Bacteria at UMass `infect' TV program

The Discovery Channel will air a show featuring the Amherst lab and its tiny organism.

By FRED CONTRADA
Staff writer

AMHERST - They're nearly as old as the Earth itself and virtually everywhere, but no one knew they existed until a few years ago. Now, thanks to a University of Massachusetts professor and the Discovery Channel, they will star beside Bigfoot in their own television show. Just don't expect much from the close-ups.

The mystery star is a bacteria called geobacter metalireducens, and it takes about 10,000 of the sausage-shaped organisms lined end to end to span an inch. In science, however, size isn't everything. Whereas Bigfoot is known to strike fear in hikers and otherwise does little more than leave tracks in the snow, this bacteria produces iron in ground water and could play an important role in ridding it of oil and toxic metals.

The bacteria, Bigfoot, horseshoe crabs and other ancient organisms real and imagined are scheduled to be featured in a show tentatively titled "Living Fossils." A crew from "Discover Magazine" spent the day at the UMass Morrill Science Center yesterday filming the bacteria segment for the Discovery Channel in the microbiology laboratories. Standing by for technical assistance was department chair and microbiology professor Derek Lovley, who discovered the organism a decade ago.

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As Lovely explains it, the bacteria first came to light as a sort-of villain that was 'found to pollute underground water sup,plies by contaminating them with iron. Lovley identified the organism while working for the U.S. Geological Survey , which was drilling deep into the Earth along the Atlantic coastal plain to study the water quality under the surface.

"Worldwide, the problem is not organic contaminants, but too much iron in ground water," Lovley said, "They thought it was a chemical reaction, but we found it was a bacteria living in deep aquifers and causing iron in ground water."

Once identified, the bacteria was found to be virtually everywhere in various concentrations. A cubic centimeter of soil can contain more than one million of the organisms, Lovley said. Although they exist in dirt, ponds and the ocean, what fascinated scientists is that the-bacteria also thrive in environments that are hostile to other organisms, such as hot springs and deep beneath the surface of the Earth. The reason for this, Lovley said, is that they don't need oxygen.

"They essentially use iron the same way we use oxygen," he said, "which is good, because there is no oxygen in deep aquifers."

Therein lies the pollution problem, according to Lovley. Through a biological process, the bacteria take ferric iron, which is almost universally present in soil and rock, and turn it into magnetite, a black magnetic material that contaminates the Water.

Which is not to say that geobacter metalireducens is all bad.

"It turned out they also have a lot of positive influences," Lovley said.

Foremost among these is that the bacteria can break down other pollutants such as oil by converting them to carbon dioxide. They can even feed on toxic metals such as uranium, essentially taking it out of the water in its soluble state and converting it into uranium particles that settle and can be harvested.

Scientists like Lovley have been working on ways to make the bacteria work faster, enhancing their use as a sort of pollution police for drinking watet. With the "Discover Magazine" crew on hand yesterday, Lovley and some of the 25 researchers in the microbiology department tried to demonstrate through lab work what the bacteria do on a scale too tiny to see. The camera zoomed in as post-**graduate** researcher Juliette Roo= ney Va t took sediment. subs ue cd& le ind in a tube in the ocess of exiract- ing its DNA. '. pr '

Although the bacteria is not as high profile as Bi oot, producer Chris Schmidt said he likes the segment because is makes for interesting science.'

"This is the. most science-intensive part of the, piece," he said,, " adding that he expects the show to air sometime this fall.

Geobacter metalireducens qualifies as a living fossil because, according to Lovley, it is one.of the. oldest o anisms on Earth.

"It's en around for billions of years," he said. "We've found mag-' netite in very early sediments."

Despite their seemingly odd means of sustenance, Lovley said bacteria are actually in the majority as life forms that prefer "breath-, ing" substances like oil and iron to air.

"The vast majority of life doesn't like oxygen, he said. Probably the biggest pollution event ever is., when p ants figured out a way to make oxygen."

To illustrate his point, he noted. that a single human body carries mom bacteria than there are people on Earth; most of them in the intestinal system.

Let Bigfoot think about that.

Staff photo by CHITOSE SUZUKI

UMass microbiology professor Derek Lovley shows off magnetite formed by the bacteria he discovered, in his UMass lab recently. At right, Gary Henoch of Lexington films some of . Loviey's work for the Discovery Channel.