### Evidence of Early Mars Life Bolsters SETI

**LITTLE FERRY, NJ..,** August 7, 1996 -- The search for intelligent life in space will be greatly bolstered by NASA's announcement that Mars may once have harbored life, according to a private group of space enthusiasts. In a press conference today at NASA headquarters, evidence was presented to suggest that the structures found in an ancient Martian meteorite appear to be fossilized micro-organisms as much as three billion years old. "This first tantalizing evidence that ours may not be the only planet ever to nurture life," notes Dr. H. Paul Shuch, executive director of the SETI (Search for Extra-Terrestrial Intelligence) League, "gives us good reason to renew our efforts to detect more advanced civilizations in the cosmos."

"Of course," says Shuch, "it's a long road from fossilized bacteria to living, thinking, breathing creatures capable of building radiotelescopes, and announcing their presence to us. But given enough planets, and enough time, it's likely to happen somewhere." The discoveries in just this past year of half a dozen planetary systems around nearby Sun-like stars suggests that there are indeed enough planets, adds Shuch. As for time, the universe is perhaps three times as old as the Earth. "If life has had time here to evolve from single celled micro-organisms to our present level," asks Shuch, "why not elsewhere?"

The first suggestion that meteorites might contain fossilized lifeforms was made by Hans Dieter Pflug in the 1980's. His early findings were dismissed by many biochemists as "pre-biotic structures which merely mimic lifeforms." But form follows function, according to SETI League biologist Muriel Hykes, so it stood to reason that other, similar evidence would ultimately resolve the question of alien life. "This seems to be the evidence we've been seeking," notes Hykes. "Now the SETI efforts can proceed in earnest."

SETI LEAGUE

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# *SearchLites*

## the Quarterly Newsletter of The SETI League, Inc.

***Volume 2 Special Edition***
***August 1996***

# Microbe Fossils Found in Martian Meteorite!

### *NASA Detects First Evidence Of Other Life*

No, the above headline did not come from the National Inquirer, but from the mainstream press. On Wednesday, August 7, 1996, NASA electrified the scientific community (and the world at large) by announcing the most compelling evidence to date for the onetime existence of an apparently extra-terrestrial lifeform. This Special Edition of *SearchLites* is devoted to analysis of the implications to SETI of this exciting discovery.

**Statement From NASA Administrator**
**Daniel S. Goldin, August 6, 1996**

"NASA has made a startling discovery that points to the possibility that a primitive form of microscopic life may have existed on Mars more than three billion years ago. The research is based on a sophisticated examination of an ancient Martian meteorite that landed on Earth some 13,000 years ago.

The evidence is exciting, even compelling, but not conclusive. It is a discovery that demands further scientific investigation. NASA is ready to assist the process of rigorous scientific investigation and lively scientific debate that will follow this discovery.

I want everyone to understand that we are not talking about 'little green men.' These are extremely small, single-cell structures that somewhat resemble bacteria on Earth. There is no evidence or suggestion that any higher life form ever existed on Mars.

The NASA scientists and researchers who made this discovery will be available at a news conference tomorrow to discuss their findings. They will outline the step-by-step "detective story" that explains how the meteorite arrived here from Mars, and how they set about looking for evidence of long-ago life in this ancient rock. They will also release some fascinating images documenting their research."

## Did Earth's Life Originate on Mars?

**by Paul Lutus** (lutusp@arachnoid.com)

*NOTE: This is a speculative argument, based on a preliminary NASA finding of possible ancient cellular life on Mars. It is not intended to represent proven scientific fact, but is a speculation based on ongoing scientific work that is incomplete at the time of writing.*

On August 7, 1996, NASA announced a startling discovery – by examining a meteorite that originated on Mars, they found what they believe is evidence for a primitive form of life that may have existed on Mars 3.6 billion years ago. More work needs to be done to confirm this preliminary result, and many scientists remain unconvinced by the present evidence. But if this preliminary result is confirmed, if the structures inside the meteorite turn out to be fossil evidence for cellular organisms, then some important steps can be taken.

First, we would need to launch a mission to Mars, manned or unmanned, to secure and return to earth core samples that might provide evidence for or against DNA as the organizing scheme for the Mars life form. Having accomplished the return of a biological sample and determined the presence or absence of DNA, one is then faced with a quandary.

If the Mars life form is not based on DNA, it supports the hypothesis that life is a likely outcome for a planet with the correct temperature range, atmospheric pressure, liquid water, and sufficient time with these conditions. This would be a very important finding – two planets with different histories, temperatures, atmospheric makeups and surface gravity, both producing life through random processes – life based on different models, but life nevertheless.

We could use this result to reinforce the theory that life is common in the universe. This single data point, the existence of life of a different form on our sister planet, would greatly aid the theory that life may be a likely event in a reasonably wide range of planetary conditions. This finding would re-energize our search for evidence of alien civilizations.

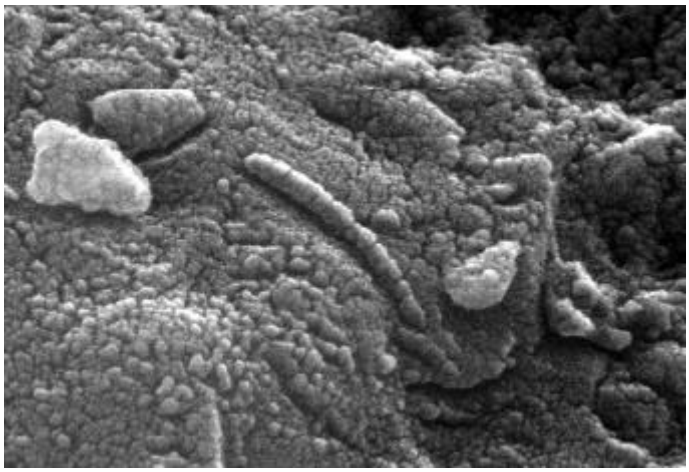
But if the Mars life form is based on DNA, this is an equally interesting result, for a different reason – because of the peculiar and ad hoc nature of DNA, and the number of equally viable alternatives to its specific structure, this outcome would strongly argue for a common origin for life on Earth and Mars.

It is hard to imagine two independent processes producing a mechanism such as DNA, especially if the two DNA forms turn out to be alike in their essential characteristics. It is much more likely that the two planets somehow shared some early organisms.

This conclusion leads to three likely hypotheses for DNA sharing:

1. Earth's DNA got to Mars.
2. Mars' DNA got to Earth.
3. Both Mars and Earth were seeded by some unknown third source.

The third of these alternatives has existed as a theory for some time. It is called "Directed Panspermia" – it proposes that all life originated from some extraterrestrial source, and (in some forms of the theory) that life was placed on earth for a reason. This theory has everything going for it except plausibility and evidence.



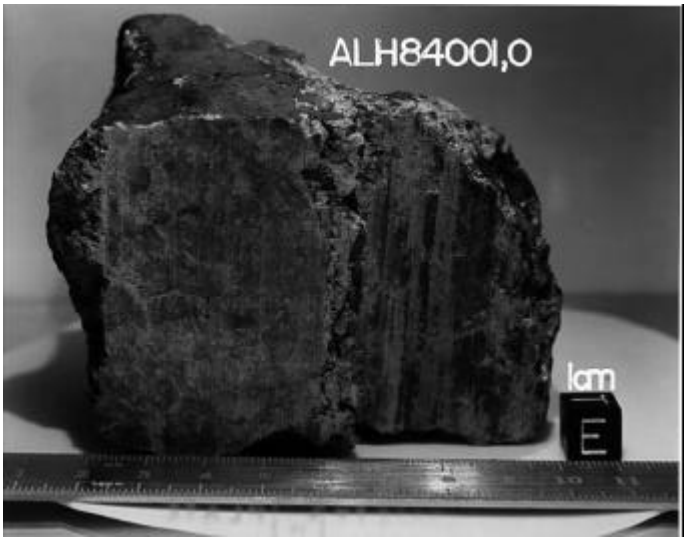
*This high-resolution scanning electron microscope image shows an unusual tube-like structural form that is less than 1/100th the width of a human hair in size found in meteorite ALH84001, a meteorite believed to be of Martian origin. Although this structure is not part of the research published in the Aug. 16 issue of the journal Science, it is located in a similar carbonate glob in the meteorite. This structure will be the subject of future investigations that could confirm whether or not it is fossil evidence of primitive life on Mars 3.6 billion years ago (text and photo courtesy NASA).*

The first of these alternatives (Earth to Mars) suffers from two problems. One, the Mars sample is 3.6 billion years old, earlier than any direct fossil evidence for life on earth. Two, Earth's atmospheric pressure prevents an incoming meteorite or asteroid from throwing surface materials entirely out of the atmosphere and into interplanetary space. There is evidence that Earth's atmosphere has had similarly high pressures for a long time period. Thus, it is not obvious how Earth's genetic material could get into interplanetary space.

The second alternative (Mars to Earth) is the most likely. Mars may have developed life in an early era of high atmospheric pressure, relatively high surface temperatures and liquid water. There is abundant evidence for all these characteristics except conclusive evidence for life.

In this hypothesis, around 3.5 billion years ago Mars' atmospheric pressure began to drop, and established life forms continued to exist only below the surface in pockets of liquid water. Then a meteorite or asteroid impacted on Mars' surface, expelling a large amount of material from the surface into interplanetary space – carrying viable organisms with it.

The final step in this theory is that some of the Martian surface material fell into Earth's early oceans, and either successfully competed with, or provided, Earth's first cellular organisms.



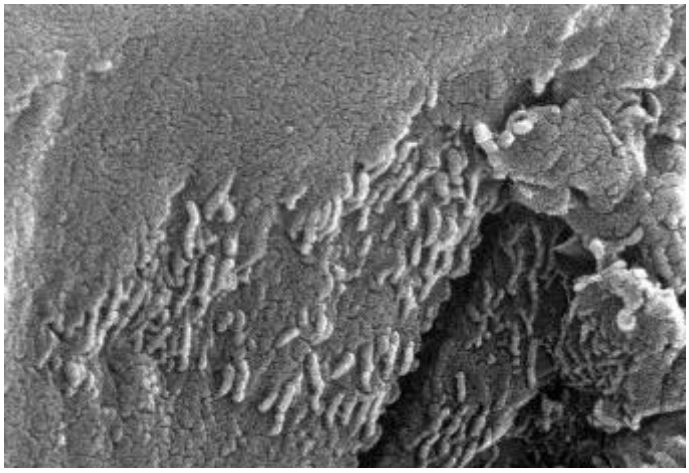

*This meteorite, called ALH84001, was found in 1984 in Allan Hills ice field, Antarctica, by an annual expedition of the National Science Foundation's Antarctic Meteorite Program. It was preserved for study in Johnson Space Center's Meteorite Processing Laboratory and its possible Martian origin was not recognized until 1993. It is one of only 12 meteorites identified so far that match the unique Martian chemistry measured by the Viking spacecraft that landed on Mars in 1976 (text and photo courtesy of NASA).*

This theory is consistent with the relative age and conditions of both Earth and Mars, and it is consistent with the age of the NASA sample, which may, with further work, show that organisms existed on Mars at a time, 3.6 billion years ago, before there is firm fossil evidence for life on Earth.

Here are some findings that would be fatal to this hypothesis:

1. If there is firm evidence that Mars' atmospheric pressure remained high until relatively recently, it would be hard to imagine how genetic material could leave the surface of Mars in time to provide Earth with its first DNA.
2. If it turns out that Earth's and Mars' cellular life forms are based on different principles, this theory has no purpose and can be set aside.
3. If the ongoing work with the Mars meteorites shows that there are no cellular structures inside the teasingly shaped cylinders seen in news photographs, this also makes this theory unnecessary.

If all these dominoes fall, however – if it turns out that there was early Martian cellular life based on a familiar form of DNA, then it may be that we are all descended from an ancient Martian cellular life form.



*While the exact nature of these tube-like structures is not known, one interpretation is that they may be microscopic fossils of primitive, bacteria-like organisms that may have lived on Mars more than 3.6 billion years ago. A two-year investigation by a NASA research team found organic molecules, mineral features characteristic of biological activity and possible microscopic fossils such as these inside of an ancient Martian rock that fell to Earth as a meteorite. The largest possible fossils are less than 1/100th the diameter of a human hair in size while most are ten times smaller (text and photo courtesy of NASA).*

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