Researchers discover some of the oldest forms of life

August 7 2007

University of Queensland researchers have identified microbial remains in some of the oldest preserved organic matter on Earth, confirmed to be 3.5 billion years-old.

The UQ team, led by School of Physical Sciences scientists Dr Miryam Glikson and Associate Professor Sue Golding as well as Associate Professor Lindsay Sly from the School of Molecular & Microbial Sciences, are the first to conclusively confirm the nature and source of the organic material.

Aspects of the research have been published in the prestigious scientific journal *Precambrian Research*.

“What we have found is the first visual confirmation of primitive microbial communities in what is considered to be the best preserved ancient organic matter on our planet,” Dr Glikson, the instigator of the research, said.

Dr Golding, Director UQ's Stable Isotope Laboratory in the Division of Earth Sciences, said previous studies used indirect analytical methods that were only able to suggest microbial involvement, not confirm it.

“We used difficult and time-consuming electron microscope techniques to conclusively confirm the microbial remains,” Dr Golding said.

“The integration of observational and micro-analytical techniques is

unique to our approach."

The core drilling samples from Western Australia's Pilbara region were collected by PhD student Lawrie Duck who said it was an amazing experience to "hold in your hands rocks that contain remains of some of the earliest forms of life on Earth."

"The Pilbara region is such a good research site as it has ancient forms of the white smokers active at plate margins today and black sulfidic smokers found in sea floor vent systems in tectonically active sites," he said.

"These are the places where scientists believe life on Earth might have had its origins."

Dr Glikson said the UQ team had then taken the study further by comparing the fossil microbial structures to primitive microbes found today in seafloor environments similar to those existing 3.5 billion years ago.

"The microbiologists on the team, led by Dr Sly, cultured currently existing primitive microbes under simulated conditions to those of the ancient forms of life," Dr Glikson said.

"A remarkable resemblance was found between the structures of the cultured microbial entities at their stage of disintegration and those of the ancient microbial remains."

The other members of the UQ research team were Robyn Webb, from the Centre for Microscopy and Microanalysis, a specialist in transmission electron microscopical techniques; Justice Baiano, from the School of Molecular & Microbial Sciences, who developed special facilities to culture primitive microbes derived from seafloor mineral-

laden hot springs active at plate margins today; and Kim Baublys, from the Stable Isotope Laboratory, who undertook analysis of products from the culture experiments.

A comparison with organic matter from rocks of similar age in South Africa also yielded microbial remains identical to those from the Pilbara, further confirming the UQ work. This was achieved with the collaboration of Dr Axel Hofmann from the University of Kwazulu, South Africa and Dr Robert Bolhar formerly of the University of Canterbury, New Zealand.

Source: UQ