

Compara resistance of subsurface Tassarococcus isolates from the Iberian Pyrite Belt to simulated Martian conditions

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During the development of the Mars Analogues for Space Exploration project (MASE) several microbial isolates of the Tassarococcus genus, a denitrifying actinomycetes, were obtained from enrichment cultures of samples from cores drilled at different depths in the Iberian Pyrite Belt. Some of these strains, isolates SSRT5 and SSRT8, were subjected to Mars environmental stress tests under controlled laboratory conditions; e.g. high salt concentrations, temperature, oxidizing compounds, radiation and low water activity. All sampling, isolation, and cultivation steps, as well as the stress tests were performed under strict anoxic conditions. The differences found between these isolates are remarkable. Isolate SSRT8 was able to grow efficiently at low temperature (4 °C). It was able to grow in the presence of 300 mM Ca, Mg and Na perchlorates and to resist up to 1M concentration of these salts. The sensitivity of isolate SSRT5 was dependent on the cation of the perchlorate. Isolate SSRT8 was more resistant to extended exposures to low temperatures (-80 °C) and exposure to 500Gy X-Ray radiation. Both isolates are extremely sensitive to freeze and thaw cycles, desiccation and starvation. Genomic comparison of both isolates is currently underway to detect the two isolates from the same ecosystem.