LIFE DETECTION SYSTEM FOR MONITORING PARAMETERS IN FOSSILIZATION PROCESS

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Introduction: The Life Detection System (LDS) is designed as a two modules system for microbial life detection under growing conditions. The microbes growth is followed by redox, pH and conductivity parameters but others parameters can be monitored as well if needed.

The experiments presented in this paper follow the physicochemical parameter in a growth culture under fossilization/mineralization-induced process with the objectives of biomarkers detection. The study of biomarkers detection [1] and fossilization process is crucial from an astrobiological point of view for the search for life on Mars as it has been reported that life can survive on Mars surface conditions under protected microniches [2]. At the same time, and using LDS system, we can follow the modification of some parameters on the media that could drive the process.

Methods and objectives: MASE (Mars Analogues for Space Exploration) is an European Commission funded project which selected three Earth analogues to be studied: Iceland (Graenvatun Lake), United Kingdom (Boulby Mines) and Germany (Regensburg). Samples from the three selected sites were study for microbial biodiversity study using different techniques including LDS system for growth monitoring but microarray immunoassays [3,4] to determine the presence of biomarkers as well. At the same time, isolates from those sites were used for induction of fossilization/mineralization process, which are being followed by LDS system as well.

Desulfovibrio sp. and *Yersinia sp*. isolates from MASE sites induced for a process of fossilization/mineralization with carbonates have been monitoring by continuous measurement of different parameters. Those parameters include changes in redox potencial (ORP), changes in pH as well as in concentration of H_2S. The signal is recorded by a pH/mV.meter and picoammperimetre, in each case.

Results: First results from our experiments with the two MASE isolates named suggest this technique as a promising method to follow evolution/changes of pH, redox potential (ORP) and reduction of sulfur as well along the fossilization/mineralization process in cultures. As an example of some of these experiments, the following plot shows a continuous measurement of H_2S concentration in an anaerobic culture of *Desulfovibrio sp.* along 45 hours. The behavior of the culture from the H_2S concentration point of view shows a cycle since the same types of changes occurs after twelve hours and 24 hours after these events. It was observed two similar events separate in time by 24 hours.

Fig. 1 Monitorization of a growing Desulfovibrio sp. culture for H_2S production. pH changed during the growth from 7 to 5.9 after several days.

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