounds of dynamite that faithful August day in 1939, something wasn't right. They were blasting rock at a quarry near Blue Mounds. Lance's brother remembers." - Reporter circa 1989

"We were drilling and then all of a sudden, there was.. the bottom just dropped off." - Vernon Dodge, Lance Dodge's Brother

"Dodge said they thought it was just a chasm. But with an explosion like this one, they tapped into what would soon be known as the ***Cave of the Mounds****."* - Reporter circa 1989

"It was kind of scary because it sounded like glass was falling down." - Sanford Kleven, quarry worker, witness to cave discovery.

"We all took cover. And then…we were all… we were pretty well… you know we were pretty surprised when this thing blew open." - Bob Jacobson, truck driver, witness to cave discovery.

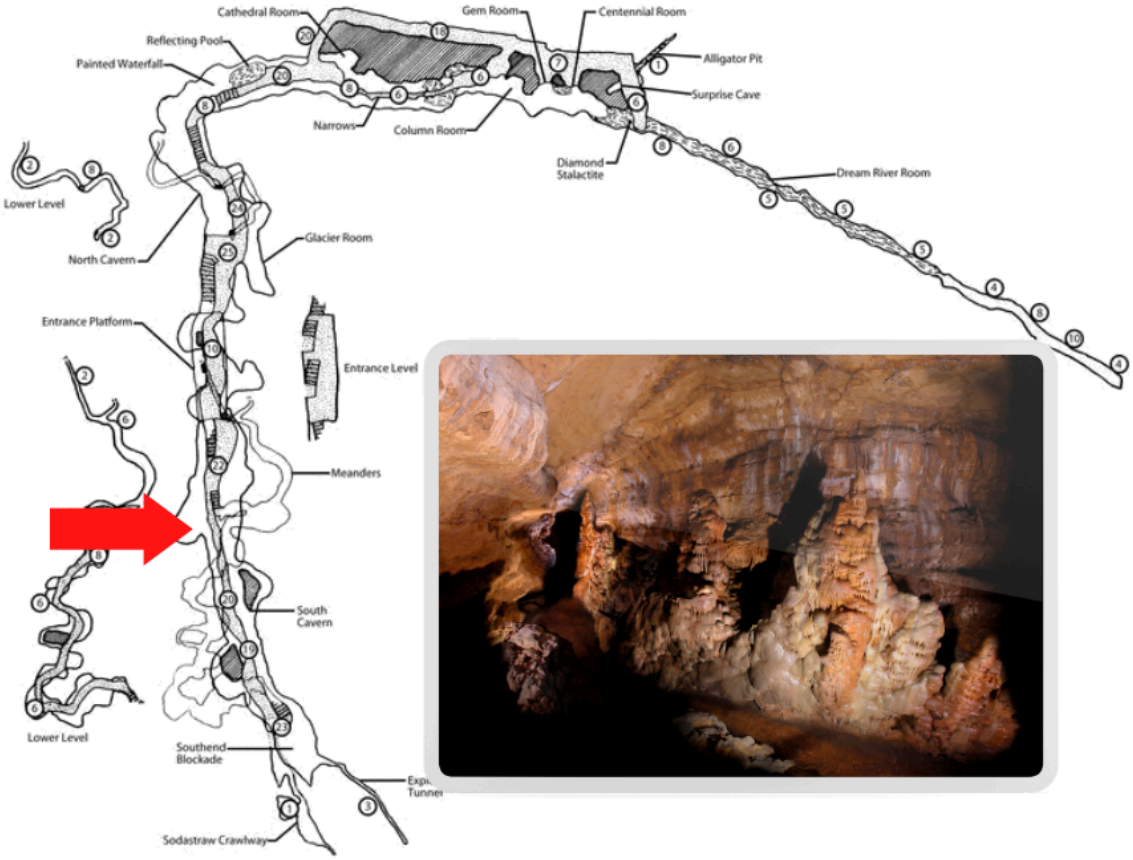
"It looked like it was a pretty big opening. Then you could hear the stalactites falling. It sounded like glass was breaking." - Sanford Kleven, quarry worker, witness to cave discovery.

"We knew there was a cave in here somewhere. And, of course, maybe more of it." - Stacy Collins, farmer, one of the first people into the Cave of the Mounds.

The rock you see all around the cave formed 400 to 500 million years ago, during the Ordovician period of geologic time. Sediments and ancient shelled sea creatures gathered at the bottom of the ordovician sea that once covered this area. Over time the sedimentary limestone rock formed.

Limestone is a very good rock for the formation of very good caves, and Cave of the Mounds is no exception. This is a solution cave: a cave that has been dissolved out of rock slowly over time by chemical erosion. Weak acids began dissolving the rock around 1.8 million years ago to create the rooms that you see today.

Stop 2 – Onyx Ridge



"Geologists have a saying – rocks remember."

-Neil Armstrong

As you walk through the south cavern of the **Cave of the Mounds**, notice the distinct crack in the rock on the ceiling above the stalagmite formations. This crack is a naturally formed fissure. Many porous spaces and fissures like this formed as the limestone layers were shaped by water or dried out over time. This is where a large amount of water seeps into the cave and therefore, many speleothems are located along this fissure. The collections

of formations you see in the cave are called speleothems. Among these are stalactites which hang “tight” to the ceiling and stalagmites rise up from the ground, someday they “might” reach the ceiling.

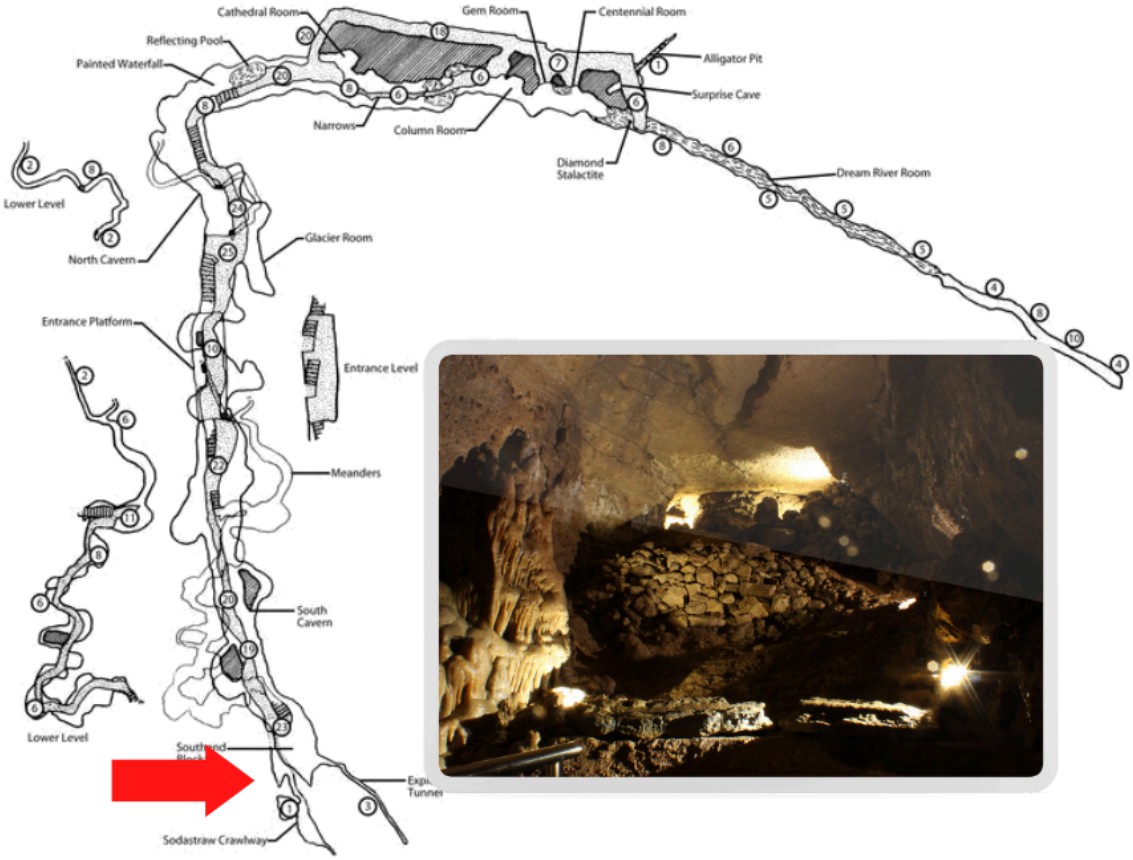
The rock looks a bit like melting wax and builds up very slowly. The amount of water in the cave can help or hinder the growth rate. Too much and the water doesn’t hang long enough for the crystals to precipitate out of the water drops; too little, and there aren’t many minerals brought down to build up. Studies recently done by a Ph.D. candidate at University of Wisconsin in Madison show that the average known growth rate here at the Cave of the Mounds is about a centimeter of growth in 100 years.

Interview Quotes from Previous Recordings:

“As soon as it got blasted into it, it seemed like I was crawling in there. Beautiful in there. Just something out of this world.” - Myrtle Lampman, witness to discovery.

“The part that unnerved me the most, well you were going by flashlight for one thing, and you didn’t know when you were going to hit a drop-off. You could keep yourself from getting stuck. You didn’t know when you were going to suddenly come to water that you couldn’t cross or a place that you couldn’t go down.” - Elizabeth Brigham Rooney, daughter of the farmer who owned the quarry.

Stop 3 - South End



"Geology is the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature."

– Charles Lyell

A fossil is the remains, impression, or trace of a living thing from the distant past. They are found in sedimentary rock most often. Common fossils include shells, bones, teeth, footprints, and leaves.

Cave of the Mounds is home to dozens of fossils, but here is the largest one at about 6 feet or almost 2 meters in length. If you look directly above the last stalagmite where the railing begins, you will notice an elongated bump on the ceiling of the cave. This is the shell of an ancient sea creature called a giant cephalopod. A cephalopod is a squid-like marine animal that lived in the Ordovician sea, an ancient body of water that once covered this area long ago.

The south-end blockade, which is a pile of rubble in the area, forbids any forward passage. This pile of rubble is the bottom of a sinkhole, which is common in karst topography (the geologic name for a cave region). Water below the surface erodes as it goes, and if the rock erodes fast, then you might have a sinkhole develop. The cave ceiling finally weakened and collapsed as the rock slowly eroded underneath. The collapse dates are unknown.

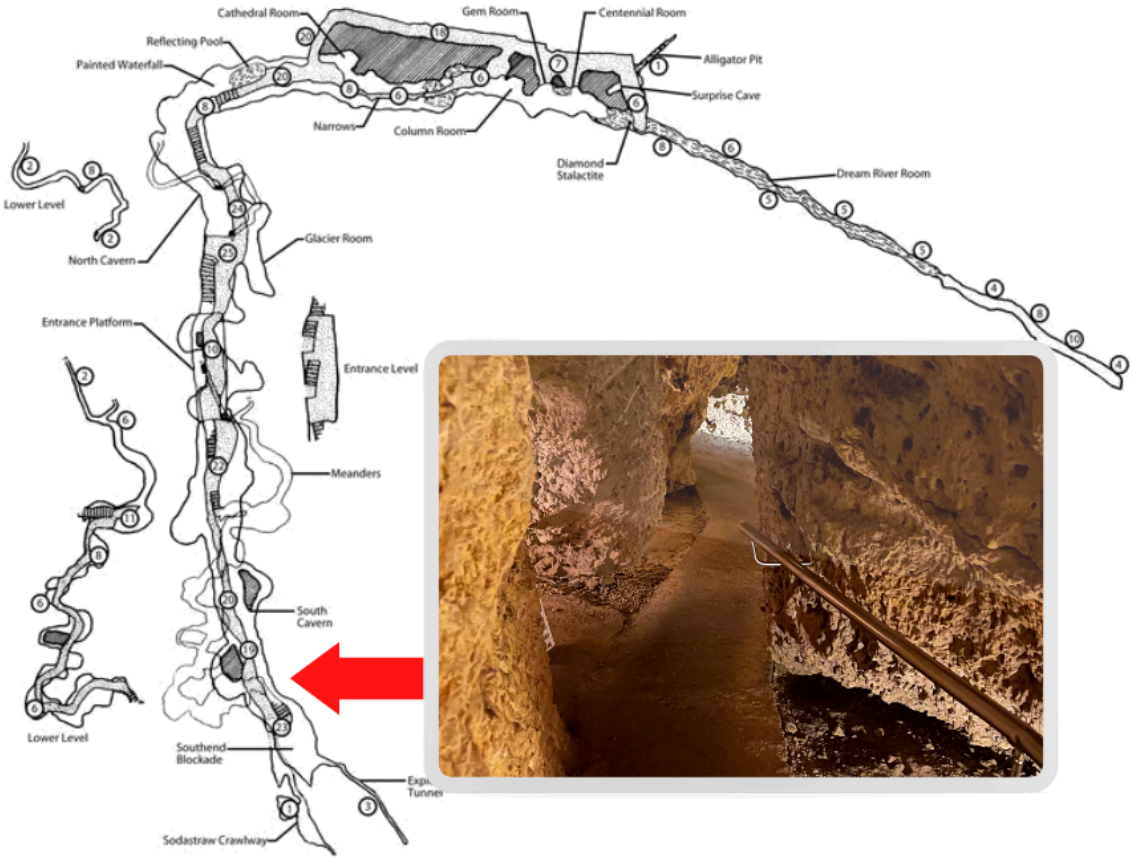
A cave like this is super strong and not at risk of collapsing, but when it was first forming, this spot wasn't as strong, but today it is all filled in with nowhere to go. Above is a sunken depression that is now very solid and you can find this on our karst view trail. A large oak stump with an informational sign near the parking area sits above this area on the surface.

An exploration tunnel can be seen on the upper left side of the breakdown. Cave scientists, called speleologists, organized a dig through the collapsed material to find more of the cave. Wisconsin Speleological Society members worked on this starting in the winter of 1973 to 1974. They dug a tunnel approximately 70 feet or 21 meters in length. The project was abandoned after no new cave passageway was discovered, and the project was halted due to unstable and therefore unsafe conditions. More advanced studies have ruled out large passages beyond this point. This is accepted as the southernmost end of the **Cave of the Mounds**.

Look at the limestone all around you. Notice the various holes throughout the surface of the rock. These holes are called vugs. Can you see the

layers in the limestone rock? Which layers do you think would be the oldest? The youngest?

Stop 4 – Meanders

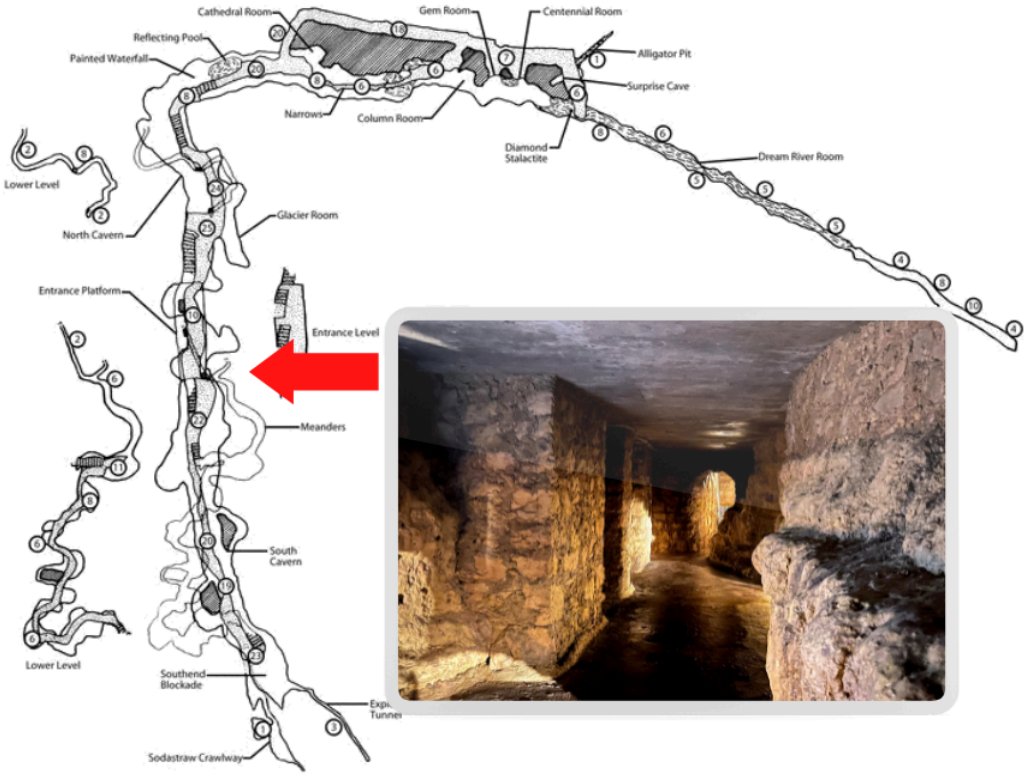


This part of the cave is known as the meanders. It was carved out by an underground stream. As you walk through this channel in the rock, try to imagine the flowing water that worked to erode the bedrock all around you. Pits and zig-zags along the trail follow the original route of the swirling,

rushing water that created it. During your walk, you will reach the lowest point on the cave tour at 70 feet or about 21 meters below the surface.

The walls of the cave have scars of strong water flow as well. Called scallops, these crescent-shaped indentations in the rock can indicate both the direction and speed of the subterranean stream that formed them. After heavy rainfall water still trickles through **Cave of the Mounds**, but the water table is now hundreds of feet below, so these channels are not getting larger.

Stop 5 - Under Discovery



"...one can look down into the ...lower passages resembling shelves and corkscrews intermingled in a maze which the cave waters followed as they worked their way deeper into the earth."

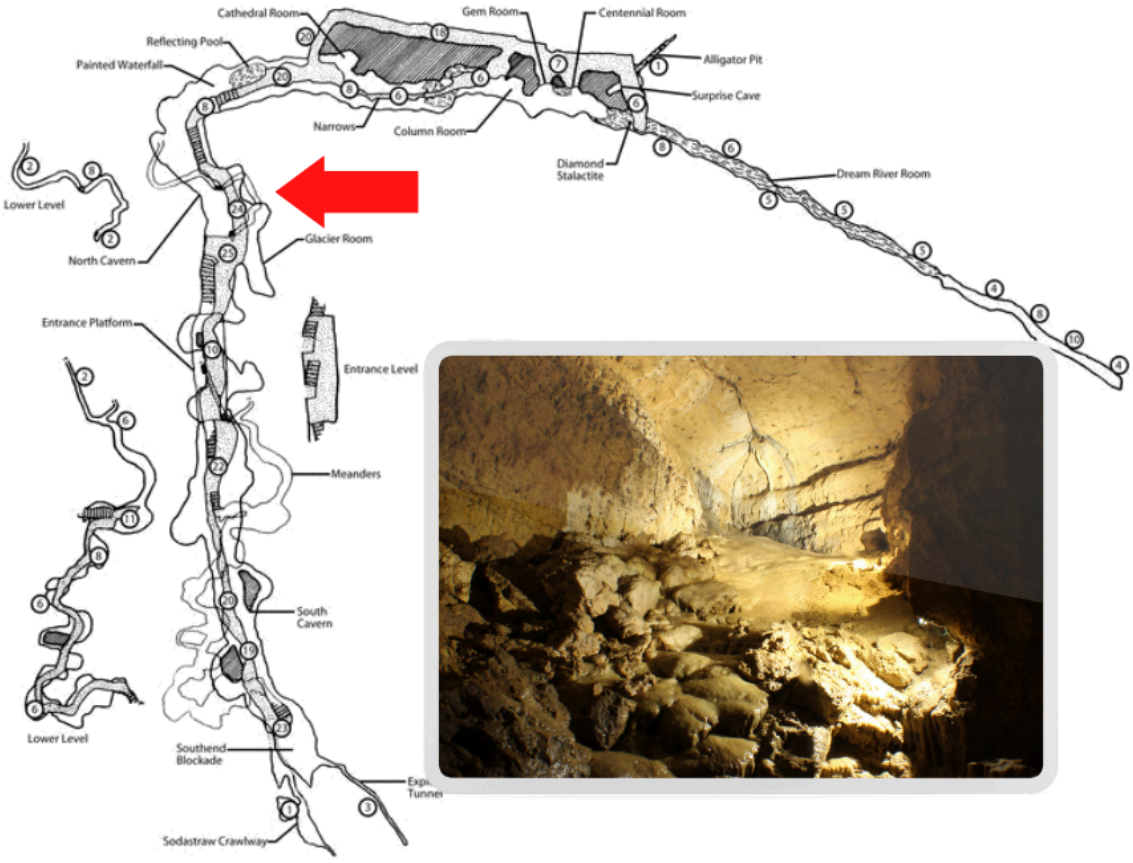
– Alonzo Pond, from the original guidebook

Here we are, back under the discovery spot. When the **Cave of the Mounds** was discovered, the ceiling of the cave fell in here during the quarry blast.

We also find more and more holes in the cement walkway. The holes were started by water dripping onto the new, wet cement; as water continued to drip in the same spots, these holes have probably been enlarged.

Look under the ledge behind you in this room to see the continuing water-carved passageways littered with rubble. This is residual evidence of the discovery day blast that remains today.

Stop 6 - North Cavern



"Here, we have an opportunity to see a cave as nature made it. This is really an unspoiled natural wonder."

– Dr. E.F. Bean, Wisconsin State Geologist, circa 1940

If we look at the ceiling here, we can see several converging fissures in the limestone. This may be evidence that an increased amount of chemical erosion occurred here, making this room so much larger than the others. It also suggests this could have been where 2 caves met.

Look off into the south corner, back toward the direction we just came from. The calcite formation on the floor is called flowstone. Flowstone is a surface coating of minerals, usually calcite, deposited by a flow of mineral-charged cave water. The water is coming from a pool resting just above the top mound at the top of this formation. In the flowstone sits "Sammy the Seal", a seal with his head laying on a rock. Can you find him?

Above the flowstone, way up in the corner is a formation that looks like tree roots, but the roots are thin like a ribbon. This is called ribbon stalactite, or drapery, but some of us affectionately call that "cave bacon." This forms when water trickling along an inclined ceiling or wall of a cave leaves behind a trail of mineral deposits. Over time these strips of calcite stack up on each other to form narrow ridges of calcite.

This is one of the larger rooms in our cave system. It is the transition point to the east cave system. The breakdown over which the stair passes is topped with flowstone which you will see as you pass over the stairs.

See if you can imagine forms in the rock as things from the world above us – a seal on the flowstone, straws in the ceiling, or perhaps a giant footprint or a face. This imagery is an enjoyable experiment in the associations we make with a hearts and minds perspective. Cave tours everywhere are often filled with imaginative names for formations as we strive to make sense of the fantastical scenes we see before us in this underground wonderland.

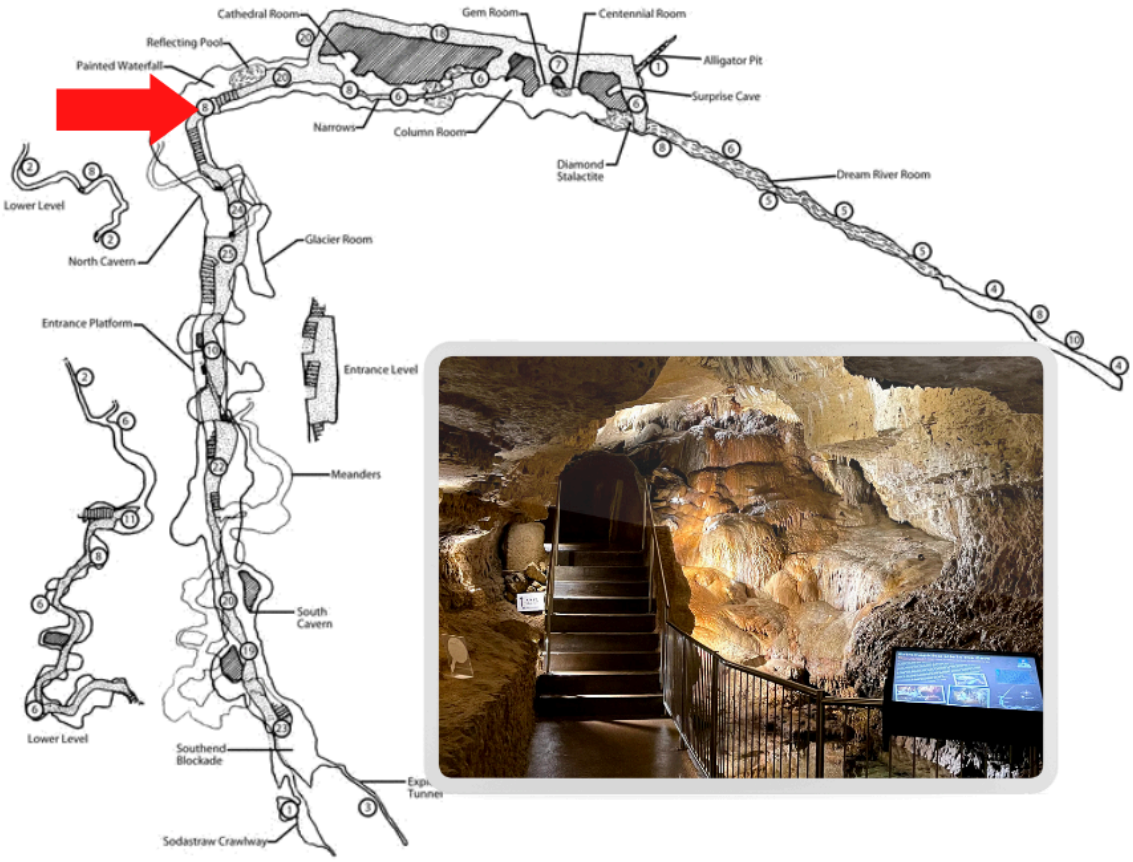
Interview Quotes from Previous Recordings:

“Word spread quickly about this amazing discovery. Geologists advised the Brigham’s to seal the entrance until preparations could be made to protect this geologic treasure.” - Reporter circa 1989

“We knew that it was something that people would want to come and see. And that it should be developed.” - Fred Hanneman Jr., Son of Developer Fred H. Hanneman

“When it comes to natural phenomenon, I can’t think of another thing that has been discovered in Wisconsin since 1939 that begins to have this impact.” - Jack Halzehueter, Historic Consultant

Stop 7 - Painted Waterfall



"When one tugs at a single thing in nature, he finds it attached to the rest of the world."

– John Muir

The flowstone structure next to the stairs has been named the Painted Waterfall. Three different colors can primarily be seen here due to the presence of different minerals. The mineral calcite is white; iron oxide gives us red, orange, and browns; and manganese gives us hues of black, blue, purple, and gray. It is for this abundance of minerals that the Painted Waterfall gets its name.

The Painted Waterfall hides the North collapse, the bottom of our second in-cave sinkhole. This shows proof of how long ago that collapse happened, as you would be seeing large cracks forming in the formations otherwise.

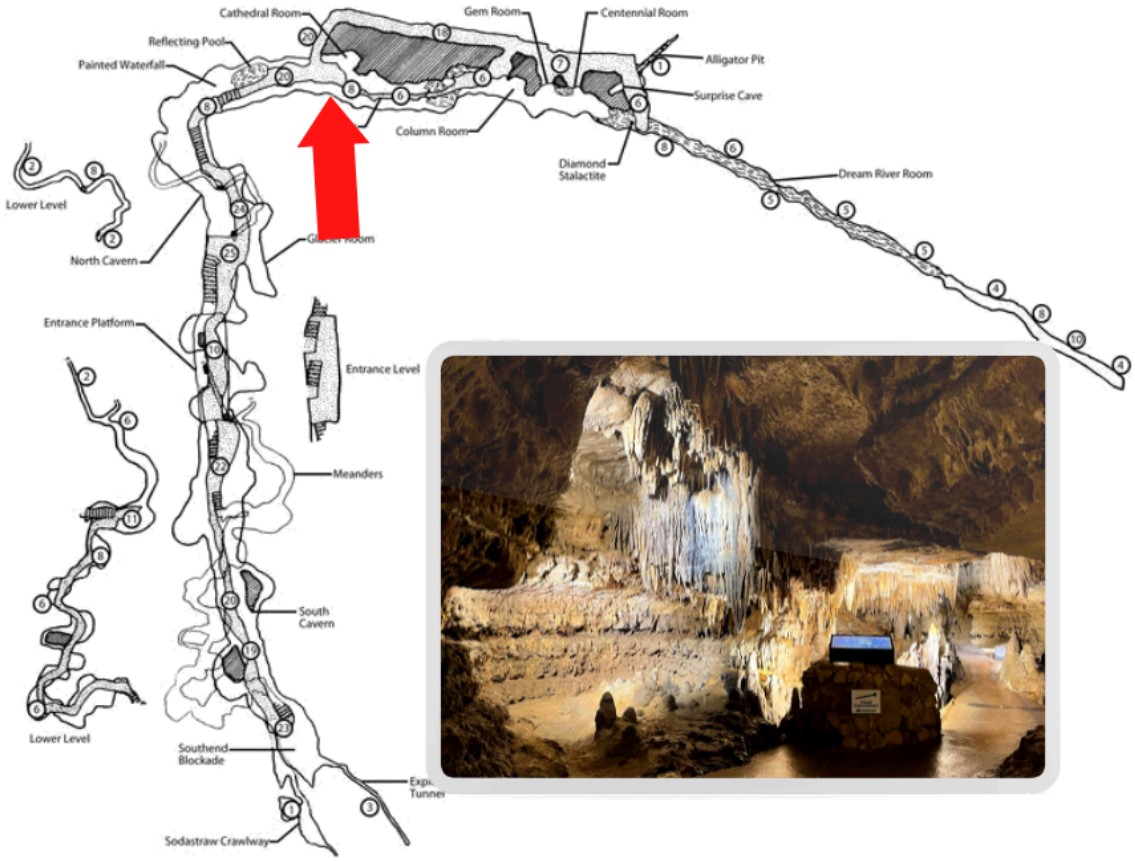
The food chain in our cave is very short: there are three native species in our cave. The first are hexapods called Springtails.The springtails have been primarily observed at the pools, which are rarely, if ever, disturbed. These springtails eat the bacteria in our water. We have two main types of bacteria. One is *Leptothrix*, which prefers manganese, and the other is *Gallionella*, which loves iron. They oxidize the minerals, resulting in the colors that we see throughout the cave.

Slightly above the pool of water is a formation that looks like burnt broccoli. This is cave coral and is a very common cave formation. It comes in many sizes, shapes, and colors, but is most often found in small, knobby clusters resembling popcorn and is sometimes referred to as “cave popcorn.” Cave corals tend to form underwater, indicating to us that this pool used to be much deeper.

Several domes can be observed throughout the cave, the largest of these is above us. It goes 4ft into the ceiling and, if you look down into the water, you’ll see a beautiful reflection of this dome above, creating an optical illusion of the water’s depth. This dome has several possible explanations. Perhaps sulfuric acid is responsible for domes forming, or perhaps cracks in the limestone were arranged in such a way as to allow for rapid dissolution, or perhaps the dome resulted because a smaller cave above the main cavern connected to it as the rock between the two caves dissolved.

Tubular stalactites, or soda straws, are on the ceiling directly over the painted waterfall. These fragile stalactites are hollow in the middle from rings of calcite deposited by water droplets. The water streams down the inside of a soda straw and leaves the calcite deposit on the bottom. Conical stalactites, or icicles, form when the hole in the middle of a soda straw gets plugged and water flows on the outside, causing them to thicken.

Stop 8 - Cathedral Room



You are now crossing underneath **Cave of the Mounds** road. As you move forward from this spot, you will be walking through the bedrock of Wisconsin that lies under the field across the road from the parking area entrance.

This area is called the Cathedral Room. The names “Cathedral Room” or “Chapel Room” come from the array of large stalactites that is reminiscent of a pipe organ. Elizabeth Brigham Rooney, the daughter of the quarry owner, wrote in her diary that “the cave is so lovely, might call it Cathedral Caverns.” The name wasn’t chosen, but we do have this beautiful room for her.

We have had weddings held in the Cathedral Room since the 1970s. The first wedding was between two eccentric guests in 1973. Weddings at **Cave of the Mounds** are quite common and are held multiple times a year.

Do you notice the stalagmite cross section on the floor in the cathedral room? It resembles a tree stump. The rings form when water flowing down over the formation builds up layers of minerals with time. Thicker rings build during wetter periods; thinner during dryer periods. Stalactite and stalagmite rings are not used to determine the age of a formation–the actual growth rings are so small that ten could fit on the width of a human hair. However, the variation in the thickness and coloration of the rings tells much about climate changes during the last 250,000 years.

Nearby, Polly the Parrot is perched on top of a group of stalactites near the pathway to your right. Polly is a stalagmite made of nearly pure calcite, and it is translucent because of this. It is growing on top of a group of stalactites which likely once grew from the bare patch on the ceiling just before the next section. The entire bunch of stalactites broke off long ago, settling upside-down a few feet away from its original location. We don't know how these heavy stalactites fell or flipped over. The presence of water or mud may account for the formation's current position.

Cave conservation and protecting this hidden treasure is a huge priority for us. In 1988, Cave of the Mounds became a National Natural Landmark, a public-private partnership with the National Park Service. It is illegal to damage or remove anything from the cave per Federal Law. All the breakages seen in these rooms were caused naturally by what we hypothesize to have been a powerful flood of water which may have happened several times.

It is impossible to know when every episode of flooding occurred in the cave. Each episode over time has created so much change, shaping the cave into what we see and experience today. We don't know and probably won't ever know. What we do know is that the breakages occurred at least 2,000 years ago because new growth on top of the broken formations has been dated to 2,000±100 years old.

A recent research study has shown that formations in Cave of the Mounds have been growing for more than 250,000 years. Uranium-Thorium dating has revealed that the oldest formation in Cave of the Mounds started to form 257,000 years ago! This is the oldest recorded stalagmite in the Midwest so far and is located in the south cave where we saw the cephalopod fossil.

Interview Quotes from Previous Recordings:

“Elizabeth Brigham Rooney, she was 15 when the cave was discovered.” - Reporter circa 1989

“The part that unnerved me the most, well you were going by flashlight for one thing, and you didn’t know when you were going to hit a drop-off. You could keep yourself from getting stuck. You didn’t know when you were going to suddenly come to water that you couldn’t cross or a cliff that you couldn’t go down.” - Elizabeth Brigham Rooney, daughter of cave owner Charles Brigham Sr.

“Rooney grew up on this property and crawled the cavern the rest of the summer of ‘39. Her father invited Mount Horeb developers to open the cave for business the following spring and since the Cave of the Mounds has hosted more than 5 million.” - Reporter circa 1989

“Lucille Brechler remembers the first risky days of one of Wisconsin’s bigger tourist attractions.” - Reporter circa 1989

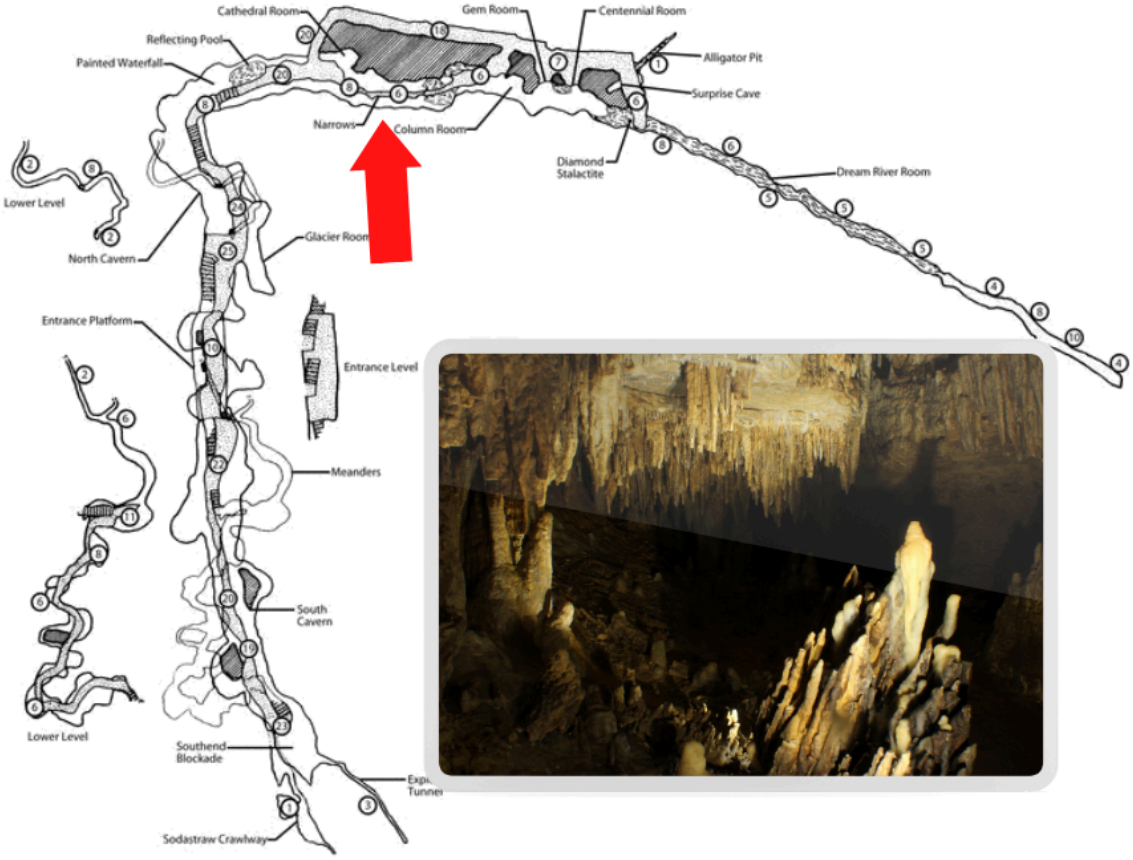
“They took their wives out there and took us in before you had to climb over all of this and just watch your step and everything. And we okayed it. We didn’t know what was going to happen.” - Lucille Brechler, wife of cave developer Carl P. Brechler

“The Brechler and the Hanneman families saw 100,000 visitors a year trudge through the cave in the next 30 years. The kids served as guides and even posed for postcards.” - Reporter circa 1989

“It was a lot of work. We all worked hard. Most of the children and all of the, both families. They all worked there at different times. We had many

wonderful people who worked for us." - Lucille Brechler, wife of cave developer Carl P. Brechler

Stop 9 – The Narrows

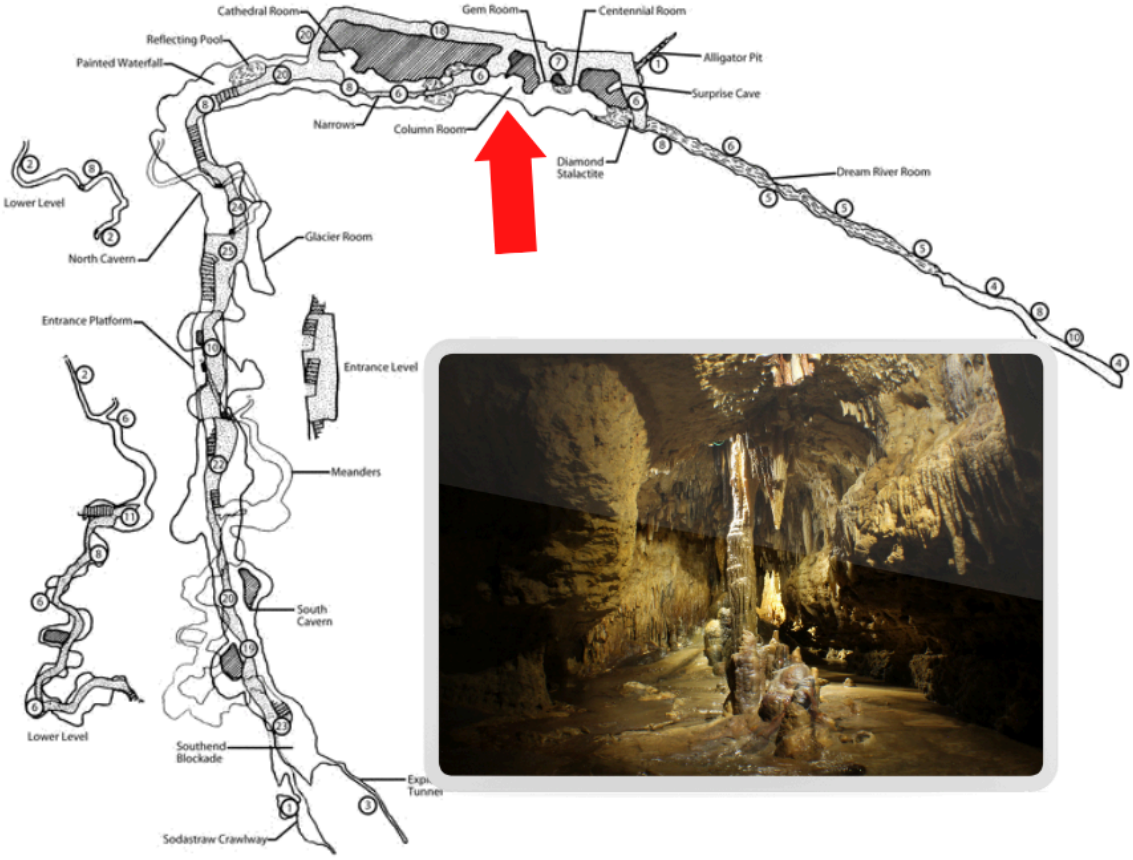


> *"The Earth was transformed through time by imperceptibly slow changes, passing through regular cycles of destruction and rebuilding, many of which we can see around us today."*
>
> – James Hutton, "Father of Geology", circa 1788

The path now proceeds through a passageway lined by a variety of cave formations. As you move through the Narrows, you may have to turn

sideways to pass. Water is on both sides of the walkway and will look deep, which is an illusion created by the reflection. The water is only a couple of inches deep.

Stop 10 – Column Room



"If you were to describe an environment like what you have down here in this cave, you don't realize that–when you're in here–how weird it is. And that the natural environment down here is total darkness… there's so much you can learn. Not just about the cave itself, but how Wisconsin has changed over time. It makes me realize that the world is filled with amazing things, and many of those things are closer than you think. There can be amazing things just around the corner, a hundred feet away, a hundred feet below

ground. There are all sorts of surprises out there and you never know where, as is the nature of surprises, you never know where they're at or where they'll come up. They're out there, and this cave is one of them."

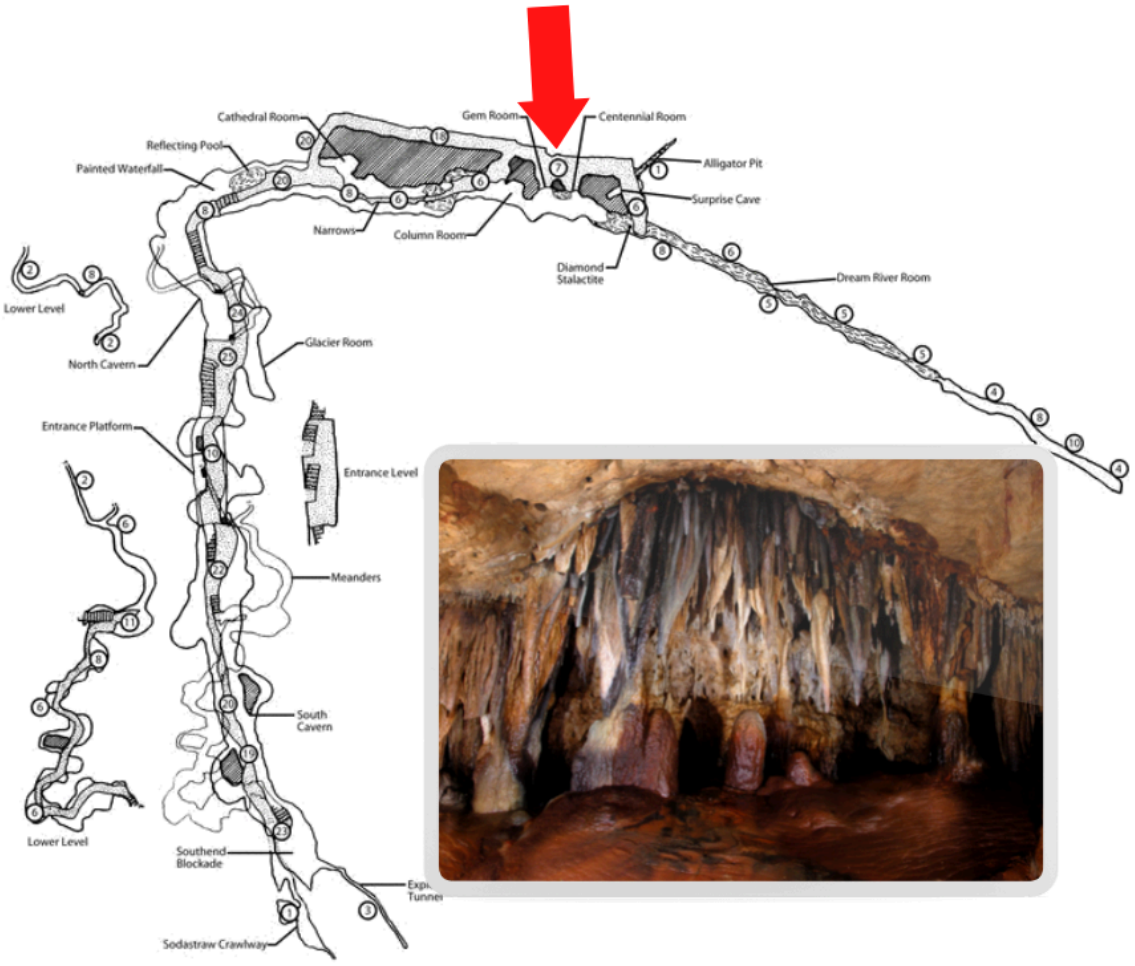
– Dr. Richard Slaughter, Director of the University of Madison Geology Museum

Columns are speleothems that connect the ceiling and floor in an unbroken pillar. Stalactites and stalagmites will often meet in the middle, but stalactites also commonly grow all the way to the ground. Columns are more common the lower the height of the room. Since this part of the cave has 6-9ft tall ceilings, columns are more common than in the first half which had 24ft tall ceilings. Note the large column in this room along with all the smaller columns forming near the ceiling and pools of water.

As you move to the next section of the cave tour, you are entering a man-made tunnel. This tunnel was built in order to protect the cave and its formations as it is too small to safely traverse at this point in the tour.The tunnel was finished in 1957 and allows visitors to view the rest of the cave while preserving the natural beauty of the formations.

Even though this is a man-made tunnel, we continue not to touch the walls or ceiling because we already have formations growing in many areas.

Stop 11 - Beauty Rooms



Interview Quotes from Previous Recordings:

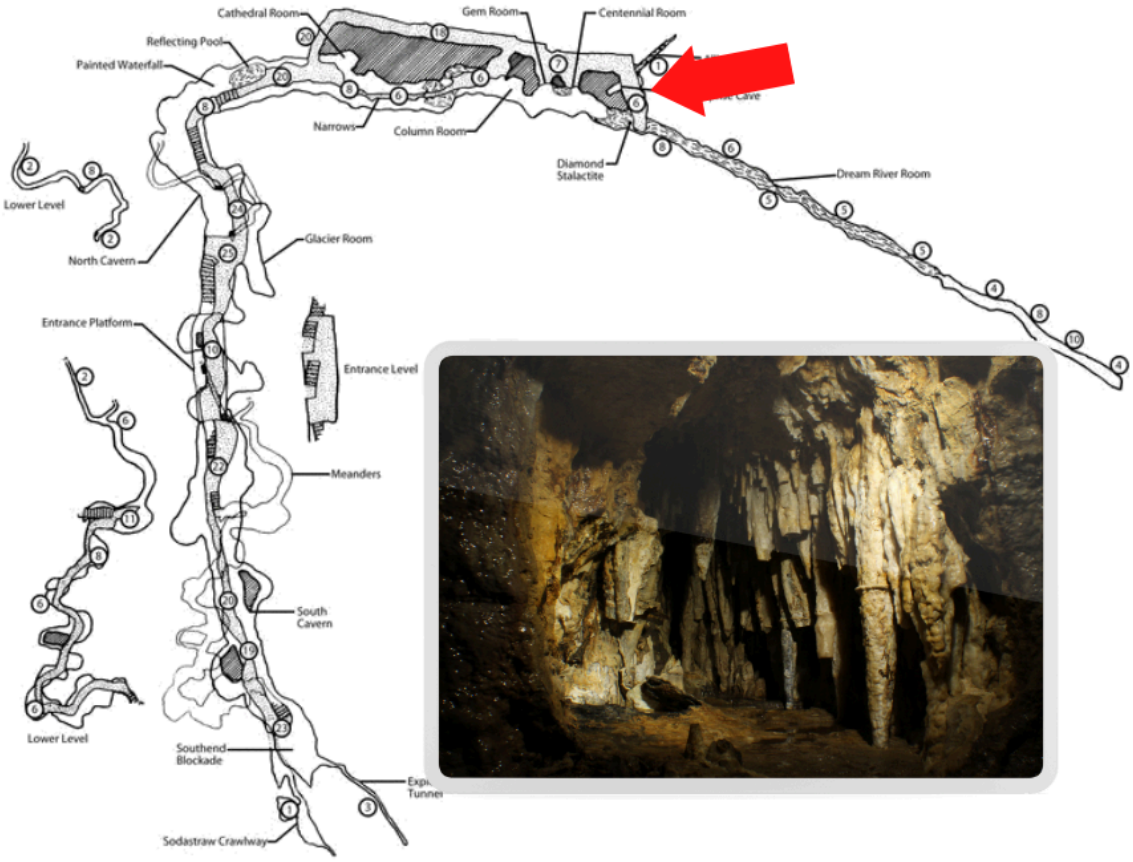
"We knew that it was something that people would want to come and see. And that it should be developed."

- Fred Hanneman Jr, son of cave developer Fred H. Hanneman

These two windows were opened to the public in 1948, providing a glimpse into the variety of formations possible in an underground cave environment. The first window is the Gem Room which was opened in 1946 followed by the Centennial Room in 1948. It got its name because it was open to the public 100 years after Wisconsin became a state.

You can now see an example of almost every type of speleothem within these two windows: cave drapery hangs like curtains, and some stalagmites resemble beehives. Rimstone dams create meandering pools along the flowstone surface, while shelf stone protects a pool that emerges from underneath. A giant column rises from the cave floor to the ceiling.

Stop 12 – Surprise Cave



"I think people look at stalagmites and stalactites and think they're beautiful formations, but they don't realize the wealth of knowledge they also hold about Earth's climate through time."

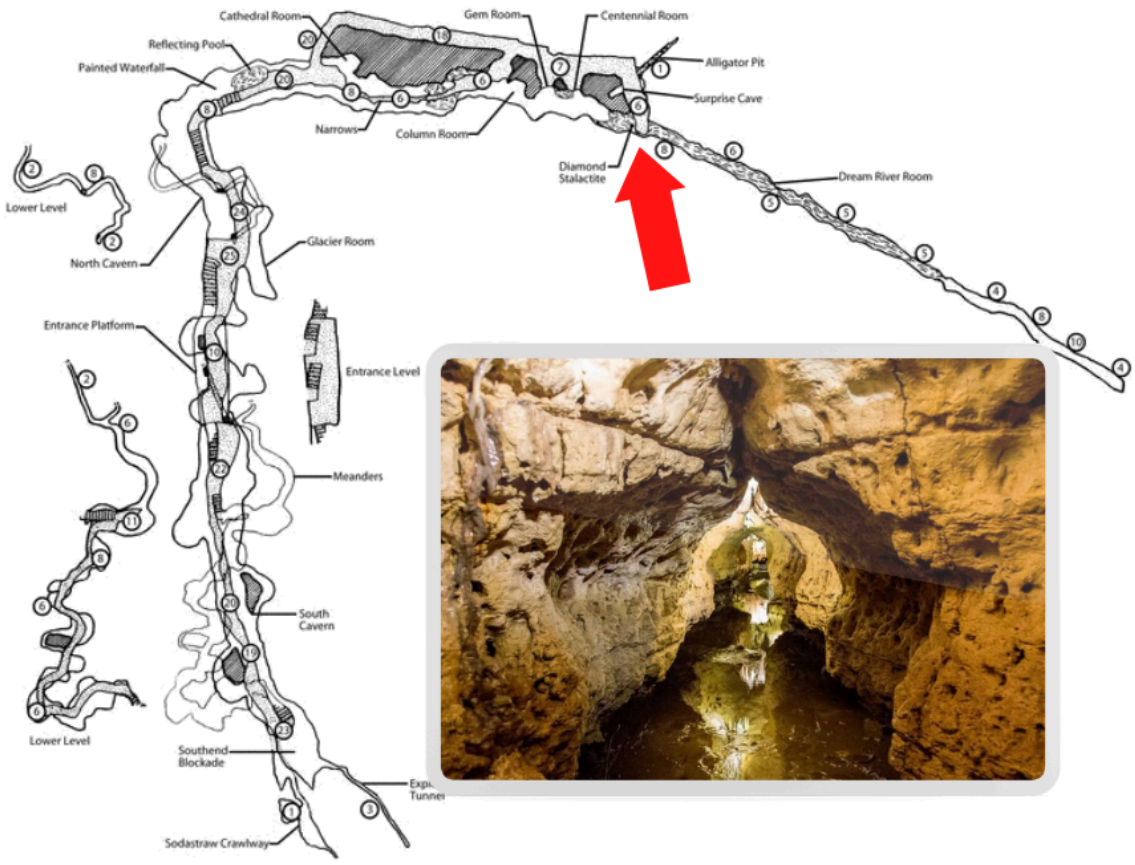
– Dr. Cameron Batchelor, the University of Wisconsin in Madison Geoscience Department

You are still in the manmade tunnel in this space. Looking in the wall to the right, you will notice a small, unexpected cave.

A cave is defined as a hole in a rock that is naturally made and large enough for a person to fit into. This hole is called Surprise Cave. Little caves like these are common in limestone and likely there are several more like it to be found around Cave of the Mounds. At this point in time, we aren't excavating or exploring for any more cave; we believe all of the main system has been discovered and mapped. However, there are several more caves on our park grounds which promise some exciting discoveries in the future.

Below Surprise Cave is a cross section of a cave formation. Pay close attention to how the layers build up, bend, and twist. In this section, a small sample was taken to be dated through Uranium-Thorium dating by the University of Wisconsin in Madison Geo-Science student Cameron Batchelor. She found out that the sample was approximately 121,000 years old.

Stop 13 - Dream River



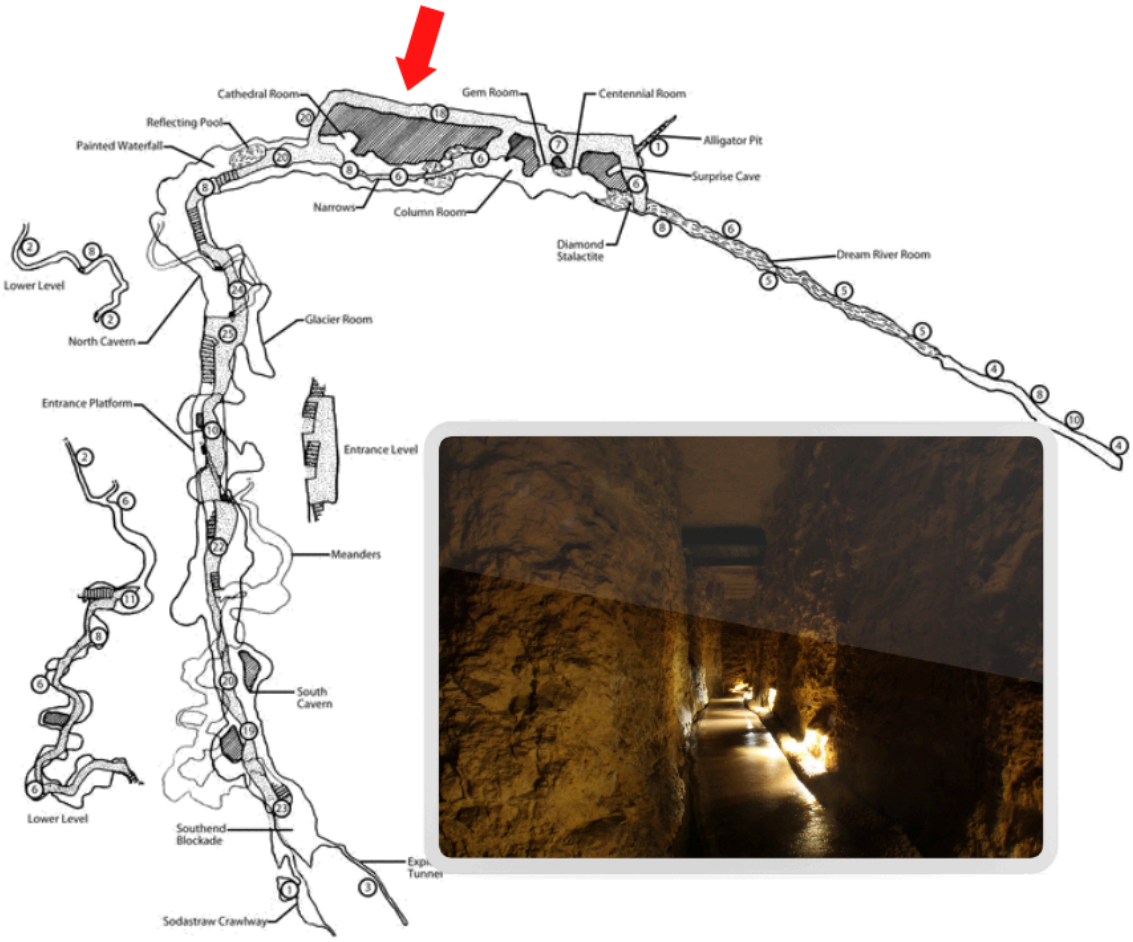
“Look deep into nature, and then you will understand everything better.”

– Albert Einstein

This last section of the East Cave ends at a dome area looking into the Dream River. Dream River is the end of the cave, extending back 250 feet before narrowing sharply at the very end. Despite its name, Dream River is not actually a river as it does not flow in any direction. Because it is so still, the water often holds stunning reflections. This area was once known as “Long Pond” – it is rumored to be a tribute to the first manager Alonzo Pond, and his wife, whose maiden name was Long.

Don’t forget to look up! The cave’s fissure is again over your head along with the Eiffel Dome; it is full of color and an *eye-full* of water! Cave kisses are drops of water that are said to bring good luck to those who receive them!

Stop 14 – High Tunnel



The reason why this tunnel's ceiling is so high was a mathematical error: the contractors estimated the depth of the cave incorrectly during the excavation of the tunnel areas. When they discovered the error, they had already reached the Column room area, which is why the Beauty Room and Surprise Cave areas have a much lower ceiling.

We now continue through the tunnel as we exit the cave. Look up at the ceiling to find the bottom of a mine shaft. Most of the equipment used to develop the man-made tunnel was brought through this shaft. The top of this shaft can be seen in the field across **Cave of the Mounds** Road as you look toward the left from the parking entrance. It looks like a little blue rooftop.

Thank you so much for coming today. We hope you enjoyed the cave and that we inspired you to help protect and preserve natural places.

> *"To find something that you didn't know was here before is really quite astonishing. We haven't had that kind of experience in Wisconsin very much. New discoveries are really unusual."*
>
> -Jack Holzehueter, Historic Consultant