The Great Preserver（图）

http://www.fristlight.cn 2007-01-26

[作者] Astrobiology Magazine
[单位] Astrobiology Magazine

[摘要] Jan 20, 2007): What scientists had once identified as the oldest known animal eggs and embryos may have actually been 600-million-year-old giant bacteria. A new analysis of the microfossils may change our understanding of life's development on Earth.

[关键词] animal eggs;embryos;microfossils

The oldest-known animal eggs and embryos, whose first pictures made the cover of Nature in 1998, were so small they looked like bugs - which, it now appears, they may have been. A new study in the journal Nature presents evidence for reinterpreting the 600 million-year-old fossils from the Precambrian era as giant bacteria. The finding may change our understanding of Earth's fossil record.

The discovery "complicates our understanding of microfossils thought to be the oldest animals," said lead author Jake Bailey, a graduate student in earth sciences at USC College.

Bailey made his discovery by combining two separate findings about Thiomargarita, the world's largest known living bacterium.

In 2005, Thiomargarita discoverer Heide Schulz, from the University of Hannover in Germany, showed that the bacterium promotes deposition of a mineral known as phosphorite.

The fossils identified as eggs and embryos in 1998 came from southern China's Doushantuo Formation, which is rich in phosphorite.

The source for the rare mineral was unknown. Bailey wondered if an ancient relative of Thiomargarita might have been involved.

"The idea is that these bacteria were causing these phosphorite deposits to form," Bailey said.

Also in 2005, University of Georgia marine biologists Samantha Joye and Karen Kalanetra, who are co-authors on Bailey's study, found that Thiomargarita can multiply by reductive cell division, a process rare among bacteria but typical of animal embryos.

Bailey knew that the fossils had been identified as embryos in part because they showed evidence of reductive cell division. Then he thought again about the phosphorite deposits.

"When I put those two pieces together, I said ... perhaps they're not animal embryos at all." Bailey and his co-authors compared the size and geometrical properties of the Doshuanto fossils and modern Thiomargarita bacteria - they were nearly identical.

Coupled with the presence of phosphorite, the result pointed strongly to ancient Thiomargarita activity.

"I was shocked that there was this other option out there," Bailey said.

The finding also solved a longstanding puzzle. Proponents of the animal theory had struggled to explain how eggs and embryos could be preserved, as neither fossilizes easily.

These bacteria, on the other hand, make better fossil candidates. And by depositing phosphorite, Thiomargarita even supplies its own rock matrix, or fossil bed.

The Nature study's authors, which include Bailey's adviser Frank Corsetti and USC biology graduate student Beverly Flood, were careful not to rule out the existence of animal fossils from the same geological era. The Doushantuo Formation contains the fossils of many species, so

While calling the evidence for animal life in the Doushantuo "controversial," Bailey noted that other fossils in the formation "bear little resemblance to Thiomargarita.

"Our paper offers an alternative interpretation of the most abundant microfossils in the Doushantuo Formation," he added. "The structures that we discuss were the first Doushantuo fossils to be interpreted as embryos, and they've been widely accepted as such."

Regardless of the evidence for animal life in the Doushantuo, Bailey's study elevates Thiomargarita to the role of Great Preserver, since without its mineral contribution the other organisms might never have fossilized.

The study appeared in the Dec. 20, 2006 issue of Nature. Funding for the group's research came from the National Science Foundation, NASA, the U.S. Department of Energy and the National Oceanic and Atmospheric Administration.