



THIS STORY HAS BEEN FORMATTED FOR EASY PRINTING

*The Boston Globe***NEWLY FOUND MICROBE CAN TAKE A LOT OF HEAT****Author(s):** Carey Goldberg, Globe Staff **Date:** August 15, 2003 **Page:** B1 **Section:** Metro/Region

[A PUBLISHED CORRECTION HAS BEEN ADDED TO THIS STORY.]

A newly discovered microscopic creature from the deep sea can survive in heat of up to 266 degrees Fahrenheit, a new record for life on earth, University of Massachusetts researchers reported yesterday.

The one-celled organism not only lived but grew successfully at 121 degrees centigrade, the temperature inside doctors' sterilization equipment, long believed to be hot enough to kill any life form. "This is like breaking the 4-minute mile - it's a real benchmark," said Matthew Kane, who oversaw the National Science Foundation grant that funded the research.

The iron-breathing microbe, named **Strain 121** for its ability to thrive at the temperature of a medical autoclave, joins a growing menagerie of "extremophiles," exotic creatures that thrive in what to humans are extremes of heat and cold. It was collected in the Pacific Ocean 200 miles off Puget Sound, where vents from deep in the earth unleash tremendous heat into the cold ocean.

The discovery of **Strain 121** does not imply that sterilization for canned foods or medical instruments must be raised to higher temperatures, however. At room or body temperature, "it doesn't die but it can't do anything because it's just too cold," said Derek Lovley, head of the Department of Microbiology at the University of Massachusetts at Amherst and coauthor of the paper reporting the discovery in today's issue of the journal *Science*.

Lovley said the existence of **Strain 121** "expands the window of conditions under which we might be able to find life."

That means there may be organisms living far deeper beneath the earth's surface than previously thought, as they could survive the higher temperatures nearer the planet's core.

Strain 121 may also have implications for theories of the evolution of life on earth because something like it could have thrived when the planet was younger and much hotter. Its iron breathing could have been "the first form of microbial respiration as life evolved on a hot, early Earth," the *Science* paper posits.

The heat-loving organism could also eventually yield some practical uses; such exotic microbes offer the prospect of improving industrial processing of paper or medications, and even cleaning hot contaminants, scientists say.

Researchers say they may well find more extreme creatures in the future. "Will 121 be the upper limit of life?" asked Dr. Craig Cary, an expert on high-temperature extremophiles at the University of Delaware. "I don't believe it will be. I believe more people like Derek and my colleagues will continue to look and continue to find them, but it's going to be harder and harder."

The hard part for Dr. Lovley and his coauthor, Kazem Kashefi, was getting **Strain 121** to survive and grow.

"It takes an enormous amount of time and an incredible amount of talent and perseverance to develop and understanding of what this organism needs to grow," Dr. Cary said. "These guys have been on the planet for over 3 billion years, so they've had a lot of time to figure it out."

Strain 121 is only about one micron (one millionth of a meter) across and looks something like a balloon with a dozen whipping strings. It belongs to an ancient branch of life known as Archaea, which are similar to

bacteria and often live in seemingly inhospitable environments.

Lovley said his lab plans to name the creature after it completes and publishes a fuller study.

Though he and his colleagues are highly familiar with the weird world of extremophiles, Lovley said that "the emotion we had when we found out it grew in the autoclave was amazement."

"You're taught from day one in biology that the temperature of an autoclave will kill any life," he said, "and we put it in there and brought it out 10 hours later, and it's still alive."

Carey Goldberg can be contacted at goldberg@globe.com

SIDEBAR:

DISCOVERY FROM THE DEEP

PLEASE REFER TO MICROFILM FOR CHART DATA.

[CORRECTION - DATE: Sunday, August 17, 2003: * Correction: Because of a graphic artist's error, some temperatures were incorrect in a graphic in Friday's City & Region section about the discovery of an organism that can live at extreme temperatures. According to The Sizesaurus, the melting point of gold is 1,945 degrees Fahrenheit, molten lava is 3,150 degrees, and the surface of the sun is 10,340 degrees.)

[Perform a new search](#)