

## **Astrobiology News October 2017: Protecting the Red Planet from the Green Planet**

Late last month, Adler Planetarium Astronomer Lucianne Walkowicz temporarily left Chicago for a 1-year position at the Library of Congress. There, she serves as Baruch S. Blumberg Chair in Astrobiology to work on a project titled, “Fear of a Green Planet: Inclusive Systems of Thought for Human Exploration of Mars.” One aspect of this project brings together diverse minds working at the intersection of space and society to forge paths to “becoming an interplanetary species that enhances access to space, rather than mirroring our Earthbound inequalities.”<sup>1</sup>

The Committee on Space Research (COSPAR) has guided exploration of the “Red Planet” for decades. COSPAR meets regularly to put in place and update guidelines on planetary protection (see February 2016 *Astrobiology News*). As plans ramp up both from international space agencies and the private sector to put humans on Mars during the 2030 decade, so debates about protecting Mars from terrestrial biological contamination are ramping up.

The current volume of the *Journal Astrobiology* includes two contrasting views on protection strategies. “Searching for Life on Mars Before It Is Too Late”<sup>2</sup> argues that we need to relax present constraints that prevent robotic missions from exploring “Special Regions”<sup>3</sup> that are thought to be most likely to host indigenous life *before* human missions to Mars. On the other hand, “Four Fallacies and an Oversight: Searching for Martian Life”<sup>4</sup> argues that relaxing constraints would neither be in the best interest of protecting Mars nor future human residents on Mars.

Arguments for exploring Special Regions are based on reasoning that (1) concerns about contamination of Mars by robotic missions are moot, since either contamination has already occurred, or Earth microbes can’t survive and reproduce in the Martian environment; and (2) Martian life would differ significantly from modern Earth life, both genetically and structurally. Counterarguments question whether (1) Special Regions are necessarily the best places to search for *Martian* life in the first place, and (2) Martian life would be sufficiently dissimilar to Earth life, considering the new groups of microorganisms that have been discovered on Earth only within the past several years. The

suggested “oversight” is particularly thought provoking: contamination of Mars could cause damage both to Martian resources and possibly to future human explorers. If Martian life uses DNA/RNA like Earth life, lateral gene transfer could result in the production of new pathogens.

These ongoing conversations ensure that we consider foreseeable possibilities before taking actions that might irreversibly change another world. The history of human activity on Earth certainly argues for a cautionary approach! The principal question facing Mars exploration today is, what are the best methods to further astrobiology research, while protecting environments on both planets? A different, but no less important, question, is how can we ensure future space exploration is equitable and beneficial to everyone?

Finally, although this doesn’t really qualify as “Astrobiology” news, I simply have to switch topics briefly to mention the exciting new gravitational wave discovery that was announced on October 16th. Yes, this is a really big deal – it’s the first time an astronomical event was detected both through gravitational waves and through light at many different wavelengths, confirming that the signal came from merging neutron stars<sup>5</sup>. This discovery also confirmed that these collisions are responsible for the production of elements heavier than iron, such as gold, platinum, and uranium. For more information and some beautiful visualizations, check out the video produced by astronomers at Northwestern University.<sup>6</sup>

Until next month,

Grace

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<sup>1</sup> <https://www.loc.gov/item/prn-17-094/walkowicz-named-astrobiology-chair-at-kluge-center/2017-07-10/>

<sup>2</sup> Fairen et al. 2017, *Astrobiology*, Vol 17, No. 10 (DOI: 10.1089/ast.2017.1703)

<sup>3</sup> COSPAR actually defines Mars Special Regions as locations in which *Earth* life could propagate.

<sup>4</sup> Rummel & Conley 2017, *Astrobiology*, Vol. 17, No. 10 (DOI: 10.1089/ast.2017.1749)

<sup>5</sup> Neutron stars are even denser than the nuclei of atoms, containing the mass of a star compacted to the size of a city.

<sup>6</sup> <https://www.youtube.com/watch?v=m1X-BFLnRIM>