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Forum Article

Comments on the June 7, 2018, NASA News Release and Papers

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The June 7, 2018, NASA news conference and two related papers in *Science* regarding the findings of organic molecules (Eigenbrode *et al.,* 2018) and methane (Webster *et al.,* 2018) on Mars are exciting for the possibility of both ancient and current life on Mars. The scientific search for extraterrestrial life began in 1864 with Louis Pasteur, who tested for microorganisms with his hay infusion broth into which he put, in vain, a bit of the freshly fallen Orgueil meteorite. The search has intensified up to the present moment. This quest to learn whether we are alone is one of the most highly prioritized scientific issues in the minds of scientists and the lay public, hence the prominence granted the NASA news conference on June 7 regarding recent pertinent findings. As participants in this search who remain current in the subject, we feel some comments are in order.

We anticipated that the NASA announcement would reveal the identification of complex, biological-type organic compounds detected by Curiosity's key experiment, the liquid extraction of organics, described by Freissinet *et al.* (2015). It did not. Nor was the liquid extraction method even mentioned in the news conference, nor—most surprisingly—in the paper (Eigenbrode *et al.,* 2018). Instead, the results reported were essentially obtained by the GCMS method used by Viking, upgraded and run at higher temperatures to vaporize more recalcitrant organics. However, the thermal release of organic vapors has been reported (Navarro-Gonzalez *et al.,* 2010) to destroy the very organics sought when heated in the presence of perchlorates, reported (Hecht *et al.,* 2009) to be common on Mars. The largest carbon molecule reported at the news conference, or in the specific paper (Eigenbrode *et al.,* 2018), contained only eight carbon atoms—not enough to be indicative of biology. Much larger organic fragments of up to 358 molecular weight were reported earlier by many of the same authors (Freissinet *et al.,* 2015). The highlight of the June 7 news conference was to make a ''probable'' case for having detected kerogens (but no analysis of such). Kerogens are generally regarded as of biological origin (Vandenbroucke and Largeau, 2006). However, the authors contended these were likely abiotic in origin.

The paper on methane in the atmosphere of Mars (Webster *et al.,* 2018) did provide important new information: the localized seasonal cycling of atmospheric methane, with substantial and repetitive amplitudes over the three martian years (six Earth years) seasonally monitored. Then, while acknowledging that almost all methane in Earth's atmosphere is of biological origin, the authors propose an abiotic scenario to explain away this strong indication of current life. On the other hand, this new result makes a possible biological source proposed (Levin and Straat, 2009; Miller *et al.,* 2010) to explain the cyclical methane on Mars even more tantalizing. Neither publication is cited.

While ostensibly contending they are seeking life, each finding pointing in that direction seems to be immediately contra-indicated by the finders and in all of NASA's releases and supported scientific publications. The June 7 NASA news conference makes more relevant than ever space science reporter Leonard David's public radio comment: ''Why is NASA running away from life on Mars?'' (Livingston, 2013).

Prima facie evidence of that avoidance is NASA's not sending another life-detection experiment to Mars since the 1976 Viking mission Labeled Release (LR) experiment obtained strong evidence (Levin and Straat, 2016) for current microbial life on the Red Planet. At that time, this evidence was overridden by the presumed lack of liquid water and the failure of the Viking GCMS to find any organic matter. Both have now been found. Much organic matter has been reported, including the possible kerogen mentioned in Curiosity's recent paper (Eigenbrode *et al.,* 2018). Yet no reference was made to the Viking LR experiment, either in the news conference or in the two papers discussed above.

In the 41 years since Viking, none of the many attempts to explain away the LR results nonbiologically has withstood scientific scrutiny, so no barrier remains to preclude the possibility of extant microbial life on Mars, or that the LR experiment detected it.

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