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The anaerobic community of an estuarine environment: an analogue for life on Mars.

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The first step in finding potential extant, and/or extinct, life on Mars is to understand the potential biological processes that may have occurred on Mars. This is dependent on identifying and characterising microbial life in suitable terrestrial analogue environments. Chemolithotrophic anaerobic microorganisms, such as methanogens, are ideal organisms for investigating potential life on Mars.

In this study, we used a community of chemolithotrophic anaerobic microorganisms, which were isolated from below the redox potential discontinuity (RPD) layer of the River Dee estuary, UK. The anaerobic conditions, the 11-15°C temperature and high salinity make the sub-RPD zone an ideal analogue for the Martian subsurface. Using 454 sequencing we investigated the composition of the microbial community which included sulfate reducing bacteria. Anaerobic growth experiments were conducted with a basalt and aegirine growth medium, which were used as an analogue for the composition of the Rocknest site on Mars.

The microbial community was able to grow, utilising the bio-essential elements in the growth medium. The dissolution kinetics were determined by measuring the release of key elements, such as Si, Ca, K, Fe in the growth medium with ICP-AES and growth was measured by cell counts

The results from this study demonstrate that the microbial community below the RPD can act as an informative analogue in studies of Martian habitability and life detection.