



Swashbuckling Scientists Discover Northern Vents

By Lee Pullen

Scientists often have a reputation for working in stuffy laboratories, cut off from the world around them. But this certainly isn't the case at the Centre for Geobiology, University of Bergen, Norway.

The Centre has had two summer cruises thus far where researchers embark on a voyage to study conditions on the ocean floor. Using state-of-the-art technology including a remotely operated vehicle, the scientists have discovered a new field of deep sea vents, one of the most northerly in the world.

Creatures living around these "black smokers" show just how tough life on Earth can be, and hint that organisms on other worlds may be able to thrive in very hostile environments.

Life on the Ocean Floor



The team have discovered new hydrothermal vents similar to this, spewing hot chemicals into the surrounding environment.
Credit: OAR/National Undersea Research Program (NURP); NOAA

Scientists used to think that life on Earth was always based on ecosystems with photosynthesis – making food and energy from sunlight – as the foundation.

But dive deeper than 200 metres (656 feet) and you'll be lucky to see any light at all – below 1000 metres (3281 feet), there is none.

Amazingly, researchers have found organisms there, generally referred to as extremophiles (as they exist in extreme environments), often thriving despite the harsh conditions.

Just how unforgiving are environments deep in the ocean?

Creatures 600 meters (1968 feet) deep endure crushing pressures around 60 times more powerful than at sea level.

But that is only one of the problems they face. The temperature on the sea floor is very low, averaging about 4°C (39°F). This changes abruptly around hydrothermal vents, where temperatures can suddenly soar up to 400°C (752°F).

These vents, like the ones discovered during the research cruise, actually create havens for life despite the scorching heat. Creatures that live in hot environments are called thermophiles, which means "heat loving".

They're perfectly happy on the outskirts of vents, where the temperature is around 50°C (122°F). Another group of organisms are known as hyperthermophiles. They live up to this impressive name by thriving at temperatures up to 120°C (248°F). Many chemicals spewed out at the vents are toxic to more common forms of life, but some extremophiles are so hardy that they actually can use these chemicals for food and energy!

Scientists Take to the Seas



Elinor Bartle is the Centre for Geobiology's Information Officer. She was part of the Centre's team aboard the newest, largest and most advanced research ship in the Norwegian fleet. After sailing for two days, they reached the first study site off the west coast of Norway.

Says Bartle, "Each leg [of the trip] involved a group of around 25 researchers, technicians and public outreach personnel in addition to the ship's crew. The group was international with representatives from a number of international partner institutions."

Their main mission was mapping the sea floor, hunting for areas of interest like elusive vents. They also collected rock samples that could provide clues about the local geology.

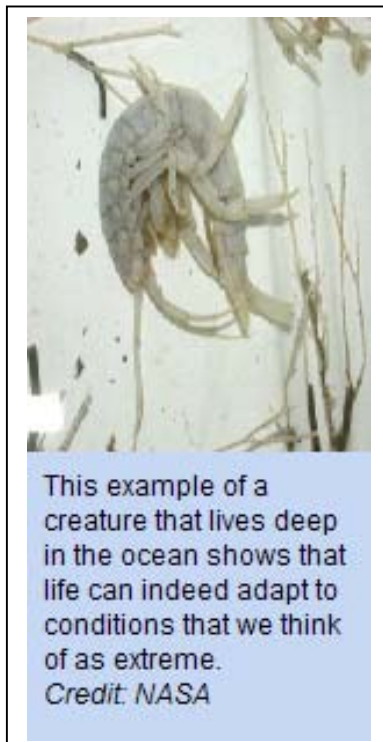
The researchers found the black smokers on mineral deposits that may be among the largest ever discovered, having been built up over the course of 100,000 years. An entire ecosystem surrounds these newly-discovered vents, using chemosynthesis for energy.

Instead of light being the basis for energy, chemicals from the vents supply the foundations for life. Samples of the creatures were collected to be studied, and the hope is that they will help us gain better understanding of extremophile life.

Studying these organisms is very important for astrobiologists. Says Bartle, "We are finding microbial organisms in unusual and extreme environments, and this is providing extremely relevant information for the search for life on other planets.

"There may be similar hydrothermal vents on the ocean floors of other worlds, such as Jupiter's icy moon Europa.

Scientists also think that conditions around the vents



could match what it was like when life first formed on the Earth four billion years ago.

The deep ocean would have provided protection from deadly solar radiation before the ozone layer had formed. The summer cruise's results are certainly good news when thinking about life on other worlds.

The fact that there are many hydrothermal vents on the ocean floor hint that they could be common on geologically active planets and moons. And the existence of life in these areas indicates there could be havens for biological communities spread throughout the solar system and beyond. Having been spurred on by these discoveries, Bartle says "We are going to follow up the cruise with intensive work to isolate, characterize and describe some of the unusual microbes we have found in three different types of extreme settings this summer. It is critical that we continue to build on the information we have gathered this year."