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Veteran Astrobiologists Criticize Article Calling for Relief of Anti-Contamination Requirements for the Return Mars Sample Mission

Astrobiologists Gilbert V. Levin and Patricia A. Straat have published an op-ed piece (ICAMSR 8-21-17) commenting on an article in *Science* (*Science*, DOI:10.1126/science.357.6351,2017) that downplays the hazards involved in NASA's Mars Return Sample Program. The *Science* article, by staff writer Paul Voosen, also addresses the difficulty imposed on the Mars rover, Curiosity, in looking for life while avoiding the possibility of contaminating the red planet with hitch-hiking Earth germs. NASA has established quarantine limits that keep Curiosity away from seeking Martian life in areas NASA thinks could sustain terrestrial life if so infected. Voosen, referring to an upcoming article by Alberto Fairen, Cornell University, (*Astrobiology*, in press), makes a case for relieving the COSPAR-imposed and NASA-accepted requirement for sterilization of spacecraft landing on Mars. The contention is made that the extreme unlikeliness that Earth microorganisms could survive on Mars makes spacecraft sterilization unnecessary, and imposes a high cost on such missions. The article does not cite relevant publications reporting the survival of terrestrial microorganisms under Martian environmental conditions, and even in naked space.

Levin and Straat point to the essential confusion in the *Science* article about the very definition of "sterilization," calling terms such as "most sterile" and "not fully sterilized" as oxymorons that demonstrate this confusion. They further cite that, while Voosen points to the Viking Mission to Mars as his example of the high cost of spacecraft sterilization, he neglects to say that the Viking Labeled Release (LR) experiment found strong evidence for extant microbial life on the surface of Mars. The results were not accepted by NASA, because Viking failed to find organic matter in the Martian material. They say that in the 41 years since Viking NASA has rejected all proposals for further life detection experiments to confirm or deny the LR findings. Moreover, none of the attempts to duplicate the LR results has succeeded. Other landers since Viking have found organic matter on Mars, supporting Levin's and Straat's contention that the Viking LR detected life. Today,

they say, NASA regards the Martian results as "ambiguous." Thus, Levin and Straat deduce, there must be some small chance that life exists on Mars. Even such a small chance should prohibit a cavalier return of Mars material to Earth because of the horrendous damage to Earth's biosphere potential Martian microorganisms might do if they were pathogenic.

The two astrobiology veterans argue for the "classical dictate of science: when an experiment produces a new result, repeat that experiment to check its validity, and, if it proves true, expand the experiment to gain new facts." Their proposals to do just that have not been accepted.