

Uncovering Novel Mechanisms of Extracellular Electron Uptake in Subsurface-Relevant Marine Bacterial Isolates

Summary

Though the Earth's subsurface supports the largest reservoir of biomass on the planet, there are major questions as to how life in these environments persists, and/or what energy sources and sinks are utilized. Due to the dearth of knowledge surrounding lithotrophic or "rock eating" metabolisms, especially those that utilize solid phase minerals and/or are cryptic in nature, the potential role of these substrates as electron sources in many habitats remains unclear. **This proposal seeks to improve our understanding of mineral-oxidation processes in a range of subsurface-relevant taxa. This work will utilize comparative genomics along with high throughput genetic screens to highlight genes involved in mineral oxidation in eight marine sediment microbes with unique electron uptake capabilities.** These organisms are closely related to strains isolated from a wide range of marine sediments, and subsurface habitats. The outcomes of this work will, not only further our understanding of lithotrophic metabolisms, but the functional gene information gleaned will aid in the detection of microbe-mineral interactions using bioinformatic approaches. This work has the potential to enhance scientific participation in individuals underrepresented in STEM fields by funding an early career scientist, and aiding in the training of an undergraduate researcher.

Data Management

Genomic data will be collected and conform to the Genomic Standard Consortium's guides regarding the minimum information about a genome sequence. Complete genomic information will be made freely available upon publication of genome announcement(s) via, NCBI WGS archive and associated BioSample and BioProject databases. Genome sequence and annotations will also be made available through the JGI's Integrated Microbial genomes platform. Tn-seq data will be archived in the NCBI short read archive and tabulated data will be made available in the supplementary information of associated publication(s). This data will also be made available under project generated at the BCO-DMO site, with links to the NCBI available datasets.