

Echoes underground . . .

Special topography yields defining features

People have been living in and visiting the Allegheny Highlands for centuries. Most were attracted to the region's forested mountains and pastoral valleys, while others came for its prized trout streams and scenic rivers. Generations of travelers and even presidents have come to take the healing waters of springs in such namesakes as Warm Springs, Hot

The World Beneath

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Springs, Bath Alum, and Healing Springs. Yet even though the springs are well known, few people understand the unique geology and biological diversity in the underground world that exists beneath our feet.

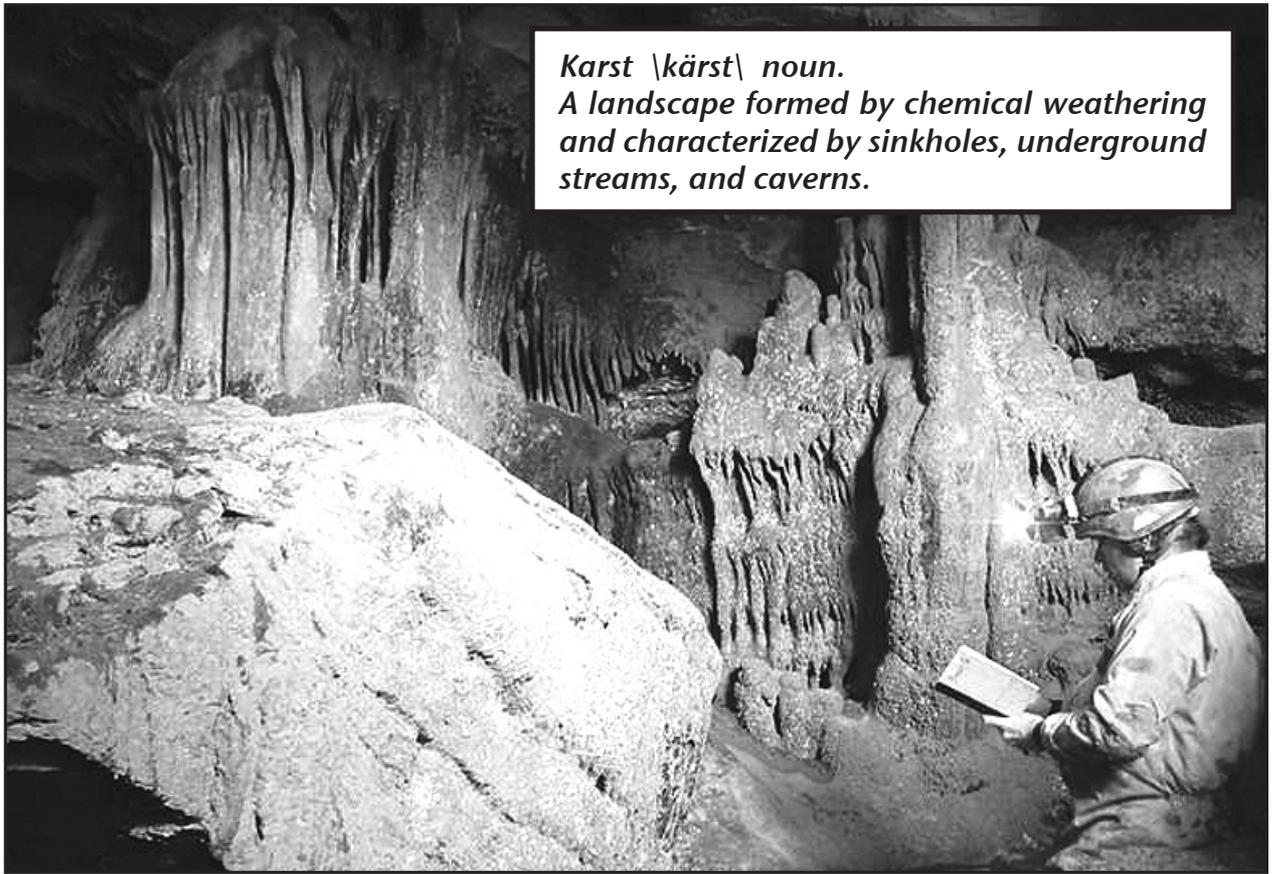
An interconnected landscape of caves, sink holes, sinking creeks, and springs, full of rare creatures and unusual rock formations, lies throughout the Allegheny Highlands, mostly out of sight. Carved by the corrosive forces of chemical weathering, this unique landscape is known as karst, a term derived from the Kras region of Slovenia. In fact, a visit to this south-central European country would reveal a rolling topography not unlike the Allegheny Highlands. Although karst landscapes are found throughout the world, from Ha Long Bay in Vietnam and Kinta Valley in Malaysia, to the Maya Mountains in Belize and Marble Canyon in British Columbia, some of the first scientific research dates to studies of the Kras region east of Trieste, Italy that once was considered part of Yugoslavia.

Regardless of the geographic location, karst landscapes develop on soluble bedrock, frequently limestone. As rain falls and passes through the soil, it picks up carbon dioxide and becomes slightly acidic. Exposed to this solution, limestone bedrock slowly dissolves along cracks and crevices, and the enlarged openings allow even more water to penetrate. Over centuries, larger openings in the bedrock develop and long, interconnected underground passages form. Mammoth Cave in Kentucky, with its 367 miles of passages, is one of the largest karst features formed in this manner. The Allegheny Highlands' own Burnsville Cove area has more than 63 miles of mapped cave passages.

We may think of most karst formations as being underground, or subterranean, but many key features are visible from the surface. Sinkholes, also called dolines, are among the most common of these and usually resemble funnel-shaped depressions or holes. Large sinkholes can often be observed from aerial photos or topographic maps while smaller features, especially forested ones, are more subtle. Rain water, along with surface runoff, flows into these depressions and drains underground.

Water which drains into sinkholes moves through a system of crevices and passages while collecting with water from other sinkholes and groundwater sources. Eventually the flow will emerge to the surface in the form of a spring. The entire trip from sinkhole to spring can take a few hours or several days and some water can remain underground for decades. Once at the surface, water travels downslope through streams, continually picking up additional water from other springs and seeps. In karst landscapes, it is not uncommon for a stream to completely sink below ground leaving a dry valley on the surface. A sinking stream may remain underground for miles before once again emerging as a spring.

Caves, often defined as an underground crevice large enough for a person to enter, are likely the most recognizable karst formations. They may form beneath sinkholes, at the emergence of springs, or at the entrance of a sinking stream, but their presence does not define a karst region. Caves are also formed by lava flows, wave action, or even melting ice, all non-chemical processes. In karst landscapes, caves are often completely or partially filled with water and



Karst \kärst\ *noun.*
A landscape formed by chemical weathering and characterized by sinkholes, underground streams, and caverns.

Greg Clemmer, president of Butler Cave Conservation Society, observes Quarry Cave in Bath County. (Photo courtesy Phil Lucus)

many serve as aquifers providing essential drinking water for their communities. As calcium and other minerals are deposited by the flowing and often slowly seeping water, beautiful and intricate formations may develop on cave surfaces. Stalactites, stalagmites, flowstones and columns are among the most common of these. In addition to their unique geology, the dark and cool conditions allow caves to harbor a diversity of wildlife species, such as bats, salamanders, crayfish, beetles, and other invertebrates. Many of these species are rare and found only in specific caves and nowhere else in the world.

Editor's note: The Allegheny Highlands Environmental Council is a networking group of environmental organizations and concerned individuals dedicated to implementing environmental education and stewardship projects. AHEC

operates as a regional environmental alliance serving Bath, Highland and Alleghany counties in the western highlands of Virginia. "The World Beneath Your Feet" is an education project of the council with financial support from the Virginia Environmental Endowment and the Virginia Department of Conservation and Recreation. Primary partners in the project are Virginia Hot Springs Preservation Trust, The Nature Conservancy, Mountain Soil and Water Conservation District, and the Virginia Department of Conservation and Recreation. Regular features on this fascinating topography will appear in The Recorder all year. Watch next month for "The World Beneath," exploring the world of cave biology and how creatures survive in an environment without light.



These sinkholes are located in the classical karst landscape of Slovenia. (Photo courtesy William K. Jones)