

Mysterious Life of Caves



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Deep in the heart of the Guadalupe Mountains in southern New Mexico, rock-eating microbes are at work. But their appetite is dainty compared with the voracious hunger their ancestors had millions of years ago when they carved some of the most impressive caves in the world. NOVA reports on a revolutionary theory of cave formation that has startling implications for the development of life on Earth and other planets, on *Mysterious Life of Caves*.

In a program of startling beauty, NOVA descends through miles of twisting, plunging caverns, including some of the most exotic in the world, off limits to all except researchers. NOVA was given special permission to film in these fragile, often perilous places that have turned the science of speleology on its head.

For all its evident risks, speleology is a science in which women are especially prominent, including several featured on NOVA: microbiologist and Mars specialist Penny Boston; geologist Carol Hill; biologist Diana Northup; and geologist Louise Hose, among others.

One of the caverns NOVA visits is the active and dangerous cavern Cueva de Villa Luz in Mexico, which emits the toxic, rotten-egg smell of hydrogen sulfide from its entrance. Inside, explorers must wear respirators and carry poison gas monitors to protect themselves from the hydrogen sulfide that reacts with water in the cave to form caustic sulfuric acid. Deep within, they discover “snottites,” mucous-like stalactites of sulfur-eating bacteria that also drip sulfuric acid. Oddly enough, the noxious environment teems with microbes, spiders, insects, crabs, and fish—all thriving in complete darkness.

Sulfuric acid is not just produced in caves by snottites but also deep underground in oil deposits, where microbes consume oil and release hydrogen sulfide gas, which rises through rock fissures and combines with ground water to produce sulfuric acid. To scientists, the biggest surprise is that this Earth-transforming process is connected to life—especially life where no one expected to find it, since caves were long considered virtually sterile environments.

Dubbed “extremophiles,” these newfound organisms, living beyond the margin of what was considered possible, are turning up in more and more environments—from hot springs at Yellowstone National Park to volcanic vents at the bottom of the ocean. Some scientists believe these bacteria descend directly from the earliest life forms that emerged on Earth some 3.5 billion years ago.

They may even be our best guess of what life is like on other planets—buried beneath the surface of Mars, floating in the oceans of Jupiter’s moon Europa, and otherwise thriving in extreme conditions throughout the cosmos.

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