On The Mountainside
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"Walking on the Moon"

Two writers explore underground wilderness through the eyes of those who research it.

Clues to the Underworld

Sandy Hevener explores the underground wilderness of caves through their signs above ground.

by Sandy Hevener

I'm much more of a surface sleuth than a caver these days. Funnel-shaped depressions on the mountainside and deep fissures in rock outcroppings conjure images of underground treasure for me – the unique smell of rich subterranean mud, the echo of a water drip many chambers away, a fragile crystal helictite, all part of delicate hidden ecosystems.

Caylx Creek. Bill and Juliet Balfour take a lunch break while trekking into a virgin (unexplored) passage in a Bath County, VA, cave with Phil Lucas. *Photo by Phil Lucas*

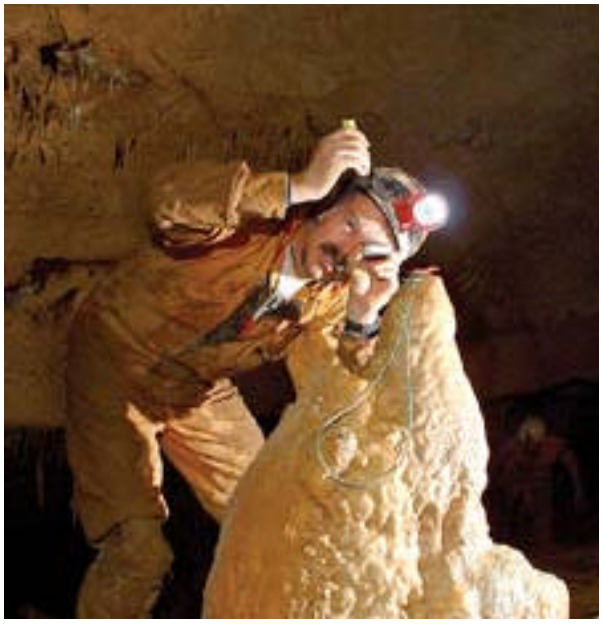
While much of nature slumbers on the surface this time of year, life abounds underground and signs of the caves below appear. Long rays from the setting sun on fresh snow accentuate a line of sinkholes in karst pasture. When the dew point is high, warm air rising from cracks in the earth's surface can emerge as visible vapor.

While I imagine a maze of cave passages below, Phil Lucas, collector of speleological data, past-president of the Virginia Speleological Survey and a lifelong cave conservationist, is quick to point out that people cannot get into most caves.

"We are starting to realize more and more that most caves do not have entrances," he says. "As many as 90 percent don't."

He says sinkholes may be a sign of a cave, but a ceiling collapsing in a cave room does not cause all sinkholes. Underground water channels can remove soil and cause a depression on the surface above.

Although cavers can't reach all caves, what people throw into sinkholes can – and it's not just pesticide residue in a discarded can that threatens life underground. Brush and dirt, things people commonly believe are benign, can cause detrimental chemical imbalances. Filling in a sinkhole prevents surface water from entering the underground drainage system and reduces nutriments for creatures inside.



Surveying cave passages. Dave Socky uses a compass to take a reading, which will aid in mapping the cave later. *Photo by Phil Lucas*

Bat colonies may be caves' most famous occupants, but they aren't the only ones.

"Most are small critters, many rare species, small crustaceans, insects, isopods," says Lucas, mentioning a mysterious freshwater shrimp discovered in a cave near Grand Caverns in Virginia. Then cave biologists found it in other places. They postulated it is the descendant of an ancient ancestor that lived in a shallow sea reaching beyond Harpers Ferry, WV. "Caves are time capsule things."

Federal laws protect caves on federal lands. State laws in Virginia, North Carolina, West Virginia, Tennessee, Georgia, Maryland, Kentucky and Alabama also safeguard caves. It is against the law in those states and others to vandalize a cave or cave gate. In general, it's illegal to do anything that damages the cave or harms living things in it.

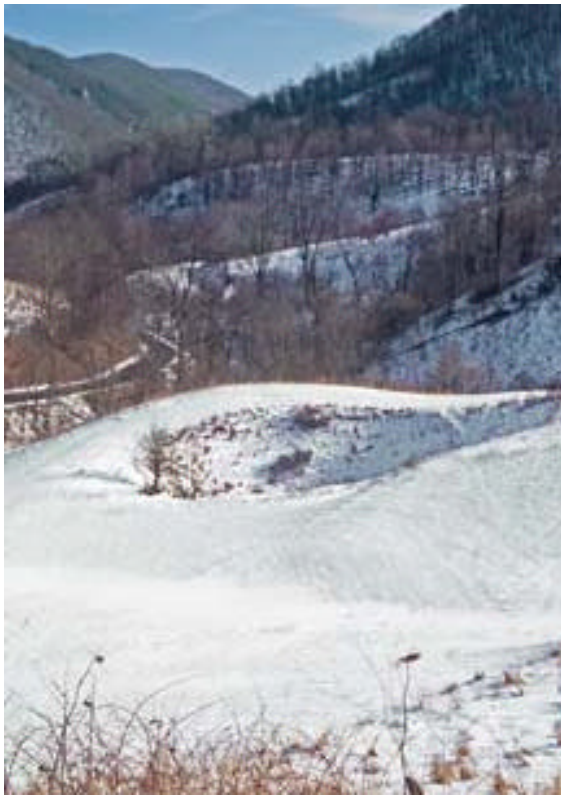
Most of the above states have laws protecting cave owners from liability charges if people using the cave for scientific or recreational purposes injure themselves. Most also prohibit putting anything in a sinkhole or burning things in one. Most require permits for scientific studies that disturb paleontological or natural features in a cave.

I'm standing along a mountain road at the head of a long valley. While looking at the intermittent stream below, I imagine underground passages between several sinkholes in the adjoining karst pasture. A small gap in the rocks below attracts my attention and I toss a small stone in it. It doesn't make a simple bonk. The hole emits increasingly deeper clunks and a full three seconds after what I think is the final sound, a thud ricochets out the hole. I vow to ask Rick Lambert about it the next time I see him. He practicably grew up in a cave.

His grandfather owned a small commercial cavern, but Lambert's interest took an altruistic turn. He's very involved in a project to survey all the caves in Highland County, VA. So far they've recorded 308 and surveyed 243 of them. When I ask Lambert about the hole in the rock pile, he's already been through the slit where I tossed the stone and to the bottom of the pit below.

"Why survey caves?" I ask.

"It's to fully document the cave," he says. "We do a physical survey, but also biological, paleontological, historical and geological surveys."



Sinkhole – cave or no cave? Winter emphasizes the hollow created by this sinkhole in Highland County, VA. *Photo by Sandy Hevener*

Cave surveyors get inquiries from people placing cell towers, transmission lines and building roads.

“The formations are nice, but our objective is to record a cricket species, unusual small formations, folds in the limestone,” says Lambert. “Things you might overlook if just walking through.”

LONGEST CAVES IN BLUE RIDGE STATES

		Length (miles)	Depth (feet)
Kentucky	Mammoth Cave (World's Longest)	367	379
West Virginia	Friars Hole	45.5	628
Tennessee	Blue Spring Cave	33.4	233
Virginia	Omega System	23.2	1263
Alabama	Fern Cave	15.6	536
Georgia	Ellison’s Cave	12.1	1063

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EXPLORE AND MAP WILD CAVES

More than 200 grottos associate with the National Speleological Society. Grottos, in this case, aren’t the ones underground but organizations or chapters of the NSS devoted to studying, exploring and conserving cave and karst resources. To find one near you go to: www.caves.org/io/grottos.shtml

Click on your state in the map for local organizations or contact The National Speleological Society, 2813 Cave Ave., Huntsville, AL 256-852-1300. nss@caves.org —Sandy Hevener

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Exploring the Antibiotic Potential of Caves

By Mikel Chavers

With underground cliffs that rise up hundreds of feet on either side, the stacked ledges make for a great foothold, framing the view to the bottom of the cave floor where a crystal clear stream of water flows. The hollowed-out areas form tunnels that wind through the expanse of darkness, lit only by headlamps from a team of four cavers. Some passages are so tight that passing through them seems impossible. But the cavers climb, squirm and walk on vigilantly.

Here in this Kentucky mountain cave, microbiologist and Northern Kentucky University Professor Dr. Hazel Barton and her crew are conducting microbiology research in hopes of eventually retrieving antibiotics from newly-discovered cave microbes.

The idea behind her research centers on unique organisms, living in a very starved environment, found in caves like this one.

“Some of these organisms could be quite useful,” Barton says. After Barton completed her doctorate in 1996, she discovered there might be antibiotics in caves – harvested from the microbes that call the harsh environment home, feeding from the toxins in the cave surroundings and using those as nutrients.

In this unique environment, underneath Kentucky mountain farmland, little fuzzy bats cling to the walls sparsely, almost hidden from view. The caving team tries not to make loud noises to avoid interrupting the mammals’ hibernation – a crude awakening that may eventually kill the creatures. They climb on, carrying hard, protective cases filled with research tools and cave mapping devices.

Barton always caves with a team of experienced cavers, students and sometimes beginners. Eric Weaver, a friend, often accompanies Barton as she conducts research and together they also map caves. Caving is a part of Weaver’s life – he began caving when he was barely able to walk and now caves with his wife, Janeen Sharpshair, and 13-year-old son, Aeron. Barton’s research has fascinated Weaver.

“It has allowed me to look at a cave from a new perspective,” he says.

“Things that appeared to be just white specks on a passage wall or dissolved limestone on the ceiling now makes me pause and wonder what is going on there.”

On this particular trip, Barton’s crew was made up of Weaver, Bob Yuelling and a beginner caver, Adam Boze.

“Caving is great,” says Yuelling. He’s middle-aged with a 25-year-old daughter and enjoys just getting out of the house. Caving, for him, is the ultimate way to relax.

“One more drop, just one more drop,” says Barton and she scrambles around the outskirts of the large underground room, looking for droplets of water forming on the ledges lining the cave walls. It was imperative to fill a vial full of drip water – another clue to unlocking the mystery of the cave microbes and what they feed on. This particular data may also lead to unlocking some funding for more cave research, according to Barton.

In fact, most of Barton’s research is conducted in Kentucky caves, an area she says is plentiful with these underground caverns.

“There are just caves left and right that we are finding all the time. Some of them are just caves, others are incredibly beautiful caves, very highly decorated. And some of them have got the weirdest microbiota in there that I’ve ever seen,” she says. “There’s a lot to do.”

Such as studying the cave in Wayne County, called Grayson Gunner Cave.

“There’s a river coming out of this mountain,” Barton says. “You have to walk upstream, and in places you have to swim because it’s so deep. And, when you look up, the entire walls and ceiling are covered in microbes.”

“To me as a caver who’s been caving for 20 years, three to four years ago, I would have said: that’s just rock,” says Barton. “But now, I know that the slight color variations, the slight changes in texture… there are places in this cave where the microbes have chewed into the rock about half an inch, and the rock is soft. You can put your finger in there – it feels like toothpaste, and that’s because the microbes have pulled nutrients out of the cave right there.”

Barton, on top of her research and teaching at NKU, is also a director of the National Speleological Society, which has member cavers across the Appalachian region.

For Barton, the Appalachian region is currently her caving home after doing extensive caving and cave surveying in Colorado.

“In fact, most of the areas we work would be considered Appalachia,” she says. “But Kentucky is fantastic because the caves are hardly impacted, there are so many caves and so few people that go caving.”

Underneath a cow field of a local farmer, the team pauses to survey and map the private cave, something that cavers often do to help preserve and protect the caves for future cavers – an ideal held at the NSS.

“There are a lot of known caves in Kentucky; however, the vast majority of these caves have never been mapped,” Weaver says. “There are the caves that we occasionally come across that nobody has ever been to. The experience of finding an unexplored cave or passage is pretty much akin to walking on the moon.”

Mapping caves is not only important in the protection of them, but also to help scientists to better understand the harsh environment, according to Weaver, an experienced surveyor.

In this cave, the blue stream was like a pathway of white-bluish smudge, painting its way through the passages where the team was surveying. Barton found the water in the stream was more acidic than she had anticipated, another small discovery that lit up her face. Discoveries like these are not uncommon on her adventures underground.

Top 10 tips from the expert (what every cave explorer should know)
—Dr. Hazel Barton, caver for 20 years, cave explorer, microbiologist

1. Get the appropriate training. “Without training, caves can be an incredibly dangerous place, with unstable rocks, slippery slopes, deep pits and a complete lack of light,” Barton says. “I think everyone who’s interested in visiting a cave needs to go with an experienced cave explorer or caver because there are a lot of people that get hurt and injured if they don’t do it right.”

2. Always tell someone where you are going and when you will be back. Barton learned this one for herself. “In the past, I’ve been in a cave when the entrance collapsed. It was a pretty easy cave, so we hadn’t told anyone where we were going – if we hadn’t been able to dig our way out, we’d still be there now!”

3. Always carry three sources of light and backup batteries.

4. Always wear a helmet. “Caves are unstable and have ceilings,” Barton says.

5. Carry enough food and water for the duration of the trip within the cave.

6. When climbing, it is important to maintain three points of contact with the rock. "That way, if you lose a hand- or foot-hold, you will be able to prevent a fall," Barton says.

7. On the way into a cave, look behind you to see where you've been – a cave always looks different on the way out. "Every time you get to a junction you have to look back and see where you just came from," Barton says.

8. If you need help, don't be afraid to ask for it.

9. If you aren't sure where you are in the cave, stop. Wandering around aimlessly can make the difference between being confused and being lost.

10. Remember the caver's creed: Take nothing but pictures, kill nothing but time, leave nothing but footprints.