AUSSIES BRAVE EARTH'S MOST HOSTILE 'LAB'

Icy clues to life on Mars

RICHARD NOONE

IT IS the most hostile place on Earth but a group of Australian scientists studying microorganisms in Antarctica may unlock the key to discovering life in outer space.

Led by University of NSW Professor Rick Cavicchioli, the scientists are drilling into the frozen continent’s icy lakes to catalogue microscopic organisms – the very foundation of life as we know it – and explore how they can exist in subzero temperatures and extremely salty conditions without food or oxygen.

Using genome sequencing, the researchers are tracking the DNA of the micro-organisms to see how they survive, procreate and change over the course of an Antarctic season.

The micro-organisms are essentially ground zero, the very start of the food chain, and the results so far have been surprising. It appears these promiscuous micro-organisms stave off the winter chill by sharing the love.

“Not only are the types of haloarchaea different, but gene swapping occurs frequently between the haloarchaea that are quite unrelated to each other; that is, gene exchange occurs between different genera and not just between different species,” Prof Cavicchioli said.

“Despite this promiscuity, the dominant members of the community retain their own identity as a species and co-exist with others.”

Australian researchers Sarah Payne and Alyce Hancock will spend up to 17 months studying the primordial soup in an icy slurry deep beneath the frozen surface of Antarctica’s mysterious lakes.

The lakes were once part of the ocean but formed when the Antarctic continent rose, trapping the water.

Covered year round in ice and snow, they provide scientists a glimpse back to how life evolved from the ocean thousands of years ago and offer clues where to look in the universe for similar life-supporting ecosystems.

There are three known “domains of life” on Earth – bacteria, eucarya and archaea.

While most people will be familiar with bacteria, eucarya includes all cellular-based organisms including plants and animals in which the cells contain a nucleus.

Archaea represents the third domain, which evolved billions of years ago.

As well as the promiscuous haloarchaea, another group of archaea known as “methanogens” are found.

It is these scientists believe could live on Mars because of their ability to grow in extreme cold, without oxygen.

Ms Payne said some methanogens used inorganic compounds such as hydrogen and carbon dioxide to grow.

“Because there is evidence that water exists on Mars, plus..."
methane is produced and exists now in the Martian 'atmosphere', it could be that Earth-like methanogens grow there and produce Martian methane," Ms Payne said.

The 26-year-old from Tasmania said the physical challenge, however, was trying to drill through 1.2m of ice to collect water and prevent it freezing long enough to take samples.
Ground zero: An owl flies close to the ground in this image from the Attenborough DVDs. Picture: Fredi Devas.

Above: Scientist Sarah Payne readies an ice drill in Antarctica. Picture: Robert Isaac.