THE SEARCH FOR LIFE ON MARS – AND EARTH: A CALL FOR OBJECTIVITY

Gilbert V. Levin
Adjunct Professor, Beyond Center
College of Liberal Arts and Sciences
Arizona State University, Tempe, AZ
gilbert.levin@asu.edu

ABSTRACT

The primary focus of NASA's Mars and other planetary exploration programs, such as Titan, Enceladus, and Europa, "is to determine if life is or was present." The author suggests that NASA's stated primary focus should, therefore, include a re-examination of the data from the 1976 Viking Mission Labeled Release (LR) life detection experiment. That experiment obtained repetitive strong positive signals supported by a variety of controls, altogether signifying the detection of microbial metabolism in the top few centimeters of the surface of Mars. The data fall well within those obtained from hundreds of terrestrial LR tests of soils and microbial cultures that made up the response library assembled for the Viking LR experiment. No physico-chemical theory or experiment of the many attempted over the years has duplicated or explained away the Viking LR results as indicative of life. Together with pertinent findings on Mars and Earth since Viking, the possibility of microbial life on Mars has become a singular scientific issue warranting the herein requested re-examination of the Viking LR data.

An elaboration of the Viking LR could seek to confirm the Viking results. The experiment would probe the active agent on Mars for a chiral preference in reacting with the LR nutrients. Chiral preferences are a strong characteristic of all known life, but play no role in chemical reactions. A finding of chiral metabolism would unambiguously prove the existence of extant life, even to the most critical observers. Moreover, were a chirality found that was different to that now known for terrestrial life, the finding would be strong evidence for an independent origin of that life form, even if it were found on Earth.

1. INTRODUCTION

It has been more than a third of a century since an extraordinary activity was discovered on the surface of Mars. When dosed with simple ^{14}C-labeled organic compounds, the soil reacted immediately, producing a strong, continuing evolution of one or more ^{14}C-labeled carbon gases. This same reaction occurred at the two Viking landing sites 4,000 miles apart. The data, themselves, are incontrovertible, and there has been no disagreement in the scientific community about these findings. The disagreement is about the interpretation – for life or not – of the data. Yet, despite numerous additional missions to Mars since Viking, there has been no attempt made to investigate the nature of the reaction. This lack of scientific pursuit is particularly disconcerting since the experiment that made the discovery satisfied the pre-mission criteria for the discovery of microbial life. Instead of pursuing the scientific method, officials directing the U.S. and European space agencies made the unwarranted presumption that the reaction was caused by a strong oxidant in the surface material of Mars. As a result, no life detection experiment has been sent to Mars since Viking. Moreover, no follow-up experiment has sought to identify the putative chemical to which the startling reaction has been attributed.

2. BACKGROUND

In 1976, NASA's Viking Mission to Mars conducted a series of Labeled Release (LR) experiments (Levin and Straat, 1976) seeking microbial life in the soil of the red planet. In the LR, a tiny drop of an extremely dilute aqueous solution of low specific activity ^{14}C-labeled organic nutrients, shown in Table 1, was added to the center of a soil sample The solution spread across the sample chromatographically, producing a range from wet to moist soil.

TABLE 1
VIKING LABELED RELEASE SUBSTRATES

Labeled Substrate	Structure and Label Position (*)	Concentration ($\times 10^{-4}$M)	μCi mL^{-1}	Specific Activity (Ci/Mole)
^{14}C-glycine	NH_2*CH_2*COOH	2.5	4	16
^{14}C-DL-alanine	*CH_3*CH (NH_2)*COOH	5.0	12	48
^{14}C-sodium formate	H*COONa	2.5	2	8
^{14}C-DL-sodium lactate	*CH_3*CHOH*COONa	5.0	12	48
^{14}C-calcium glycolate	(*CH_2OH*COO)$_2$Ca	2.5	4	16