FORESTRY, FIRE & STATE LANDS PROPOSAL

Cover Sheet

Project Title	Microbial Mercury Methylation in Great Salt Lake Stromatolites
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Abstract	The fate of mercury (Hg) inf Great Salt Lake (GSL) is of heightened concern due to its potential methylation (CH_3-Hg) and trophic transfer to pupating fly larvae, brine shrimp, and ultimately avian populations. Methylation of Hg is mediated by anaerobic microorganisms as a detoxification strategy and is typically catalyzed by organisms that ferment organic carbon, reduce sulfate or iron, or by methanogenic Archaea. Our preliminary study of a stromatolite structure collected from GSL reveals that it is likely to have been built by oxygenic and photosynthetic diatoms. Surprisingly, we also identified evidence for co-inhabiting anaerobic microorganisms closely affiliated with known sulfate reducing and fermentative Hg methylators. *We hypothesize that diatoms account for the majority of primary production during day time hours, however, the consumption of photosynthate during the night by aerobic organisms drives the stromatolite structures anoxic creating a niche for organisms capable of fermenting organic carbon or reducing sulfate, and in the process methylating Hg. This CH_3-Hg is then available for transfer to grazing fly larvae, brine shrimp, and ultimately avian populations.* Considering that stromatolite structures cover ~30% of the lake bottom in the south arm of GSL and represent a predominant food source for brine shrimp, we suspect that Hg methylation by anaerobic bacteria inhabiting stromatolite structures to be a primary and previously undocumented source of CH_3-Hg to higher trophic levels comprising the GSL ecosystem. By identifying the processes that lead to CH_3-Hg production and entry in the ecosystem, we can then strategize intervention. The ultimate goal is to provide the baseline data needed to design bioremediation systems.

Project Funding	**Amount Requested** **$ 29,380**	Matching Funds $ 20,000	Total Project Cost $ 49,380