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Mars Life Theory Gains Momentum

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Mars life theory gains momentum

By David L. Chandler, Globe Staff, 03/21/98

HOUSTON - The case for life on Mars - albeit in the very distant past - was strengthened yesterday by a new report that a Martian meteorite contains crystalline traces of living organisms.

The assertion that the meteorite from Mars shows evidence of life, first ventured by a team of scientists in 1996, remains controversial. But no evidence has refuted it, and new findings make it more difficult to find a nonbiological explanation, several scientists said.

The most significant new evidence is that the rock, which was found in Antarctica in 1984, contains crystals of magnetite - a magnetic mineral produced by many terrestrial bacteria - that have a shape only found in magnetite produced by living organisms.

While magnetite grains can easily be produced by nonliving chemical processes, none of those have ever been found to have the six-sided columnar shape, called a parallelepiped, seen in these grains, said Kathie Thomas-Keprta, a coauthor of the original paper reporting evidence of life in the Martian meteorite.

"We found a variety" of shapes of magnetite crystals in the meteorite, known as ALH 84001, Thomas-Keprta said. But the unusual hexagonal forms, she said, "are produced by bacteria in anaerobic [oxygen-free] environments. We don't know of any nonbiological process" that can produce such shapes, she said.

Magnetite crystals found in the Mars meteorite match those found in microbes on Earth "in size, shape, chemistry, and the lack of structural defects," she said.

One of her coauthors on the new research, Dennis Bazylnski, has been doing research on the magnetite grains in microbes for 20 years, she said, and has never found any such forms being produced nonbiologically. The unusual crystals appear in such quantities, Thomas-Keprta said, that she stopped counting after she documented over 100 of them.

The findings were reported at the annual Lunar and Planetary Science conference held at the Johnson Space Center.

John Bradley, a geochemist, suggested that there is a way to produce such shapes chemically through vapor deposition. But David McKay, a Johnson Space Center researcher and lead author of the original Mars meteorite paper, said there is no evidence of that in scientific literature, and questioned whether a high-temperature vapor deposition process would have any relevance to this case anyway, since most scientists agree that the shapes in the Mars meteorite formed at low temperatures.

"We think that's our strongest evidence," McKay said of the new magnetite research. And unlike some other possible signs of life that critics have said might be contamination that entered the rock on Earth, the magnetite grains are incorporated in the rock and clearly came from Mars.

In 14 talks and dozens of poster presentations at the conference, scientists on both sides of the contentious debate over the significance of the Martian meteorite presented their latest results, but none appeared to significantly undermine the original assertions of possible biological remains in the rock.

Several other presentations added ammunition to support the claim that tiny cell-like shapes found in the Mars rock may be fossils of ancient microbial life. While many biologists have questioned whether it is possible for a living organism to be as tiny as the fossils, numerous researchers have now found living microbes on Earth that are comparable in size.

Several of these tiny organisms, sometimes called nanofossils, have been found in water from thermal springs at Yellowstone National Park and at Hot Springs, Ark., among other places.

Several recent scientific papers have suggested that carbon compounds found in the rock, which are held up as part of the evidence of signs of past life, were actually contamination that entered the rock after it landed in Antarctica 13,000 years ago.

But Simon Clemett, a biochemist at Stanford University, showed that some of the compounds found in the meteorite have very different chemical characteristics from those found in Antarctic ice. While there undoubtedly has been some contamination, he said, it is possible to distinguish the terrestrial compounds from those that apparently were there already.

The important thing, McKay emphasized, is to be able to distinguish the different kinds of compounds so that laboratory analysis can concentrate on the extraterrestrial components.

Everett Gibson, another Johnson Space Center researcher who was part of the original team that analyzed the meteorite, concluded, "There's still no smoking gun, but there's no bullet holes put in our hypothesis."

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