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SALINISPHAERA SHABANENSIS - A NEW ASTROBIOLOGICAL MODEL ORGANISM

Abstract

In our solar system Mars and Enceladus are the most promising targets for a search for evidence of life. The subsurface of Mars and the subsurface oceans of Enceladus might be habitable. The general environmental conditions of both are quite different, but both have in common the presence of water, low average temperatures, the availability of carbon in form of CO2 or organic compounds, and the presence of salts. Assessing the habitability of Mars and detecting life, if it was ever there, depends on knowledge of whether the combined environmental stresses experienced on Mars are compatible with life and whether records of that life could be detected. Our current ability to make these assessments is hampered by a lack of knowledge of how the combined effect of different environmental stresses influence the survival and growth of organisms. In particular, many combinations of stress, such as high radiation conditions combined with an absence of water as it is the case in the shallow subsurface of Mars have not been investigated. Furthermore, a lack of experimental studies on how anaerobic microorganisms, from extreme terrestrial environments, respond to such stresses undermine our knowledge of Mars as a location for life since the planet is essentially anoxic. We tested the response of a variety of (facultative) anaerobic microorganisms to conditions on current day or on early Mars. Strain selection and first resistance tests are in process with bacteria from a variety of groups, among them the moderately halophilic Salinisphaera shabanensis, previously isolated from a deep-sea brine. This bacterium is facultative anaerobic, radiation tolerant and can survive long periods of desiccation making it a promising new model organism for astrobiology.