

SEND TO A FRIEND

New Find Proves Life Can Thrive in Hostile ConditionsBy [Stewart Taggart](#)Special to [SPACE.com](#)posted: 04:01 pm ET
18 May 2000

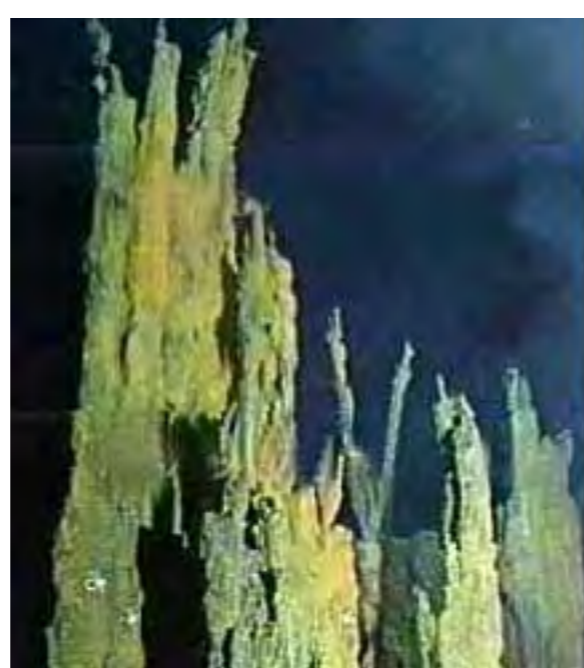
SYDNEY, Australia -- From the oceanic abyss off Papua-New Guinea, Australian researchers recently pulled up a volcanic "chimney" covered in bacteria that thrive on superheated, acidic mineral water.

These deep-sea "extremophiles" join a growing list of hardy creatures being found in Earth's deserts, oceans and ice caps. As a group, they're stretching man's conception of where -- and how -- life can exist.

"Every month it seems some new organism is found that's even more fantastic than the last," said Ken Nealson, a biological scientist at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California.

"These organisms are extreme, not only in terms of their physical and chemical attributes, but extreme in terms of what they can eat and the fuels they burn," Nealson said. And their very existence holds huge implications in the search for life that may exist elsewhere in the universe, he said.

For the past two years, Nealson has spearheaded JPL's astrobiology unit, which focuses on how planets and life can co-evolve. Learning more about extremophiles on Earth helps scientists like Nealson develop more sophisticated methods for determining likely environments for life elsewhere.



This recently discovered bacteria-covered volcanic chimney joins a growing list of extreme environments that stretch our conception of where and how life can exist.

Most immediately, the Australian scientists who gathered bacteria from the chimneys, or "black smokers," beneath the Bismarck Sea will be studying how the organisms survive by metabolizing superheated mineral fluids spewing from the vents.

They'll also be seeking insight into some of Earth's earliest life forms, things known as archaea, says Peter Franzmann, a microbiologist with Australia's national research organization CSIRO (Commonwealth Scientific and Industrial Research Organization). These extremophiles may offer a glimpse into Earth's early days -- more than 3 billion years ago, he says.

"Conditions back then were similar to what we now see in these seafloor hydrothermal vents -- high temperatures, intense pressure, lots of volcanic activity, darkness," he said. "Nutrients to sustain life poured out of the earth itself."

To Pam Conrad, another JPL astrobiology researcher, "extremophiles" help challenge man's conventional notions of what "life" is. Ultimately that will help scientists develop better tests for life, therefore lessening the chance of sending probes into space with scientific blinders on.

"If we can define life as broadly as possible, then we won't miss it when we go looking for it," she said. "If we can figure out how to do that in the laboratory -- and then in the field -- we'll be able to do it using space probes touching down in other worlds."

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Other deep-ocean areas where "extremophile" research has been conducted has been on the East Pacific Rise off South America, and the Mid-Atlantic Ridge roughly halfway between North and South America, and Europe and Africa. On land, extremophile research has taken place in the Arctic and Antarctic, as well as places such as Death Valley in California and the Negev desert in the Middle East.

For his part, Nealson speaks in awe at the near-irrepressible power of Earth's life forms.

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Looking for signs of life in space, the current scientific focus is on Jupiter's ice-cube moon Europa, where ice sheets covering its surface may be hiding a liquid ocean where cold-tolerant extremophile life may cling.

But two other jovian moons -- Callisto and Ganymede -- may also hold out the promise of life, Nealson believes. Both bear evidence of ice and volcanism, raising the possibility of a cycle of freezing and thawing of water, he said. This could allow life to flourish for short periods coupled by periods of hibernation -- a bit like primitive fungi found in Earth's polar regions.

For Nealson, extremophile research can be traced back to the 1960s, when microbiologist Thomas Brock discovered microorganisms living in the superheated geysers and hot springs of Yellowstone National Park in Wyoming and Montana.

But the real boost came when martian meteorites retrieved from Antarctica were deemed to contain suggestive evidence of fossilized life. Nealson believes these meteorites represented a turning point in man's perceptions about extraterrestrial life, or "ET."

That's because the meteorites meant the first human contact with aliens may not be with creatures who alight from flying saucers and have laser beams for eyes, but rather through a more prosaic discovery: something akin to the mold growing on the walls of our showers.

For Australian researchers, studying the "extremophiles" from the Bismarck Sea will help push forward basic science, but it may also yield some very practical, down-to-earth tips.

"Because these bugs operate at very high temperatures, around 212 degrees Fahrenheit (100 degrees Celsius), they are extremely efficient at what they do," Franzmann said. "This includes extracting minerals like copper, gold, zinc, nickel, manganese and lead from the mineral-rich fluids spewing out of these hydrothermal vents."

If the research scientists can figure out how the microbes accomplish the trick of separating valuable minerals, the process could one day be applied to make Australia's \$22 billion mining industry more efficient.

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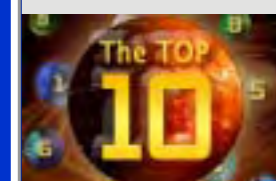
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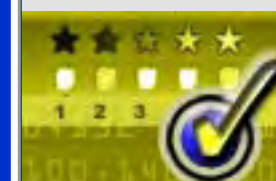
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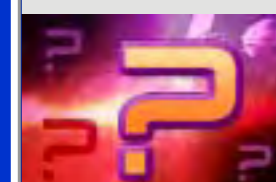
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