THE CAMPUS CHRONICLE

Vol. XVII, Issue 17 *for the Amherst campus of the University of Massachusetts* January 18, 2002

PAGE ONE
WEEKLY BULLETIN
GRAIN & CHAFF
OBITUARIES
LETTERS
ARCHIVES
CONTACT US

SEARCH
Go

Microbes could survive on Mars, say scientists

Similar conditions found in Idaho

by Paula Hartman Cohen, News Office staff

Deep below the surface of the Beverhead Mountains of Idaho, a research team led by Derek Lovley, head of the Microbiology Department, and Francis H. Chappelle of the U.S. Geological Survey (USGS), has found an unusual community of microoganisms that may hold the key to understanding how life could survive on Mars. Their findings are spelled out in the Jan. 17 issue of the journal *Nature.*

Derek Lovley

"The microbial community we found in Idaho is unlike any previously described on Earth," said Lovley. "This is as close as we have come to finding life on Earth under geological conditions most like those expected below the surface of Mars.

"Life requires water and an energy source. The primary energy source for life on earth is sunlight. Plants convert sunlight energy to organic matter that other organisms then use for fuel. On Mars and other planets or moons in our solar system on which life might exist, liquid water is only available below the surface where there is no sunlight. So, if there is life, it must sustain itself with alternative energy sources. This study demonstrates, for the first time, that certain microorganisms can thrive in the absence of sunlight by using hydrogen gas released from deep in the Earth's surface as their energy source."

Lovley added, "The microbial community found at the Idaho site is remarkably similar to what geochemists have postulated might be found below the surface of Mars, based on what they know of Martian subsurface chemistry. Now that such a community has been discovered, we can use it to test hypotheses about hydrogen-based subsurface life and use these findings to develop strategies for searching for similar microbial communities on other planets."

According to Lovley, geologists and microbiologists have searched for at least a decade for a community of microorganisms on Earth that could survive on hydrogen, somewhere underground, away from sunlight. Chappelle, of USGS, explained that he specifically chose the Idaho site for the study because it provided geological conditions most like those expected on Mars.

"The water deep within these volcanic rocks has been isolated from the surface for thousands of years," Chappelle said. "It is devoid of measurable organic matter, but contains significant amounts of hydrogen."

Lovley added, "In prior studies, when we looked in underground areas we considered promising, the DNA signatures of the bacteria present indicated they were living on organic matter carried in the groundwater or that had been deposited along with the subsurface of rocks. Those environments are not likely to represent conditions on Mars because, on Mars, such organic matter would not be available.

"At the Idaho site we saw something completely different. Over 90 percent of the microorganisms were Archaea, which are microorganisms considered to be most closely related to ancient life on Earth. In this case, the Archaea were methane-producing microorganisms that live by combining hydrogen with carbon dioxide to make methane gas. They do not require organic carbon in order to grow. This is exactly the scenario that geochemists have predicted for life on Mars."

The study was funded by the U.S. Geological Survey and a grant from the Life in Extreme Environments program of the National Science Foundation. In addition to Lovley and Chappelle, the team included postdoctoral researchers Stacy A. Clufo, Barbara A. Methé and Kathleen O'Neill from the University; Paul M. Bradley of USGS, Columbia, S.C.; and LeRoy L. Knobel, of USGS, Idaho Falls, Idaho.