

WE HAVE NOT DETECTED LIFE ON MARS...OR HAVE WE?

Charles H. Lineweaver

Planetary Science Institute, Australian National University, ACT 0200, AUSTRALIA

email: charley@mso.anu.edu.au

The canals and faces on Mars have disappeared. In 1976, results from the Viking landers were initially ambiguous, but it was concluded that life on Mars had not been observed (e.g. McKay 1997, Klein 1999). No obelisks have been found on Mars, and no eyewitnesses from Roswell are talking. With all this negative evidence piling up, every reasonable scientist I know is of the opinion that no evidence for life has been found on Mars or anywhere else in the Universe: "...there is no evidence from the reconnaissance of the solar system that life exists on any planet other than Earth." (McKay and Stoker 1998).

However, if I were parochial enough to define language as anything that resembles English, and then traveled to China, I would conclude that "No evidence for language has been found in China." The meaningfulness of this statement depends entirely on how meaningful my definition of language is. Similarly, the meaningfulness of the statement "No evidence for life has been found beyond earth" depends entirely on how meaningful our definition of life is. Without knowing the cosmic range of life forms, how can we determine if our terrestrial-life-based definitions are meaningful in a cosmic context?

To find Martian life maybe all we need to do is redefine life by shifting our paradigm of what life is. By redefining life in a more general way, we can legitimately conclude that we have already detected life on Mars. This is not a semantic game. The thermodynamic justifications for a broader definition of life are compelling and more universal than the traditional definitions of life based on DNA, "self-reproduction" and the chemical complexity of the terrestrial life most familiar to us.

How can we measure whether our concept of life is general enough to be useful in a Martian context? Estimates of the generality of a given property of life can be based on how fundamental or how ancient or how widespread that property is. If a property is fundamental, ancient and widespread among the life forms on Earth, it is almost certainly a property of the last common ancestor and it is a good candidate for being general enough to be present outside the Earth.

If traces of life are found on Mars the question that needs to be asked is: How independent is this life from life on Earth? A paradigm shift is needed from "Was there a second genesis?" to "How much of one was there?" This abandonment of a picture in black and white to a more nuanced grey is based on the idea that the boundary between life and non-life was not sharp and that the origin of life was an extended process of molecular tinkering. Martian life, if it exists maybe be stuck somewhere between inevitable biochemistry and quirky biology.

NOTES