

Relic of life in that Martian meteorite? A fresh look

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Since the mid-1990s a great debate has raged over whether organic compounds and tiny globules of carbonate minerals imbedded in the Martian meteorite Allan Hills 84001 were processed by living creatures from the Red Planet. The materials have been under intense scrutiny ever since.

Scientists at the Carnegie Institution's Geophysical Laboratory, with colleagues, have taken a fresh look at how material associated with carbonate globules was created using sophisticated instrumentation and they compared the results to analogous globules from a volcanic complex on Svalbard, an island north of Norway. It does not appear that living organisms were at work.

To some, the tiny carbonate globules from the meteorite seem to resemble minerals that arise from microbial activity on Earth. The team focused on whether macromolecular carbon (MMC) in and around the globules was processed organically or not--an unresolved issue. The team had a complete depth profile of the meteorite. Lead author Andrew Steele explained, "By using micro-Raman spectroscopy and a scanning electron microscope we could detect both the structure of the minerals and the forms of carbon present. We did a similar analysis on carbonate globules from Earth in terrain analogous to Mars--the Bockjord Volcanic Complex on Svalbard--for comparison."

The researchers found that the macromolecular carbon is always associated with the mineral magnetite. This association is important because magnetite is known to act as a catalyst in the formation of MMC. Macromolecular carbon present within the carbonate globules in ALH84001 may represent the first evidence of non-biological synthesis of organic molecules on Mars.

"Although we haven't settled the debate on whether evidence of life is contained in Allan Hills, we have shown that these carbon complexes likely formed by non-biological processing on Mars," concluded Steele.

The research is presented at NASA's Astrobiology Science Conference (AbSciCon) 2006 in Washington, D.C. March 26-30. See <http://abscicon2006.arc.nasa.gov/> for details.

Source: Carnegie Institution

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