MINERALIZATION AND POTENTIAL FOR FOSSILIZATION OF AN EXTREMOTOLERANT BACTERIUM ISOLATED FROM A PAST MARS ANALOG ENVIRONMENT. Frédéric Gaboyer[1], Maria Bohmeier[2], Frédéric Foucher[1], Claude Le Milbeau[3], Pascale Gautret[3], Annie Richard[4], Audrey Sauldubois[4], Régis Guégan[3], Frances Westall[1] and the MASE team
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Introduction: Several decades dedicated to the study of Mars has enabled scientists to highlight that during its history, environmental conditions of Mars strongly contrasted with the present-day conditions, hostile for life.

Indeed, previous (Mars Express, Viking…) and more recent (MSL) missions confirmed that liquid water, heat (volcanism, hydrothermalism) organic matter and redox conditions probably occurred on the planet, thus enabling scientists to seriously consider early Mars as being habitable and suitable for the emergence of life [1].

However, the detection of past life on Mars, if it existed, also requires that biomarkers (i) be preserved over geological time scales and that (ii) they remained detectable.

Therefore, in the run for Mars analogues on Earth, astrobiologists are still addressing questions related to microbial adaptation, lifestyles and survival in extraterrestrial environments [2].

In this context, the European MASE project (Mars Analogues for Space Exploration) aims at better understanding habitability, microbial lifestyles and biomarker preservation in such environmental analogues. To do this, one of the goals of MASE is to better characterize the evolution and preservation of diverse biomarkers during the microbial fossilization process [3].

Methods and objectives : A poly-extremotolerant *Yersinia* strain isolated from a cold-acidic-oligotrophic lake in Iceland was artificially mineralized in SiO_2 and $CaSO_4$ to evaluate its potential for further fossilization over geological times. Morphological, biogeochemical, and physical aspects of the process were studied using GC-MS, SEM, TEM, FT-IR or RAMAN spectroscopy.

We also evaluated the impact of microbial stress induced by Mars-like conditions by studying mineralization of cells after exposing the model to both dessication and radiation stresses.

Results : We show that only a part of the cell culture was rapidly embedded in minerals even after 6 months of mineralization, and thus *Yersinia* populations remain largely viable after that time.

Considering our methodology, no difference could be observed with and without stress, suggesting that physiological responses to these stresses do not alter the in the mineralization process.

Geochemical data obtained with Rock-eval also confirmed that the fossilization potential of this strain over geological times is quite limited.

To conclude, astrobiologists should be kept in mind that, in the microbial world, not all groups are prone to fossilization, even those inhabiting past Mars analog environments. Nevertheless, the question of microbial remains preservation in anaerobic fine-grained sediments is distinct and also remains possible for this *Yersinia* strain.

References: Use the brief numbered style common in many abstracts, e.g., [1], [2], etc. References should then appear in numerical order in the reference list, and should use the following abbreviated style:

[1] Westall, F., Foucher, F., Bost, N., Bertrand, M., Loizeau, D., Vago, J.L., Kminek, G., Gaboyer, F., Campbell, K.A., Bréhéret, J.-G., et al. (2015) *Astrobiology*., *15*, 998–1029. [2] Cockell, C.S., Bush, T., Bryce, C., Direito, S., Fox-Powell, M., Harrison, J.P., Lammer, H., Landenmark, H., Martin-Torres, J., Nicholson, N., et al. (2016) *Astrobiology.*, 16, 89–117. [3] http://mase.esf.org/