

# Tough bugs point to life on Mars



Photo by K.R.O'Neill  
Discovery: Lidy Springs, Beaverhead Mountains, Idaho

By BBC News Online science editor  
Dr David Whitehouse

Researchers have discovered a colony of microbes like no other on Earth.

Scientists are excited because the organisms could resemble the type of life that might survive on Mars.

The microbes were found living in a hot spring, 200 metres (660 feet) beneath the US state of Idaho. They get their energy not from the Sun or from consuming other organic matter, but by combining hydrogen from rocks with carbon dioxide.

Because similar sunlight and oxygen-free environments are thought to exist on the Red Planet, and even on

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**Prof Derek Lovley**

Jupiter's moon Europa, such organisms could provide clues about searching for life on other worlds.

"It's possible this type of metabolism was the very first metabolism that evolved on the early Earth," Dr Francis Chapelle, of the US Geological Survey (USGS), told the BBC. "Because hydrogen and carbon dioxide are present on Mars and other places in the Solar System, that kind of life may in fact be what's up there."

Co-researcher Professor Derek Lovley, head of the microbiology department at the University of Massachusetts, added: "The conditions of the environment that we studied here on Earth in Idaho are very much what are expected to be on the sub-surface of Mars and it's been predicted that if there is any life on that planet it's growing on hydrogen that exists below the surface."

## Alternate energy sources

The microbes belong to an ancient group of living things known as the Archaea. Because their metabolism means they "breathe out" methane they are referred to as methanogens.

They were found deep below the surface in the Lidy Springs on the Beaverhead Mountains.

"The microbial community we found in Idaho is unlike any previously described on Earth," said Professor Lovley. "This is as close as we have come to finding life on Earth under geological



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conditions most like those expected below the surface of Mars."

Life requires water and an energy source, and for almost all organisms on Earth the primary energy source is sunlight. Plants convert sunlight into 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 out there, it must use alternative energy sources.

This research demonstrates that certain microbes can thrive in the absence of sunlight by using hydrogen gas released from deep inside the Earth as an energy source.

### **Long search**

Dr Chapelle told the BBC: "The fact that we find that kind of metabolism here on Earth makes those hypotheses [about life on other worlds] slightly more than hypotheses."

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

In the researchers' previous studies, when they looked in underground areas they considered promising, the DNA signatures of the bacteria present indicated they were living on organic matter carried in the groundwater or had been in the rocks.

Those environments were not likely to represent conditions on Mars because on the Red Planet such organic matter does not exist.

"At the Idaho site we saw something completely different," Professor Lovley said. At the new site, over 90% of the micro-organisms were Archaea, the lifeforms considered to be most closely related to ancient life on Earth.

The newly discovered microbes form part of an exhibition opening at the Science Museum in London, UK, on Thursday.

A labelled vial of water from the hot spring containing the micro-organisms will be on display along with rock from the site and a model of the Mars Sojourner rover which visited the Red Planet in 1997.

Commenting on the study, which appears in the journal Nature, UK astrobiologist Dr Charles Cockell said: "We know there is no life on the surface of Mars from the landers that went there in the 1970s.

"So, any life we find under the surface here on Earth is going to be pretty helpful in trying to pin down exactly where to look on the Red Planet. This is a very important step in that direction."

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