

CAVES



IN IOWA

FRONT COVER

A caver studying stalactites and stalagmites in Cold Water Cave, Winneshiek County.

Photo by Mike Bounk



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Approximately one thousand caves are known to exist in Iowa. They vary in length from 15 feet, the minimum distance to be considered a cave, to over 17 miles long, in the case of Cold Water Cave in Winneshiek County, the longest known cave in the state. The average air temperature in Iowa caves is about 48 degrees Fahrenheit. Caves are located mainly in eastern and northeastern Iowa and form in carbonate rocks (limestone and dolomite) through solution of the host rock by slightly acidic groundwater. Such solution results in the formation of sinkholes (naturally occurring depressions due to rock solution or collapse), caves, areas of disappearing drainage (stream flows with no surface outlet), and other features, creating a landscape of solutional karst topography. Karst can also form mechanically, due to blocks of the host carbonate rock gradually sliding on underlying shale.

Solutional Caves

Solutional caves commonly begin with groundwater moving through fractured limestone (calcium carbonate) or dolomite (calcium magnesium carbonate). This groundwater contains dissolved carbon dioxide gas picked up from the air and soil, forming a weak solution of carbonic acid that is capable of dissolving carbonate rock over time. As water moves through the rock, usually following fractures and bedding planes, it dissolves the adjacent rock and widens these fractures or bedding planes. As fractures become wider, more water flows through them, resulting in the creation of conduits and passageways. A cave is a passageway large enough for a person to enter.

Initially a cave is completely water filled, lying at or below the water table. In cross section, a newly formed cave is typically circular or elliptical. Water flows through it as through a pipe, dissolving the rock outward in all directions. These are what are



Cave formations (speleothems) that hang down from the ceiling of a cave are called stalactites and are made of calcium carbonate.

known as *phreatic* (water-filled) conditions. Later, if the water table falls, the cave will be partly drained. The remaining water occupying the lower part of the cave forms a stream, similar to a surface stream. Once this stream is formed, enlargement of the cave is then usually limited to erosion of the stream bed. These mostly air-filled conditions are called *vadose* conditions. The stream commonly cuts a vadose canyon below the original phreatic tube. The lower part of this canyon will often be refilled by clay, mud, and gravel in areas where flow has slowed. This can occur upstream of a pile of collapsed ceiling or wall rock, known as *breakdown*. Also, where a stream flows over an irregularity in the floor it sometimes deposits calcium carbonate, forming a *rimstone dam*. The resulting pool upstream from the dam can then fill with sediments as well.

As water continues to flow through the air-filled part of the cave it often deposits calcium carbonate in the form of speleothems such as stalactites, stalagmites, bacon rind, soda straws, and flowstone. Water dripping from the tips of stalactites (hanging from the ceiling) can form stalagmites, which build upward from the floor, drip by drip. Publicly accessible



Cold Water Cave, shown in both photos, contains spectacular speleothems, including stalactites, stalagmites, bacon rind, soda straws, and flowstone. Note the detailed texture of the flowstone and the depth of the stream (about 3 feet) in the close-up photo to the right.

caves in Iowa with actively growing formations include Spook Cave near McGregor and Crystal Lake Cave near Dubuque, two commercial caves. The best example is Cold Water Cave, which is almost entirely privately owned and not normally accessible to the public.

Mechanical Caves

The karst terrain in which mechanical caves are produced occurs along the Silurian Escarpment (a ridge of 430 million-year-old dolomite running northwest to southeast through southern Clayton, Dubuque, and northern Jackson counties), as well as in other areas of northeast Iowa. Water seeping down through the dolomite lubricates the underlying shale and softens it. This can result in blocks of dolomite, under the

influence of gravity, sliding and often rotating out from the main outcrop, creating abundant sinkholes, underlying fracture networks, and caves along most of the escarpment. In winter, cold air flowing through this network cools the rock. In spring, snowmelt and rainwater enter these openings, sometimes freezing, and in the summer, chilled air flows from these slopes. This results in what are termed *algific slopes*, which harbor vegetation not normally found this far south, as well as species of vegetation remaining from the last ice age (which ended approximately ten thousand years ago). A few caves in these slopes contain ice far into the summer. The best known example is Decorah Ice Cave, which occurs well north of the Silurian Escarpment.

Human Uses

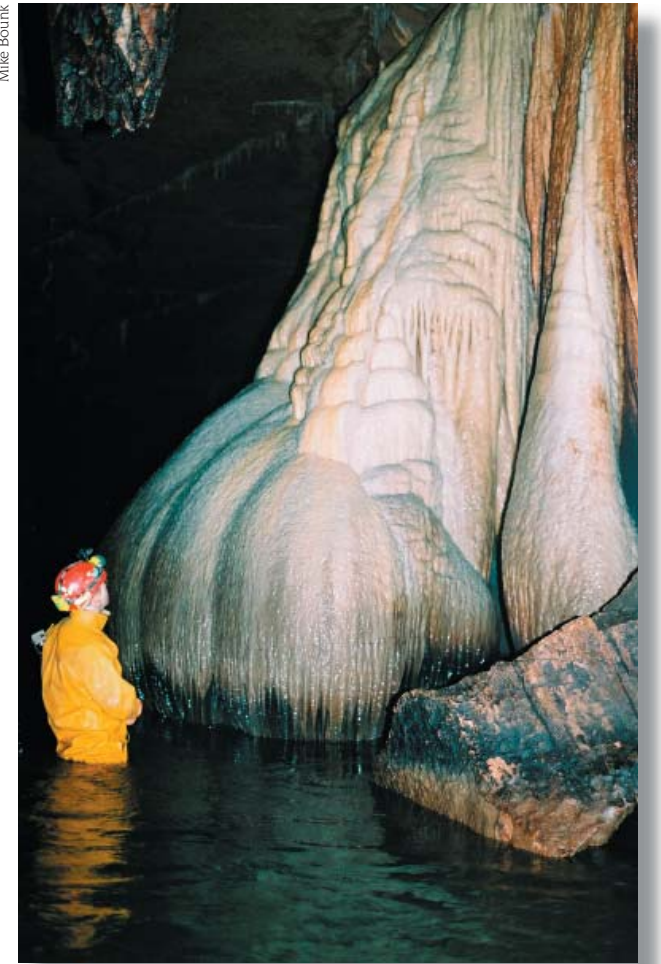
Prehistoric humans used caves in Iowa for shelter. Even today, prehistoric pictographs can be seen on the walls of some caves. Later uses have included the mining of lead and zinc ores from caves in the Dubuque area, and obtaining ice from ice caves during the summer. Water flowing from springs (presumably fed by caves) has been used to run mills and supply fish hatcheries, such as the hatcheries at Siewers Springs near Decorah and Big Spring near Elkader. Cold Water Creek, which the Iowa Department of Natural Resources stocks with trout, originates from Cold Water Cave. Popular public use areas exist around caves, such as Dutton's Cave County Park near West Union and Maquoketa Caves State Park near Maquoketa. Caves are visited by cavers both for recreation and scientific studies, such as mapping, water quality research, and cave development, as well as studies to understand climate change.

Conservation

Never disturb anything in a cave. A damaged formation will take thousands of years to repair itself, if ever. In the case of an actively growing formation, even touching it or getting mud on it can cause damage. Don't leave trash, litter, or anything else behind. Also, be sure not to disturb bats during their hibernation from October to March, as they can die if disturbed.

Safety

Caves can be very dangerous. Never cave alone. Always make sure someone knows where you are going and when you will be back. Take proper equipment, including a hard hat, multiple light sources, gloves, boots equipped with cleats, and warm clothes that can insulate even when wet. Proper clothing can include a full wetsuit. Listen to weather forecasts and heed them. Never go into an unknown cave or one that is likely to flood when rain or snowmelt may occur, as caves can flood quickly.



Get proper training. Locate a group of experienced cavers, commonly known as a *grotto*, in your area. These knowledgeable cavers can teach you specialized skills such as rope work, which is done on special low stretch ropes, not with clothesline or hardware rope.

To find your local grotto, contact the National Speleological Society, 2813 Cave Avenue, Huntsville, Alabama 35810, (telephone 256-852-1300, email nss@caves.org). Visit their web site at www.caves.org