COMMUNITY COMPOSITION AND METABOLIC CHARACTERIZATION OF THE BONNEVILLE SALT FLATS. J. M. McGonigle[1], E. R. Dart[2], B. Kleba[3], B. B. Bowen[4], and W. J. Brazelton[5]
[1](University of Utah, Department of Biology, j.mcgonigle@biology.utah.edu) [2](University of Utah, Department of Biology, emily.dart@utah.edu) [3](Sampleminded, bkleba@sampleminded.com) [4](University of Utah, Department of Geology & Geophysics, brenda.bowen@utah.edu) [5](University of Utah, Department of Biology, william.brazelton@utah.edu)

An 18 square mile salt flat on Mars has recently been speculated to be a remnant of the last large lake which may have potentially hosted life on the red planet [1]. Similar large scale salt deposits exist on Earth, such as the Bonneville Salt Flats in Utah. These salt flats are a remnant of a massive lake that stretched further than the Great Salt Lake in the Pleistocene. Although these salt flats on Earth currently undergo ephemeral wet/dry cycles that the salt flats on Mars no longer experience, they nonetheless represent a Mars analog and provide the opportunity to learn more about extreme ecosystems that support microbial communities on Earth.

Comprehensive microbial studies have been conducted on salt flats in other locations, but to date the only studies done at the Bonneville Salt Flats have been limited to culture-based approaches [2]. We are using culture-independent approaches for the first time to investigate the microbial community of these salt flats. DNA will be extracted from samples collected in September 2016 from 8 pits spanning the flats in horizontal and vertical transects. Sequencing of the 16S rRNA gene, the universal taxonomic marker for microbial species, will be performed on extracted DNA. Species diversity and composition will be compared between pits to assess human impact on microbial communities that inhabit the salt flats. Samples with species of interest may be selected for metagenomic sequencing.

In addition to sequencing efforts, incubation experiments using media enriched with 13C- glucose, acetate, and bicarbonate were done to investigate the carbon metabolism of the microbial community members. Presence or absence of enriched carbon dioxide and methane in headspace gases of the incubation tubes can indicate metabolic use of carbon in these experiments. Enriched carbon incorporation into cellular biomass will also be determined with an elemental analyzer coupled to an IRMS. Dominant community members of this ecosystem are suspected to be sulfate reducing bacteria, salt tolerant eukaryotic algae, and halophilic archaea. Anaerobic community members may include methanogens and/or acetogens. Both halophilic archaea and methanogens have been identified as organisms which harbor unique adaptations that might allow them to survive harsh conditions on the surface or subsurface of other planets [3][4].

In addition to providing insight towards microbial metabolism at the Bonneville Salt Flats for the first time, these incubation experiments serve as test run for future work to be done at the Lost City, a site of serpentinite-hosted hydrothermal chimneys of great astrobiological interest. Subsamples of incubated material were preserved for developing a Raman microscopy approach to investigating carbon incorporation events at a single cell resolution. Once refined on these samples, the technique will be applied to samples collected in 2018 from the Lost City hydrothermal field.

References: [1] Hynek B. M. et al. (2015) Geology, 43, 787-790 [2] G. L. Boogaerts (2015) Thesis, The University of Alabama at Birmingham. [3] Landis, G. A. (2004) Astrobiology, 1, 161-164. [4] Schirmack, J. et al. (2014) Planet. Space Sci., 98, 198-204.