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Ancient critters' dinner menu: glass

By Robert C. Cowen

When Marie Antoinette heard that citizens lacked bread, she reportedly said, "Let them eat cake."

When paleontologists realized that Earth's earliest microbes lacked organic food, they said, "Let them eat rock." And that, apparently, is what they did to survivesome 3.5 billion years ago, according to a Norwegian-led research team.

Harald Furnes and Neil Banerjee at the University of Bergen, and colleagues in Canada, South Africa, and the United States are studying ancient lava in the Barberton Greenstone Belt, several hundred miles east of Johannesburg in South Africa.

They recently reported in Science that they're finding tiny tubular channels in the old volcanic glass. That's just what you would expect if microbes had eaten into the glass to get iron, phosphorus, and other nutrients.

Some microbes do that today. But what excites scientists is the fact that "our evidence is amongst the oldest evidence for life found so far," explains team member Hubert Staudigel at Scripps Institution of Oceanography in San Diego.

Although such findings are likely to generate a number of critical - and skeptical - reviews of the data, they do re-inforce the notion that, when the evolution of life reaches the stage of self-reproducing microbes, these microbes can exploit inorganic substances not usually considered food.

The tubular structures also give seekers of ancient life another type of indicator - a so-called biomarker - that something once lived in old

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rocks, whether on Earth or on Mars.

The Barberton lavas have a pillow-like structure, which indicates that they formed underwater in oceanic crust. Dr. Staudigel says it would have been "a favorable place for the origin of life."

He adds that further study of the Barberton remains may help scientists link "the visual clues of these microbial fossils with their chemical fingerprints." The latter include residues of biologically processed carbon.

The search for reliable biomarkers has been tricky. Every report of primordial fossils is an invitation to bring on the skeptics.

The famous "discovery" of microfossils in the meteorite ALH84001 from Mars, announced in 1996,has been substantially - although not totally - discounted. Skeptics have found ways to produce the "fossils" without invoking life.

Western Australia's 3.5 billion-year-old Warrawoona formation has also focused debate between skeptics and believers. Microscopic structures and organic chemicals in the rock strongly suggest ancient life.

Yet last year, J. Manuel García-Ruiz at the University of Granada, Spain, and colleagues showed how to produce similar structures in the laboratory - no microbes needed.

Martin Brasier at Britain's University of Oxford had already shown how the suspected chemical fingerprints of life in the rock could have formed through nonbiological processes.

Now Dr. Brasier is challenging the Barberton microfossils. His team is studying comparable Australian lavas, and he finds the same kind of microtubular channels.

He thinks chemical processes could have etched the channels as high-pressure fluids flowed in the old sea-floor lavas. Again, no life processes needed.

This debate is about more than scientific curiosity. The US, Europe, and Japan are investing heavily in Mars exploration with the primary goal of finding evidence of present or past life.

Right now, they don't know exactly what to look for. They do know they could waste a lot of effort and money if they pursue this quest blindly.

Whether or not the latest "microfossils" survive skeptical review, they provide another opportunity for scientists to hone their prospecting skills.

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