Hyperthermophile Abundances and Metabolic Diversity in Deep-Sea Hydrothermal Sulfide Deposits from the Endeavour Segment, Northeastern Pacific Ocean

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Endolithic microbial communities may be pervasive within the subseafloor, and hydrothermal sulfide deposits at deep-sea vents may serve as a surface outcrop of these subseafloor environments. Little is known about the metabolism and distribution of these organisms. The purpose of this study was to determine quantitatively whether autotrophic dissimilatory iron reducers comprise a significant proportion of the hyperthermophile populations in sulfide rock samples, whether they are significantly higher in abundance than other hyperthermophilic autotrophs (i.e., sulfur and nitrate reducers and methanogens), and how their abundances vary with those of hyperthermophilic heterotrophs throughout a sulfide deposit. Samples, including actively-venting sulfidic rocks, subsamples from *in situ* sulfide incubation chambers, sulfide-hosted diffuse fluid, and *Paralvinella sulfincola* polychaete worms from outside of an active sulfide, were collected from the Endeavour segment of the Juan de Fuca Ridge in the northeastern Pacific Ocean. Different metabolic types of hyperthermophiles were selectively enriched for and quantitatively compared via incubation of natural microbial assemblages, most-probable-number (MPN) analyses, and fluorescent *in situ* hybridization (FISH) based cell counts. From these enrichments, pure hyperthermophile strains were isolated and characterized based on their growth characteristics and 16S rDNA sequence analysis. Our results suggest that hyperthermophilic iron reducers are ubiquitous in sulfide deposits, that hyperthermophile metabolism becomes increasingly autotrophic and decreasingly heterotrophic towards the interior of a sulfide deposit, and that the majority of the high-temperature autotrophic metabolism is catalyzed by obligate iron reducers.

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