

PCR-based Detection of Microbial Communities during the EuroGeoMars MDRS Campaign

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Abstract

The goal of the mission (from 15 February to 28 February) was to install a minimal molecular biology lab at the Mars Desert Research Station (MDRS) and to establish a routine for detection of DNA from micro-organisms based on the effective but also robust and simple PCR technique [1].

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During the MDRS simulation we were able to show that it is possible to establish a minimal molecular biology lab in the habitat for an immediate on site analysis by PCR after sample collection. Soil and water samples were taken from different locations and soil depths. The sample analysis was started immediately after returning to the habitat and was completed during the following days. DNA was isolated from micro-organisms in soil and water samples and was used as a template for PCR analysis of the highly conserved ribosomal DNA to identify representatives of the different groups of micro-organisms (archaea, bacteria, eukaryotes). PCR products were visualized by agarose gel electrophoresis and documented by UV-transilluminator and digital camera.

The PCR analysis was complemented by investigation of the soil composition. Concentrations of Nitrogen, Phosphorus, Potassium, Calcium and Magnesium as well as pH and conductivity were determined and related to the microbial content of the soil.

Subsequent to the MDRS simulation, DNA samples were transferred to a molecular biology lab at Mesa State College to reproduce the PCR data. Additionally, the documented DNA and soil samples were taken to ESTEC and collaborator institutes for further analyses.



Figure 1: Molecular biology unit at MDRS used for PCR based detection of micro-organisms.

References

[1] Foing, B.H., Pletser, V., Boche-Sauvan, L. Et al, Daily reports from MDRS (crew 76 and 77) on <http://desert.marssociety.org/mdrs/fs08/>.