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D. Caldwell: **AEROBIC SULFUR-OXIDIZING BACTERIA: ENVIRONMENTAL SELECTION AND DIVERSIFICATION**

Sulfur-oxidizing bacteria oxidize reduced inorganic compounds to sulfuric acid. In the case of lithotrophic sulfur oxidizers, the energy obtained from oxidation is used for microbial growth. Heterotrophic sulfur oxidizers obtain energy from the oxidation of organic compounds. In sulfur-oxidizing mixotrophs energy may be derived either from the oxidation of inorganic or organic compounds. Sulfur-oxidizing bacteria are usually located within the sulfide/oxygen interfaces of springs, sediments, soil microenvironments, and the hypolimnion. Colonization of the interface is necessary since sulfide auto-oxidizes and because both oxygen and sulfide are needed for growth. The environmental stresses associated with the colonization of these interfaces have resulted in the evolution of morphologically diverse and unique aerobic sulfur oxidizers.

Most sulfur-oxidizing bacteria are sulfur-oxidizing heterotrophs and chemolithoheterotrophs. Variations amongst members of these groups is poorly described partly because of the preoccupation of microbiologists with the morphological and physiological diversity of sulfur autotrophs. However, further studies of heterotrophic sulfur oxidation will be necessary to understand the global sulfur cycle. In the sulfur spring environment there are two groups of sulfur oxidizers: acidophilic and non-acidophilic. Acidophilic communities frequently result when growth rate exceeds dilution. Metabolic wastes, primarily sulfuric acid, accumulate. When the dilution rate exceeds the growth rate, attachment is required to avoid the loss of populations, and sulfuric acid does not accumulate. In sulfur springs the sulfur oxidizing bacteria position themselves within the sulfide/oxygen interface by attaching preferentially to pyrite which is located upst am on the reducing side of the spring. They form streamers, bundles of trichomes (filaments) which extend downstream and into the interface when the organisms are oxygen-limited. Extremely thermophilic sulfur oxidizers from geothermal environments grow at greater rates to higher cell yields than analogous mesophiles. This suggests that the optimum temperature for aerobic sulfur oxidizers exceeds 70°C. The sulfide/oxygen interfaces of hypolimnia are frequently dominated by photosynthetic sulfur bacteria which exclude aerobic sulfur oxidizers. Sulfur-oxidizing bacteria found in sediment environments often migrate diurnally in response to shifting gradients of oxygen and sulfide. This results in the migration of oxidizing equivalents, in the form of elemental sulfur, within the sediment.

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