

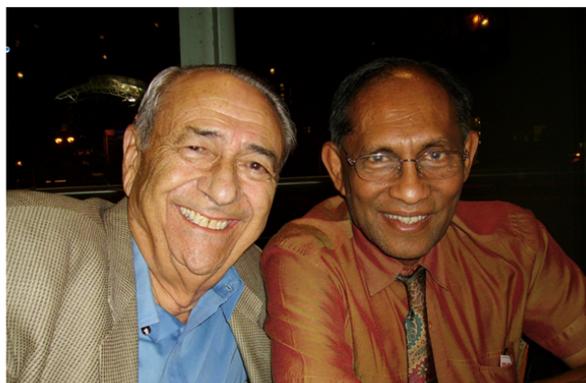
Search for Life on Mars and the Legacy of Gilbert Levin

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INTRODUCTION

Gilbert Victor Levin (1923-2021) was the undisputed pioneer of Mars-life studies in the modern era. Along with Patricia Straat (1936-2020) he carried out the celebrated Labelled Release Experiment, in which a radio-actively imbued nutrient broth was added to soil taken at the landing site of the spacecraft Viking spacecraft (1). The object of the experiment was to determine if the nutrient was taken up by microbes that may have existed at or near the surface assuming that such microbes possessed similar metabolisms to those that exist on the Earth. The Viking 1 spacecraft landed on Mars on 20 July 1976 and a few months later the second spacecraft Viking 2 touched down on 3rd September. Everything went according to plan and it is now a matter of history that the Levin's experiment turned out to be a startling success. Samples of Martian soil, one of which from beneath a rock, when they were subject to the test all yielded positive results for microbial metabolism. However, an initial plan to make such a declaration (according to Levin) was quickly thwarted and stalled by the intervention of NASA bureaucracy.



Gil Levin and Chandra Wickramasinghe in Cardiff, UK in 2006 (Photo: courtesy Barry DiGregorio)

The reservation expressed at the time was that other more conservative explanations had first to be ruled out before a positive detection of life could be announced. In particular the possibility that a purely chemical reaction with a super-oxidising

soil could have mimicked biology had to be ruled out. An independent discovery that appeared confusing was that the Martian soil at the landing site did not show any detectable amounts of organic compounds within the limitations of the equipment used (Viking GC/MS experiment), and this provided justification for a cautious approach. NASA's Curiosity Rover has since then confirmed the existence of seasonal liquid water flows on Mars as well as clear evidence of the organics that were thought to be missing in the GC/MS experiments of the Viking Mission.

In 2012 a re-examination of the data from the Viking experiments left little doubt that Levin and Straat really did discover microbial life on Mars in 1976 (2). Despite Levin's persistent protestations it is a sad commentary on the sociology of science that the 1976 Viking life-detection experiment, or one similar to it, was not considered desirable to include in any later mission to Mars. This is reminiscent of the rejection of proposals that were made by a Cardiff UK team to include a similar life detection experiment on the ROSETTA mission to the comet 67P/CG that was concluded in 2016, with data that was all consistent with cometary biology.

Evidence that could be interpreted as pointing to extant microbial life on Mars was obtained more recently in many in the situ studies of the Mars surface. This includes not only the discovery of organic molecules near the surface but also a wide range of mineral configurations that are indicative of biological processes. The discovery of methane with a seasonal as well as diurnal variation, particularly at the Gale crater, is rather tediously interpreted as due to a geochemical process, but a biological explanation is clearly the most reasonable (3). The reluctance to conclude the existence of contemporary microbial life on Mars appears to be deep rooted in the prevailing science culture. This may well be part of the resistance to accept the wider concept of life being a truly cosmic phenomenon that takes root, evolves and flourishes whenever and wherever the right conditions prevail (4).

There is not the slightest doubt that the first scientific evidence of active microbial life on Mars was discovered by Gilbert Levin and Patricia Straat 35 years ago, and credit for their part in the

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discovery should long ago have been fulsomely acknowledged. It is a sad day for astrobiology when politics and ideology are given precedence over fact.

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