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Editorial Open Access

Comment on Liquid Water and Life on Mars

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Editorial

The announcement this week of the detection of liquid water on Mars has come close on 4 decades after the arrival of the first Viking landers at the red planet in 1976 [1]. The temperatures at the two original landing sites of the Viking spacecraft in 1976 ranged between a high of -31°C and a low of -84°C, so no liquid water would have persisted at the surface. The Viking probes had also carried out in situ biological tests of Martian soil, the so-called Labeled Release Experiment, where an isotope-labeled nutrient was applied to the soil to test for the presence of microbial life [2]. An astoundingly positive result for the uptake of the nutrient and hence extant life was obtained; but it was quickly rejected on grounds of alleged uncertainties of interpretation, as well as the lack of organic molecules detectable at the landing site. A year later, in1977, a major dust storm enveloped the planet and H. Abadi and the present writer reported evidence of absorption properties of the Martian dust that was consistent with the presence of aromatic hydrocarbons [3]. In 2012 a careful re-examination of all the Viking results of 1976 led to the conclusion that a positive detection of microbial life on Mars may have been obtained at the time [4]. This is a position that Gil Levin has firmly held and defended against all his critics (Figure 1).

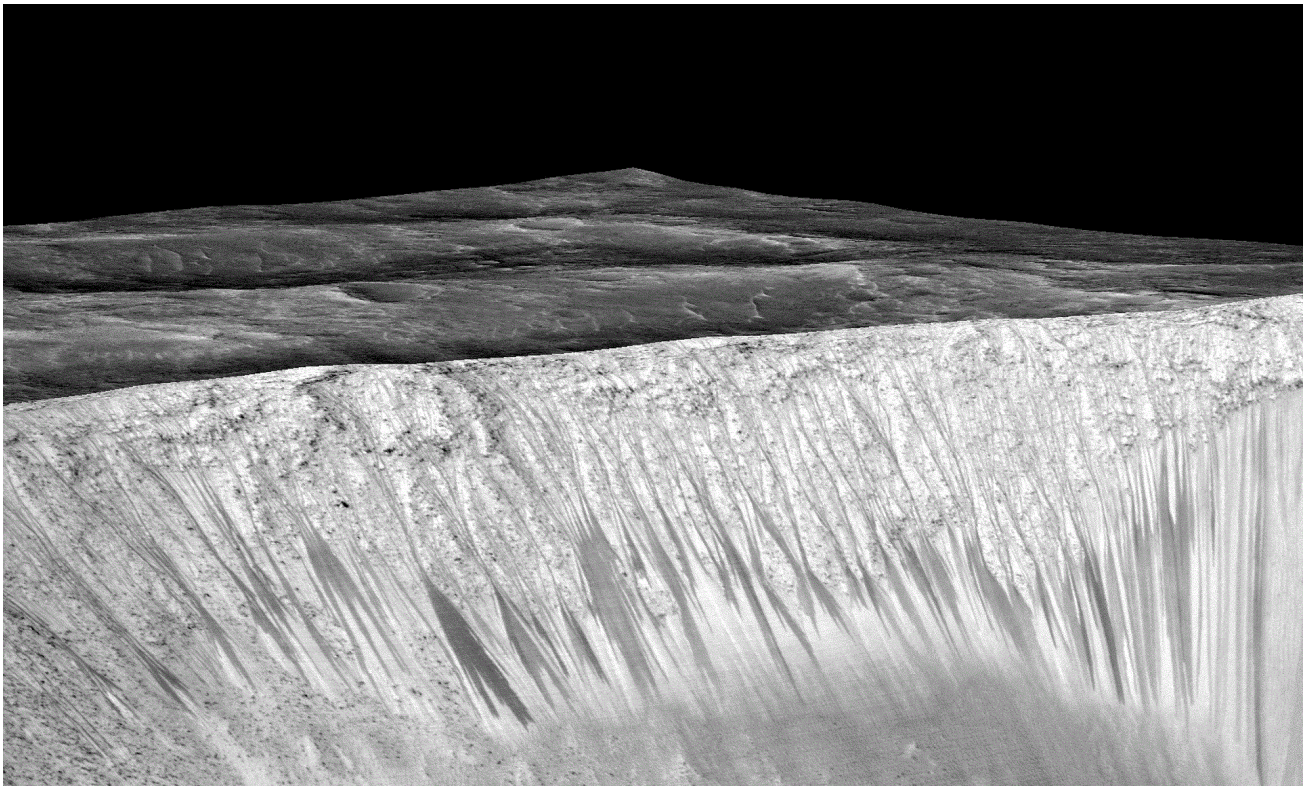

Figure 1: Evidence of seasonally changing liquid water trickling on canyon face (Courtesy, NASA).

The next development in the Life on Mars saga came in 1996 when McKay et al [5] announced the presence of microbial fossils in a meteorite from Mars ALH84001. On this occasion US President Bill Clinton made a special address on the discovery that was greatly hyped throughout the popular science media. Not long afterwards, however, the claim of microbial fossils in the Mars meteorite was dismissed as

due to possible crystallographic artifacts. The world was not ready to accept the possibility of life on Mars!

When in 2004 ESA's Mars Express satellite discovered methane in the Mars atmosphere the possibility of Martian microbiology was again raised, but promptly rejected as inconclusive. Last year, the Mars Curiosity Rover found sporadic emissions of Methane emerging from patches of the ground that once again raised the spectre of possible microbial life [6,7].

Over the past decade the results of many different types of investigations have confirmed the presence of dried-up river beds and lake deltas as well as hydrated rock minerals on Mars. It was generally accepted that there was an abundance of liquid water forming oceans and rivers in the distant past. Now all this data have been combined with evidence of summer-time trickles of water down mountain slopes and canyons leading to the conclusion that there must indeed be liquid water on Mars in the present day.

Be that as it may, but what everyone wants to know is whether microbial life currently exists on Mars. If the presence of water, methane and organic molecules is conceded, the existence of life will also be guaranteed by the simple fact the Mars and Earth are in close proximity within the solar system and have indeed been connected by impacts and exchanges of meteoritic rocks that would have transferred biomaterial between the planets. Although we know nothing of the mechanism by which life starts de novo anywhere, the processes of panspermia and interplanet transfers of life have an inevitability that cannot be denied.

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