

Astrovirology: Viruses at Large in the Universe

Berliner Aaron J. Mochizuki Tomohiro, and Stedman Kenneth M.

Published Online: 1 Feb 2018 <https://doi.org/10.1089/ast.2017.1649>

Abstract

Viruses are the most abundant biological entities on modern Earth. They are highly diverse both in structure and genomic sequence, play critical roles in evolution, strongly influence terran biogeochemistry, and are believed to have played important roles in the origin and evolution of life. However, there is yet very little focus on viruses in astrobiology. Viruses arguably have coexisted with cellular life-forms since the earliest stages of life, may have been directly involved therein, and have profoundly influenced cellular evolution. Viruses are the only entities on modern Earth to use either RNA or DNA in both single- and double-stranded forms for their genetic material and thus may provide a model for the putative RNA-protein world. With this review, we hope to inspire integration of virus research into astrobiology and also point out pressing unanswered questions in astrovirology, particularly regarding the detection of virus biosignatures and whether viruses could be spread extraterrestrially. We present basic virology principles, an inclusive definition of viruses, review current virology research pertinent to astrobiology, and propose ideas for future astrovirology research foci. **Key Words:** Astrobiology—Virology—Biosignatures—Origin of life—Roadmap. *Astrobiology* 18, 207–223.