Media Release

Chiefs of Staff, News Directors

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Antarctic bacteria could hold secret to finding life on Mars

A microbiologist, who has sequenced the genes of a rare bacterium that lives in the highly saline, low nutrient and extreme cold conditions of Antarctic sea ice, says Mars microbes, if they existed, would need to have similar adaptions to survive.

Scientists analysing data collected by NASA announced overnight that they have found evidence of flowing liquid salty water on Mars. The next stage will be to look for signs of life during the Mars rover mission planned for launch in 2020.

Tasmanian Institute of Agriculture Associate Professor of Microbiology John Bowman says that for any simple form of life such as bacteria to survive on Mars, they would have to withstand extreme salinity, low nutrients and repeated freezing cycles down to -153 degrees Celsius or live underground where it was warm enough for water to be present as a liquid.

"If there are bacteria found living on Mars, they would be anaerobic (not require oxygen), chemotrophs where they are able to obtain energy from rock minerals like iron and sulphur, and very slow growing," Associate Professor Bowman said.

"They would also need to be able to fix nitrogen or use nitrates contained in Martian rocks and be able to source carbon dioxide dissolved in water."

The bacteria that Associate Professor Bowman sequenced from Antarctica, *Psychroflexus torquis*, are an extreme psychrophile, which means that they only grow at low temperatures.

"It has an amazing array of adaptations to withstand extreme cold, salinity and low nutrients, which makes it unique in the bacterial world," he said.

"P. *torquis* has novel cold adaption and stress protection mechanisms where it produces massive amounts of slimy exopolysaccharides (complex carbohydrates) and anti-freeze proteins, which enable it to grow at temperatures below -10 degrees Centigrade.

"The bacteria also has an unusual light active protein that absorbs light and generates energy, called proteorhodopsin and can store carbon and energy as glycogen and polyphosphate, which enable it to survive when nutrients are not available.

"It is extremely slow growing, replicating itself just once a day, compared with common warm-temperature bacteria that replicate every half hour.

"These types of adaptations that enable it to generate its own energy and store energy would also be something any bacteria living on Mars would need to have to be able to survive in such harsh conditions."

Professor Bowman says finding signs of life on Mars would be very difficult, but the best chance for finding microorganisms would be to drill into the planet's surface where water is present.

Associate Professor Bowman studies cold adapted bacteria and has been looking at microorganism survival, physiological strategies and interactions with other life in Antarctica in collaboration with researchers from the Institute for Marine and Antarctic Studies.

TIA is a joint venture between the University of Tasmania and the Tasmanian Government.

Information released by:
The Tasmanian Institute of Agriculture
Phone: 61 3 6226 6216 or 0418 524 297
Email: tia.comms@utas.edu.au