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Metabolic preferences of a chemoautotrophic thermophilic microorganism

High-temperature chemotrophic hot springs in Yellowstone National Park are inhabited by microorganisms that subsist on varied substrates supplied primarily by water-rock interactions. Hydrogen oxidation is a particularly important metabolism for many such microorganisms and helps fuel chemoautotrophic growth. Hydrogen-oxidizing microorganisms (hydrogenotrophs) living in YNP are capable of coupling this activity to the reduction of oxidants, including oxygen and ferric iron. We've observed seemingly contradictory metabolic preferences carried out by a chemoautotrophic, thermophilic, hydrogenotroph in the 'Roadside East' hot spring (pH 3.0, 82.4°C). Sediment-associated communities from the source of this spring are dominated by a species of *Metallosphaera* (80% of the total community) which has the genomic potential for hydrogen oxidation with [NiFe]-hydrogenases. Additionally, we have shown the ability of this organism to oxidize hydrogen in laboratory cultures. However, net microbial hydrogen oxidation is not measured in situ in this spring, but we can observe the presence of iron oxides in this spring. The *Metallosphaera* species present in this community is seemingly conducting iron oxidation coupled with oxygen reduction instead of hydrogen oxidation, a process which yields less energy. Here I present preliminary work aimed at investigating why this microorganism is using iron oxidation instead of hydrogen oxidation, with both metabolisms requiring oxygen, often limited in hot springs. Results will be discussed in light of the ability of a putative *Metallosphaera* isolate from Roadside East to conduct both metabolisms. Further, results will be discussed from laboratory competition experiments determining metabolic preferences when both iron and hydrogen are available.

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