NASA Scientists Find Primordial Organic Matter in Tagish Lake Meteorite(图)

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[摘要] November 30, 2006. NASA researchers at Johnson Space Center, Houston have found organic materials that formed in the most distant reaches of the early Solar System preserved in a unique meteorite. The study was performed on the Tagish Lake carbonaceous chondrite, a rare type of meteorite that is rich in organic (carbon-bearing) compounds.

[关键词] Organic Matter;Solar System;meteorite

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-bearing) compounds.

Organic matter in meteorites is a subject of intense interest because this material formed at the dawn of the Solar System and may have seeded the early Earth with the building blocks of life. The Tagish Lake meteorite is especially valuable for this work because much of it was collected immediately after its fall over Canada in 2000 and has been maintained in a frozen state, minimizing terrestrial contamination. The collecti

In a paper published in the Dec. 1 issue of the journal Science, the team, headed by NASA space scientist Keiko Nakamura-

Messenger, reports that the Tagish Lake meteorite contains numerous submicrometer hollow organic globules.

"Similar objects have been reported from several meteorites since the 60"s. Some scientists believed these were space organisms, but others thought they were just terrestrial contamination," said Nakamura

-Messenger. The same bubble-

like organic globules appeared in this freshest meteorite ever received from space. "But in the past, there was no way to determine for sure where these organic globules came from because they were simply too small. They are only 1/10,000 inch in size or less."

In 2005, two powerful new nano-

technology instruments were installed in the scientists' laboratory at Johnson Space Center. The organic globules were first found in ultrathin slices of the meteorite with a new JEOL transmission electron microscope. It provided detailed structural and chemical information about the globules. The organic globules were then analyzed for their isotopic compositions with a new mass spectrometer, the Cameca NanoSIMS, th

The organic globules in the Tagish Lake meteorites were found to have very unusual hydrogen and nitrogen isotopic compositions, proving that the globules did not come from Earth.

"The isotopic ratios in these globules show that they formed at temperatures of about -260?

C, near absolute zero," said Scott Messenger, NASA space scientist and co-

author of the paper. "The organic globules most likely originated in the cold molecular cloud that gave birth to our Solar System, or at the outermost reaches of the early Solar System."

The type of meteorite in which the globules were found is also so fragile that it generally breaks up into dust during its entry into Earth's atmosphere, scattering its organic contents across a wide swath. "If, as we suspect, this type of meteorite has been falling onto Earth throughout its entire history, then the Earth was seeded with these organic globules at the same time life was first forming here," said Mike Zolensky, N

-author of the paper.

The origin of life is one of the fundamental unsolved problems in natural sciences. Some biologists think that making a bubble-

shape is the first step on the path to biotic life. "We may be a step closer to knowing where our ancestors came from," Nakamura-Messenger said.

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