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SALINISPHAERA SHABANENSIS – A NEW EXTREMOPHILIC MODEL ORGANISM FOR THE SPACE EXPOSURE EXPERIMENT MEXEM

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The project MEXEM (Mars EXposed Extremophiles Mixture) is an astrobiological survey of responses of selected (facultative) anaerobic microorganisms to conditions on current day or on early Mars. MEXEM will test the hypothesis that selected terrestrial microbial pure strains, mixed cultures and original samples from extreme Mars-analogue environments on Earth are able to withstand the Martian environmental stress factors due to their highly effective cellular and molecular adaptations and repair mechanisms. Microorganisms will be exposed for three month in Martian atmosphere to solar radiation on the outside of the international space station. Post-exposure analysis will confirm cells survival rates and positive results will support and guide the discussion about the existence of life on Mars.

Here we report the results of pre-tests with *Salinisphaera shabanensis*, a facultative anaerobic, halophilic bacterium isolated from a deep-sea anoxic brine from the Red Sea [1]. Our results uncovered a high tolerance to desiccation under anoxic conditions. After four weeks of storage under dry conditions the survival rate is reduced by only three orders of magnitude, which is higher than rates of other vegetative cells [2]. *S. shabanensis* was also moderately tolerant to monochromatic UV-C radiation (254 nm), with calculated F_{10}-values of 55.7 J/m^2, which is average when compared to standard microorganisms such as *Escherichia coli* and *Bacillus subtilis* [3]. The next steps will include application of combined stresses, namely desiccation in Martian atmosphere (2.7% N_2, 1.6% Ar, 0.15% O_2 in CO_2 v/v at a pressure of 10^3 Pa) and a polychromatic Martian UV-spectrum (200-400 nm).

In general, the strategy of MEXEM has proven useful in gaining new model organisms. These organisms have previously unreported high tolerances against cell damaging treatments and may serve as model organisms for future space exposure experiments.

References

1. Antunes, A., Eder, W., Fareleira, P., Santos, H., Huber, R. (2003). *Extremophiles*, **7(1)**, 29-34.
2. Beblo, K., Rabbow, E., Rachel, R., Huber, H., Rettberg, P. (2009). *Extremophiles*, **13(3)**, 521-531.
3. Beblo, K., Douki, T., Schmalz, G., Rachel, R., Wirth, R., Huber, H., Reitz, G., Rettberg, P. (2011) *Archives of Microbiology*, **193(11)**, 797-809.