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THE BIOMEX SPACE EXPERIMENT ON THE EXPOSE R2 MISSION: THE RESISTANCE OF THE
ANTARCTIC BLACK FUNGUS *CRYOMYCES ANTARCTICUS* AND IMPLICATIONS FOR
ASTROBIOLOGY

Abstract

The space experiments BIOMEX (BIOlogy and Mars experiment) was exposed on the space exposure facility EXPOSE-R2 on the International Space Station (ISS) in 2014. The prime objective of BIOMEX project is to evaluate to what extent biomolecules are resistant to, and can maintain their stability under, space and Mars-like conditions. It aims at establishing a biosignature data base; e.g. a Raman spectral library to be used for extraterrestrial life biosignatures. The secondary objective of BIOMEX is to investigate the endurance of extremophiles, when mixed with Lunar and Martian mineral analogues. In this context, the cryptoendolithic black fungus *Cryomyces antarcticus*, due to its ability to withstand stresses beyond the conditions, already prohibitive, of its natural environment, was selected, and exposed for 1.5 years to the extreme conditions experienced in Low Earth Orbit. Cultural and molecular tests revealed that the fungus survived on rock analogues under space and simulated Martian conditions, showing only slight ultra-structural and molecular damage. The outcomes of these studies outstretched the concept of limits for microbial life and are giving clues for defining the boundaries for habitable environments on Earth, discovering life in environments previously considered sterile, and assessing the habitability of Mars or other planets