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August 19, 2003, Tuesday

SCIENCE DESK

## OBSERVATORY

By HENRY FOUNTAIN (NYT) 663 words

### Surviving the Heat

Think it's hot, eh? Had enough of 90-degree days? Tired of coming back from lunch to have a colleague ask if you have been splashing around in a fountain, when it's just sweat that's soaking through your shirt?

Sorry, but you don't know hot.

Strain 121, however, does. It has set an unofficial record for extreme living, thriving at temperatures about 40 degrees above the boiling point of water.

Strain 121 is the temporary name for a newly discovered species of Archaea, those single-celled bacteria-like organisms that are often found in extreme environments (it will get a species name when it is more completely described). It was collected in water samples from a hydrothermal vent 7,000 feet down along the Juan de Fuca Ridge in the northeastern Pacific. Hydrothermal vents spew mineral-rich water that is super hot and are home to many unique and bizarre organisms.

Kazem Kashefi and Derek R. Lovley of the University of Massachusetts isolated Strain 121, which is about a micron in diameter, during studies to culture organisms that use iron for metabolic energy, much the way people and other creatures use oxygen. Iron respiration -- in which ferric iron is reduced (meaning it gains an electron) to become ferrous iron, creating the mineral magnetite -- may have been the first form of respiration during the early evolution of single-celled organisms.

The researchers, who described their findings in *Science*, found that Strain 121 both reduced iron and grew at temperatures ranging from 185 to 250 degrees (250 Fahrenheit is 121 centigrade, thus the name). The previous record was held by another Archaea, *Pyrolobus furmarii*, which could thrive up to 235 degrees. Strain 121 even survived several hours at 266 degrees, and then grew when transferred to cooler water.

The Bloom of Death

Iron plays a critical role in life, as Strain 121 shows. But it can also play a role in death. Consider what happened to an Indonesian coral reef, for example.

The reef, a diverse habitat with more than 100 coral species near the Mentawai Islands off southwest Sumatra, died in late 1997. In itself that is not completely unusual: many Indian Ocean reefs died or were damaged in 1997 and 1998 due to rising ocean temperatures (attributed to global warming) combined with El Nino.

But the Mentawai die-off was different, researchers from the Australian National University and the Indonesian Institute of Sciences report in *Science*. For one thing, surface temperatures remained relatively cool in that part of the ocean.

In seeking a cause, the researchers examined samples of corals of the genus *Porites*, which give clues to their life, and death, in the chemical makeup of their skeletons. Around the time the coral died, the skeletons showed changes in concentration of carbon isotopes, indicating a large algal bloom. This coincides with reports of a massive red tide, or bloom, at the time. All that algae would have suffocated the coral.

But what caused the red tide? The researchers suggest that widespread wildfires in Indonesia in 1997 were to blame. The fires produced huge plumes of smoke and ash containing, among other things, a lot of ferric iron -- 11,000 metric tons of it by some estimates. The researchers say that when the smoke and ash settled on the ocean, the iron acted like a fertilizer, causing the algal bloom.

#### Naming a Meat-Eater

Indian and American paleontologists have announced a new dinosaur species, identified from 65-million-year-old bones uncovered nearly two decades ago in western India.

The dinosaur, which was about 30 feet long and had a horn on top of its skull, has been named *Rajasaurus narmadensis*. It walked on two legs and was a meat-eater, with a taste for its fellow beasts: bone of titanosaurs were found with it.

**CAPTIONS:** Drawing (Drawing by Nurit Karlin)

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