

World-first technology enables study of ancient bacteria

June 6 2005

Sustainable energy source could solve Bermuda Triangle riddle

Experts at Cardiff University, UK, have designed world-first technology to investigate sustainable energy sources from the ocean bed by isolating ancient high-pressure bacteria from deep sediments.

Scientists and engineers at Cardiff University are investigating bacteria from deep sediments which despite high pressures (greater than 1,000 atmospheres), gradually increasing temperatures (from an icy 2°C to over 100°C), great depth (several kilometres) and age (many millions of years) may contain most of the bacteria on Earth.

Some of these bacteria produce methane that accumulates in "gas hydrates" – a super concentrated methane ice that contains more carbon than all conventional fossil fuels and, therefore, a potentially enormous energy source. However, we know little about gas hydrates as they melt during recovery due to the fall in pressure.

Professor R. John Parkes, of the School of Earth, Ocean and Planetary Sciences at Cardiff University, is leading part of a major European Union project, called HYACINTH which is developing systems to recover gas hydrates and bacteria under high pressure.

He has turned to experts in the University's Manufacturing Engineering Centre to help create a system that would enable his team to grow, isolate and study these ancient bacteria in the laboratory.

"DNA analysis of deep sediments has shown diverse bacterial populations, including major new types, but we have been unable to culture them and this might be because we have not been able to keep them at the very high pressures which they need to survive," said Professor Parkes.

The Manufacturing Engineering Centre in the School of Engineering has helped design and produce a high-pressure system, which is the first of its kind in the world.

Using titanium and stainless steel alloys, and sapphire windows, the Centre's experts have built an isolation system, as well as a special cutting chamber to enable scientists to take precise sediment samples and grow bacteria from them at pressures as high as 1,000 atmospheres. A special ram for the system was produced by the Technical University, Berlin.

As well as studying potentially the deepest organisms on Earth this research might also throw light on the mystery of the Bermuda Triangle by finding out more about the behaviour of the mysterious hydrates.

One theory now suggests that when the covering of "methane ice" which exists over much of the seabed of the Bermuda Triangle becomes unstable; this causes instability of the sea and an explosive mixture of air and methane above. Any ships or planes travelling over the area could sink or catch fire.

"So ancient, deep-sediment bacteria may be a key to sustainable energy in the future and to explaining a few disasters," said Professor Parkes.

Source: [Cardiff University](#)

Citation: World-first technology enables study of ancient bacteria (2005, June 6) retrieved 26 April 2024 from

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