ISOTOPIC EVIDENCE OF MICROBIAL SULFUR CYCLING IN SEDIMENTS ASSOCIATED WITH SPRINGS ON THE MARGIN OF A SALINE, ALKALINE, LAKE IN SOUTH CENTRAL OREGON. C. C. Elbaz[1] and L. M. Pratt[2], [1]Indiana University (celbaz@indiana.edu), [2]Indiana University (Prattl@indiana.edu).

Warner Valley is a closed-drainage basin located between the high lava plains on the Oregon Basalt Plateau and the North American Basin and Range Province where shallow evaporitic lakes and playas are common. Coleman Lake, just south of Warner Valley, is a saline, alkaline, dry lakebed receiving inflow only from rain, snow, and two perennial springs on the west shore. Foskett Spring and Dace Spring are mesothermal springs (about 18 ˚C) with narrow outflow channels dissipating into wetlands. Stringer mats of white, filamentous, sulfur-oxidizing bacteria and an intermittent sulfidic odor are characteristic of the wetland below Foskett Spring in winter. Those sulfur oxidizing microbes observed at Coleman Lake are also closely related to *Sulfuricurvum kujiense* a cultured facultatively anaerobic chemolithoautotrophic sulfur oxidizer [1] and to filamentous bacteria found in an aphotic sulfidic cave in Wyoming [2].

Despite sulfate concentrations only about 350 ppm in Dace and Foskett Springs, there is isotopic evidence of a microbial sulfur cycle preserved in the sediments along the flow path. A combination of basaltic landscape, semi-arid climate, and closed-drainage lakes allows useful comparisons with crater lakes on ancient Mars. The objective of this research is to quantitatively extract, purify, and measure the concentration and isotopic composition of sulfur-containing minerals and dissolved-sulfur constituents in springs, seeps and wetlands located on the margin of the Coleman dry lakebed as insight into plausible evidence of past microbial life on Mars and of early Earth sulfur cycle when the oceans were more dilute.

Six sediment cores of 0.3 to 0.6 meter in length were collected and used for sequential extraction of sulfur in various oxidation states (sulfate, elemental sulfur, monosulfide and disulfide) and for measurement of sulfur isotope ratios. Results from this study are used to predict the preservation potential for chemical and isotopic signatures in sediment during burial and along the discharge path. Sulfur mineralogy has been studied at several other evaporitic lakes and playas in the Great Basin region, providing useful comparators for the Coleman study although isotopic data are not reported as often as concentrations. Anderson Lake [3] is a perennial shallow lake and Mugwump Pond [4] is a small playa located about 50 km north of Coleman Lake in the Warner Valley drainage. Borax Lake [5] and a nearby playa are located in the Alvord Valley about 50 km East of Warner Valley. In central and southern part of the Great Basin region, comparisons are made with Owens Lake [6]. Great Salt Lake [7] in Utah is also used as comparator.

There are three main processes that appear to influence the deposition and preservation of the different sulfur species at Coleman Lake: (1) the upstream location of the Coleman study sites within the 85 km long drainage path of Warner Valley, (2) the local enrichment of disulfides and sulfates by microbial sulfate reducers and the subsequent reoxidation by microbial sulfur oxidizers, (3) the redistribution of wind-blown sulfates from regional evaporitic deposits. The Coleman dry lakebed and the surrounding sediments of the different Coleman study sites are not enriched in sulfate minerals and appear to be leached due to their location at the upstream end of a the 85 km long drainage path of Warner Valley. The microbes present in the water and sediments of Coleman Lake influence the concentration and preservation of the different sulfur species by microbial sulfate reduction, production and leakage of hydrogen sulfide, microbial sulfur reoxidation and elemental sulfur disproportionation.The sulfate accumulated within the Coleman sediments do not solely originate from the surrounding basaltic rocks, but also from atmospheric deposition events. The lower sulfate concentrations and more positive sulfate $\delta^{34}S$ values measured at the Coleman study sites fall within the range of windblown and rain or snow precipitation sulfate concentration and isotopic ranges reported in the literature for Oregon [8] and the Great Basin region [9,10,11] and therefore may be associated in part with an atmospheric origin. Could the deposition of dust and snow on the Martian surface be a source of sulfate and water for Martian microbial communities?

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