BIOMEX (Biology and Mars Experiment): Preliminary results on Antarctic black cryptoendolithic fungi in ground based experiments.

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The main goal for astrobiologists is to find traces of present or past life in extraterrestrial environment or in meteorites. Biomolecules, such as lipids, pigments or polysaccharides, may be useful to establish the presence of extant or extinct life (Simoneit, B et al., 1998). BIOMEX (Biology and Mars Experiment) aims to measure to what extent biomolecules, such as pigments and cellular components, preserve their stability under space and Mars-like conditions. The experiment has just been launched in the space and will be exposed on EXPOSE-R payload to the outside of the International Space Station (ISS) for about 2 years. Among a number of extremophilic microorganisms tested, the Antarctic cryptoendolithic black fungus *Cryomyces antarcticus* CCFEE 515 was included in the experiment. The fungus, living in the airspaces of porous rocks, was already chosen in previous astrobiological investigation for studying the interplanetary transfer of life via meteorites. In that context, the fungus survived 18 months of exposure outside of the ISS (Onofri al., 2012); for all these reasons it is considered an optimal eukaryotic model for astrobiological exploration. Before launch dried samples were exposed, in ground based experiments, to extreme conditions, including vacuum, irradiation and temperature cycles.Upon sample re-hydration and survival analysis, including colony forming ability, Propidium MonoAzide (PMA) assay-coupled quantitative PCR (Mohapatra and La Duc, 2012) all the test systems survived, neither any DNA damage was detectable. Our analyses focused also on mineral-microorganisms interactions and stability/degradation of typical fungal macromolecules, in particular melanin, when exposed to space and simulated Martian conditions, contributing to the development of libraries of biosignatures in rocks, supporting future exploration missions.

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