

Astrobioethics: Guiding Principles for the Ethical Conduct of Astrobiology Research on Earth and Beyond

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Astrobiologists frequently confront a “life bias”—an attitude that unquestioningly assumes that living entities/inhabited environments are more valuable than non-living entities/sterile environments. The life bias stems from Western ethics, which has a long history of focusing on one trait—e.g., rationality, autonomy, sentience, or aliveness—and considering only whether and to what extent the things we encounter possess that trait. Such a rigid, hierarchical worldview undermines one’s ability to recognize moral value whenever and wherever it presents itself. For instance, complex geochemical interactions themselves can generate new forms of ethical value in the context of an extraterrestrial environment (e.g., Titan’s dynamic methane cycle, Mars’s unique Valles Marineris, etc.). As a group composed of philosophers and scientists, we argue for an expanded scope of multiply-realizable, morally relevant properties. Our view allows for entities that are not sentient nor even alive to possess various forms of moral value.

Simultaneously, the field of astrobiology provides one of the most fertile grounds for the development of a more expansive ethical framework. Astrobiology’s view of life being interwoven with astrophysical and planetary evolution, as well as the field’s pursuit of unraveling the nature of the living state, facilitates the development of ethical frameworks that embrace the intrinsic value of non-living—i.e., geochemical/geophysical—phenomena. Moreover, space exploration regularly brings humanity into contact with phenomena to which we likely have no pre-existing relation, be it biotic or abiotic in nature. Hence, the act of envisioning the exploration of the cosmos oriented toward the discovery of extraterrestrial life thrusts us into new ethical territory: How should we recognize the moral value of entirely new classes of phenomena?

To meet this challenge, we introduce our “*Principles of Astrobioethics*”, developed by implementing concepts from the fields of value theory and applied ethics to the practice of modern-day astrobiological exploration. We then explore how these principles may guide our actions in several case studies, including the first discovery of life elsewhere in the Solar System. Looking to the future, we anticipate that astrobioethical progress will reorient humanity’s ability to recognize value in the complex webs of biogeochemical interactions on Earth and beyond.