

## ASTROBIOLOGY

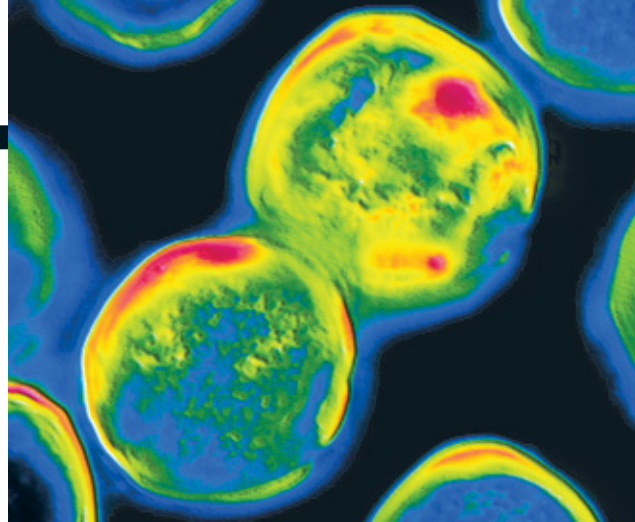
### Running on Poison

Newly discovered microbes breathe rocket fuel

The energetic molecule perchlorate is rocket fuel and, it turns out, food for an ancient kind of life. A team of Dutch researchers show in the April 5 *Science* that the earthly archaeon—as the name implies, an old type of microbe distinct from bacteria—can grow quite happily on perchlorate. *Archaeoglobus fulgidus* (shown at right) takes the perchlorate in, gains energy by transforming it into highly reactive chlorite and moves on. Thriving in volcanic vents underneath the sea as well as other superhot areas of Earth, such as oil reservoirs or places where hot rock turns water to steam, *A. fulgidus* and other

microbes like it might be the reason there is not more rocket fuel lying around on our planet.

This is the first archaeon known to feed on perchlorate, but it is not the first microbe found to do so. Some bacteria can manage the same trick and even produce a special enzyme to help them rapidly break down the resulting chlorite, which is otherwise damaging to cells, producing oxygen as a by-product. *A. fulgidus*, which cannot tolerate oxygen, uses a different chemistry to break down the chlorite: it relies on sulfur compounds that are naturally present in its environment—a symbiotic relation



that exists between life and non-life chemistries.

*A. fulgidus* may in fact be a primeval form of life on Earth, having evolved before photosynthesis. Once algae caused the presence of oxygen in the atmosphere to rise, the ancestors of *A. fulgidus* would have had to escape to dark, deep, hot places of the globe. Deposits of perchlorate have also been found wherever robots look on Mars.

Does this mean the substance, poi-

sonous to humans, serves as lunch for some Martian microbe?

The prospect is not out of the question. The surface of Mars is certainly too cold for this bug to survive, which may explain why there is so much rocket fuel lying around. But the discovery of the microbe raises the odds that some other life-form on the Red Planet lives deep below the perchlorate-bearing surface.

—David Biello

ALFRED PASEIKA/Science Source

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