

# MARS LIFE STATUS 2020 - Hard and Circumstantial Evidence

Review by Gil Levin

Viking LR is adaption of Louis Pasteur's test for microorganisms now used by health departments around the world. C14 was added to the test broth to improve sensitivity, and simple substrates ubiquitously used by terrestrial organisms were added to increase its scope. In some 4,000 tests of soils, pure and mixed microbial cultures on Earth the LR has amassed the impressive provenance of never having produced a false positive or false negative result. No one has ever challenged the Viking LR data or the accuracy of the test or instrument.

Viewed objectively, LR more than satisfied requirements for verification and proof of life on Mars. On Viking 1, the LR duplicated its initial positive result, and confirmed the positives with stringent controls. The entire process was duplicated, and thus replicated, by Viking 2, some 4,000 miles away.

The Viking LR Mars results were rejected because of the failure of the molecular analysis instrument (GCMS – Gas Chromatograph-Mass Spectrometer) to detect organics. Yet, this instrument had frequently failed in pre-mission tests on Earth. Where are the data Curiosity promised on complex organics to be determined by a wet extraction method? If they did not do the run, how come NASA announced finding probable kerogen (which is of organic origin only)?

Liquid water was detected by Viking 2, and several times by later missions, but officially denied until Curiosity reported several percent moisture in the Martian regolith. Images from several missions showing greenish patches on rocks and surface areas were denied for many years. Why have there been no spectral analyses of this green color?

Where are there no isotopic ratio data on methane? Why no isotopic analysis of regional atmospheric CO<sub>2</sub>?

Based on our current knowledge, there is no possibility Mars could be sterile.

NASA said discovery of life on Mars may be "possibly the greatest experiment t in the history of science." Why no verifying mission or even independent review of existing data by academic institution?

## **Specific Hard and Circumstantial Evidence**

1. Amino acids and many other organics have been found all over the reachable cosmos.
2. Biological fossils have been found in meteorites by many scientists.
3. Liquid water, biologically complex organic compounds, all key elements of life, including CHNOPS, have found on Mars.

4. Terrestrial microorganisms have been grown under Martian environmental conditions, and even harsher.
5. Microbes on Earth could be impelled to Mars in bolides launched by meteoric impact, and land in viable form (all the parameters have been verified, and lab studies have shown that some terrestrial microbial species could survive and grow under Martian conditions).
6. The Viking Mission 1 LR test and a series of increasingly decisive varied controls more than satisfied NASA's pre-mission requirements for the detection of extant life.
7. Then, as dictated by the scientific method, the Viking 1 LR repeated the test.  
This duplication verified the first test and controls, thereby establishing the grounds for scientific proof.
8. In a separate mission, Viking 2 replicated the experiment and also duplicated it. All its results completely confirmed the presence of extant microbes.
9. Viking 2 detected greenish patches on some rocks. Analyzed with the six channel Viking imaging system, the spectrum of the patches completely matched that of terrestrial lichen when similarly analyzed.
10. Precise replicates of the patches taken at yearly intervals for three Martian years showed the shapes had changed, with no changes in the surrounding field, thereby eliminating wind and dust as an explanation.
11. Chlorophyll was reported by spectral analysis of the Martian surface and on the lander deck. Although the respected scientist who made this claim withdrew the published peer-reviewed publication, coercion is suspected.
12. Ultraviolet (UV) activation of the Martian surface material did not, as initially proposed by some, cause the LR reaction: a sample taken from under a UV-shielding rock was as LR-active as surface samples.
13. Among complex organics reported on Mars by Curiosity's scientists, is possibly kerogen, which is only of biological origin.
14. Phoenix and Curiosity concluded that the ancient Martian environment was habitable. They did not conclude that it was still not so.
15. The excess of carbon-13 over carbon-12 in the Martian atmosphere is strongly indicative of biological activity, which prefers ingesting the latter.
16. The Martian atmosphere is in disequilibrium: its CO<sub>2</sub> should long ago have been converted to CO by the sun's UV light; thus, the CO<sub>2</sub> is being regenerated, possibly by biology including microorganisms, as on Earth.

17. Methane has been measured in the Martian atmosphere both cyclically and locally; microbial methanogens could be the source.
18. The rapid disappearance of methane from the Martian atmosphere requires a sink, possibly supplied by methanotrophs that could co-exist with methanogens on the Martian surface.
19. Ghost-like moving lights, resembling will-O'-the-wisps on Earth that are formed by spontaneous ignition of methane, have been video-recorded on the Martian surface.
20. Formaldehyde and ammonia, each possibly indicative of biology, are claimed to be in the Martian atmosphere.
21. An independent complexity analysis of the positive LR signal identified it as biological.
22. A worm-like feature was in an image taken by Curiosity.
23. Large structures resembling terrestrial stromatolites (formed only by microorganisms) were found by Curiosity; a statistical analysis of their complex features showed the probability was less than 0.004 that the similarity could be caused by chance alone.
24. Images sent by Curiosity bear strong resemblances to metazoans as assessed by experts.
25. Images sent by Curiosity also bear features resembling mushrooms as assessed by experts. The “mushrooms” are seen to expand and new ones pop up out of the ground in images taken several days apart.
25. Nothing inimical to life, even as we know it on Earth, has been found on Mars.

In summary, we have: positive results from a test adapted from one used by public health departments daily to test for microbial contamination of drinking water of billions of people in cities around the world; supportive responses from strong and varied controls; duplication of the LR results at each of the two Viking sites; replication of the experiment at the two Viking sites; with the above copious additional hard and circumstantial evidence for life on Mars - and the failure for over 44 years of any experiment or theory to provide a scientifically supportable non-biological explanation of the Viking LR results.

What is the evidence against the possibility of life on Mars? The astonishing fact is that there is *NONE*.