Habitability

A planet or planetary satellite is habitable if it can sustain life that originates there or if it sustains life that is carried to it...

Habitable environments must provide liquid water, conditions favorable for the assembly of complex organic molecules, and energy sources to sustain metabolism.
Search for Mars life reaches a dead-end

America’s search for life on another planet has run into a dead-end with Viking I’s failure to find life-essential organic materials on Mars.

New information from the rover on Thursday showed that no organic compounds were found by the sample analysis system. The colorless, odorless methane gas was also detected higher in all life as we know it.

Scientists were quick to point out that the latest failure of their project to find life on Mars puts the already slim odds of finding microbial life in the planet’s past at zero. The team was also quick to update the “search for life” to “search for microbes.”

In a statement that experts saw as a win for the boring and not-yet-volcanic planet, the scientists will be conducted three more tests of a promising, higher temperature. The low level of water means that the tests will be conducted on a Martian rock.

The organic experiment searches for “insensitive biocatalysts,” or the building blocks of life, in the low-pH environment of the Martian surface. It was hoped that by finding organic compounds and possibly even life, the signals would lead to Earthly life, detectable through the detection of organic acids and other products of life.

Scientists and Earth biologists who have reviewed the results say that the planet is too cold and dry to sustain life, and the planet is too cold and dry to sustain life as we know it. The planet is too cold and dry to sustain life, and the planet is too cold and dry to sustain life as we know it.

“Water is a critical factor for life,” said Dr. Daniel McCleese, who heads the search for life on Mars. “We need to find water before we can find life on Mars. We need to find water before we can find life on Mars. We need to find water before we can find life on Mars.”

In a statement about the results of the search for life on Mars, McCleese said, “We need to find water before we can find life on Mars.”

Sojourner at “Yogi”
Life on Mars?

Was Evidence of Life Found in Martian Meteorite?

"Today, Rock 84001 speaks to us across all those billions of years and millions of miles. It speaks of the possibility of life. If this discovery is confirmed, it will surely be one of the most stunning insights into our universe that science has ever uncovered.

President Bill Clinton, August 7, 1996"
Criteria for Recognizing Past Life in Geologic Samples\(^1\) (applied to ALH84001)

1. Is the geologic context of the sample compatible with past life? **NO\(^2\)**
2. Is the age of the sample and its stratigraphic location compatible with possible life? **Similar to Earth’s timeframe\(^2\)**
3. Does the sample contain evidence of cellular morphology? and **Some disproven\(^3\), some maybe\(^2\)**
4. colonies? **NO\(^3\)**
5. Is there any evidence of biominerals showing chemical or mineral disequilibria? **Magnetite, not necessarily biologic\(^3\)**
6. Is there any evidence of stable isotope patterns unique to biology? **Carbon, not necessarily biologic\(^3\)**
7. Are there any organic biomarkers present? **PAHs: inorganic? \(^3\)**
8. Are the features indigenous to the sample? **Some\(^2\)**

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\(^1\)Schopf and Walker, 1983 & Cloud and Morrison, 1979; \(^2\) Gibson et al., 1999; \(^3\) Subsequent papers by other authors
Europa

Europa is approximately 90% the size of Earth's moon

Europa's Icy Surface
Titan is approximately 40% the size of Earth, or 150% the size of Earth's moon.
Huygens Probe Lands on Titan

Deep Impact Approaches Comet Tempel 1

Dr. Daniel McCleese, NASA-JPL (KITP Public Lecture 7-13-05) The Search for Habitable Environments in the Solar System