

Survival of MASE strains under different aspects of simulated Martian conditions

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During the project MASE (Mars Analogues for Space Exploration) several microbial isolates were obtained and some of these strains were subjected to Mars relevant environmental stress factors in the laboratory under controlled conditions; e.g. radiation, low water activity, high salt concentrations, oxidizing compounds. All sampling, isolation, and cultivation steps, as well as the stress tests were performed under anoxic conditions.

So far, five only distantly related microorganisms are under detailed investigation: *Buttiauxella* sp. MASE-IM-7, *Clostridium* sp. MASE-IM-4, *Halanaerobium* sp. MASE-BB-1, *Trichococcus* sp. MASE-IM-5, and *Yersinia* sp. MASE-LG-1. It was shown that tolerance to desiccation and to ionizing radiation, applied separately was not correlated. If desiccation and exposure to radiation was applied together typical additive effects could be observed in each species. The survival after addition of oxidizing compounds (hydrogen peroxide; perchlorates) for a dedicated time (15 minutes; 24 hours) was very diverse. If the five microorganisms were compared with each other, *Trichococcus* sp. MASE-IM-5 was the most sensitive strain and survived only 10 mM hydrogen peroxide for 15 minutes and 24 hours, respectively. The most tolerant organism was *Halanaerobium* sp. MASE-BB-1 which was able to survive 100 mM hydrogen peroxide for both tested time points. In between, the other Bacteria were arranged with different tolerances against hydrogen peroxide. Comparable, species specific results were obtained after the addition of different perchlorates.

In general, the strategy of the MASE project has proven to be useful to gain new model microorganisms. The isolated and characterized MASE strains have so far unknown high tolerances against cell damaging treatments and may serve as model organisms for future space exposure experiments.