GEOFACTS
OHIO GEOLOGICAL SURVEY • DEPARTMENT OF NATURAL RESOURCES

Ohio Caverns

Beneath the picturesque rolling hills of rural west-central Ohio lies a unique underground wonder. Ohio Caverns is the largest cave system in Ohio at more than 15,700 feet (ft; 4,800 meters [m]) long and is noted for its crystal formations, especially Crystal King (fig. 1).

Historical discovery

Ohio Caverns remained undocumented until August 1897. The caverns were initially described by Robert Noffsinger, a farmhand on the land owned by Abraham William Reams. Noffsinger noticed a sinkhole had begun forming in a low spot in the field and with the help of Jordan Reams, Noffsinger dug into the sinkhole, finding a crack in the limestone bedrock. He broke through the rock and found an entrance to the cavern. This excavated area was opened to the public on September 9, 1897, advertised as Mt. Tabor Cave Tours. The first tours explored over 0.25 miles (mi) (0.4 kilometers [km]) of the cavern system, bringing in hundreds of visitors. Unfortunately, early tourism destroyed much of the natural beauty of this section of the cave system. At the time, individuals were encouraged to remove crystal formations as souvenirs and to inscribe their names and other messages onto the walls.

In May 1921, a local judge ruled on a property dispute that most of the cavern was located under the property of Reams' neighbor, Albert H. Smith. The entrance to the cavern remained on the Reams' farm, whereas the Smith property had most of the cavern. Later that year in August, after several failed attempts, Smith dug 20 ft (6 m) down and found an alternative passage into the cavern, which became the entrance that is used today.

In 1923, Smith bought the Reams' share of the cavern and renamed it Ohio Caverns. With the help of his brother Ira Smith, Albert hired a team to excavate the rest of the cavern by removing mud deposited by the underground river that eroded the tunnels. Electric lighting was added, and the brothers offered paid guided tours. In 1925 when a more striking area of the cavern was discovered, the original entrance of the cavern unearthed by Noffsinger was closed. During the years that followed, improvements to the path and lighting continued, allowing thousands of visitors each year to explore this natural wonder.

Figure 1. Crystal King is an example of a large and perfectly formed stalactite. It has been growing for over 250,000 years and currently measures about 4 ft, 10 in tall (1.5 m).

Geologic setting and formation

Ohio Caverns is located in the southwestern portion of the Bellefontaine Outlier. An *outlier* is a topographically high area of younger rock surrounded by rocks of an older geologic age. Stratigraphically, the caverns provide insight to Ohio's geologic history. The rocks that formed the passageways of the cavern are Middle Devonian-age (394–383 million years ago [mya]) Columbus Limestone. In the area of Ohio Caverns, the Columbus Limestone is about 65 ft (20 m) thick. In many areas of Ohio where the Columbus Limestone is exposed, abundant fossils can be found within the rock; however, few fossils are found in the Columbus Limestone exposed within Ohio Caverns.

At the time of the limestone's deposition, Ohio was located south of the Equator and covered by a warm, clear, shallow inland sea. Sea level rose during the Late Devonian (383–359 mya), and other rock formations, including the Ohio Shale, were deposited. The Ohio Shale is still present throughout the majority of the cave system. At the surface, glacial till (sediments derived from glacial deposits) covers the bedrock that comprises the cavern.

Ohio Caverns is a type of karst formation. Karst features, such as caves and caverns, are formed when soluble rocks, such as limestone, are dissolved by the passage of acidic and non-acidic water through them (fig. 2). A cave can be described as a cavity within the ground that is large enough that a portion of it will not receive direct sunlight, whereas a cavern is a specific type of cave with the ability to grow crystal formations called *speleothems.*

Researchers determined that Ohio Caverns formed from karst processes where dissolution of the limestone occurred along preexisting weaknesses in the Columbus Limestone. During the most recent Ice Age, meltwater derived from the receding glaciers above would have descended downward through these points of weakness, promoting dissolution.

Inside the cavern

Ohio Caverns is a branchwork cavern with at least two levels. Nearly three miles (4.8 km) of passages have been surveyed, but the total length of the cavern is unknown because of sediment infill.

Mineralogically, three types of deposits have formed: bluish-black manganese dioxide (MnO_2), red to yellowish-brown iron oxide (Fe_2O_3), and white calcite ($CaCO_3$). The manganese and iron oxides provide the different hues that brighten the cavern's walls (fig. 2).

Ohio Caverns is covered in sheet-like deposits of calcite called *flowstone*, formed from the flow of water down a wall or along the floor. Cave-deposited calcite is referred to as *travertine flowstone*. It forms by precipitation from water saturated with calcium carbonate dripping from the cavern's ceiling. In turn, travertine forms speleothems throughout the cavern and varying in size from 1 inch (in) to 5 ft long. It takes approximately 500 to 1,000 years for one cubic inch of calcite crystal to form this way. While the cavern already has abundant speleothems, travertine is still actively forming, evidenced by the wet cavern floor and the dripping of water from the ceiling.

Another unique feature to this cavern is the presence of dual formations: reddish-brown iron oxide and white calcite speleothems and flowstone. The iron-oxide formations formed first, with calcite forming later and on top of the preexisting iron oxide, causing the two distinctive cave deposits never to mix.

Spectacular speleothems

The most abundant speleothems are stalactites, stalagmites, and columns (fig. 3). *Stalactites* are speleothems that hang from the ceiling of a cavern room or passage, whereas *stalagmites* are found on the floors and walls forming from dripping water from above. When stalactites and stalagmites join to form a continuous deposit, a *column* is formed. Hollow, small-diameter, thin-walled stalactite tubes, known as *soda straw stalactites*, are visible in many areas of the cavern. Soda straw stalactites are filled with water and continually growing.

Visible throughout the cave and closely related to soda straw stalactites are the most delicate of the cavern's speleothem formations, known as *helictites.* Helictites are stalactites that change their axes vertically at one or more stages during growth, giving them the appearance of defying gravity. They form when a soda straw stalactite becomes clogged at the base and starts growing in other directions.

Visiting Ohio Caverns

Ohio Caverns is located in West Liberty, Ohio, about 60 mi (97 km) northwest of Columbus. It is a privately owned feature that requires an entry fee for all visitors. The temperature in the cavern is a constant 54ºF (12ºC), suitable for visiting in all seasons.

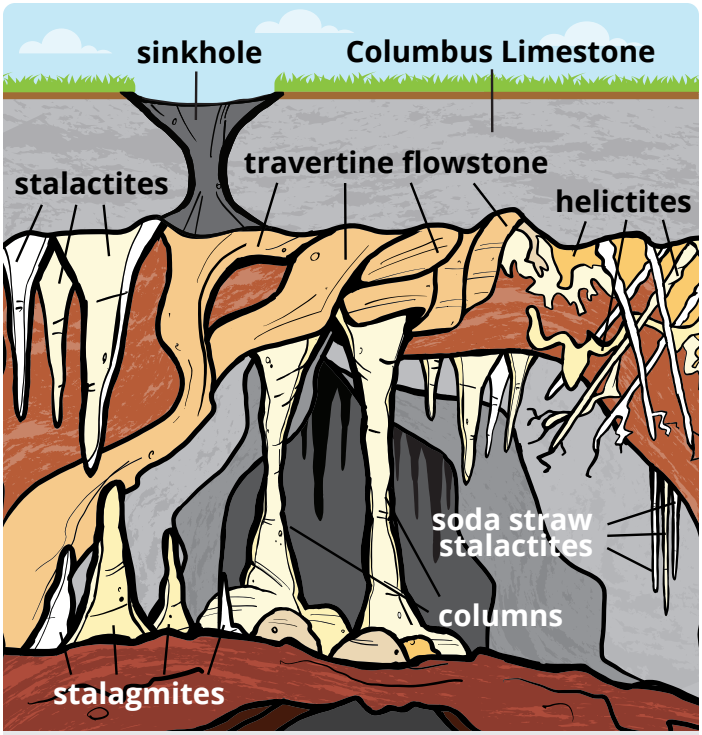

Figure 2. Conceptual illustration of geologic formations that can be observed in Ohio Caverns.

Figure 3. Geologic formations present in the Ohio Caverns include stalactites, stalagmites, travertine flowstone, helictites, soda straw stalactites, and columns. See Figure 2 for a labeled diagram of geologic formations found in Ohio Caverns.

References & Further Reading

Aden, D.J., 2015, Ohio Karst: Columbus, Ohio Department of Natural Resources, Division of Geological Survey GeoFacts No. 31.

Carlson, E.H., 2015, Minerals of Ohio (2nd ed.): Columbus, Ohio Department of Natural Resources, Division of Geological Survey Bulletin 69, 304 p.