Discovering the metabolic potential of a novel archaeal phylum.

Natural gas reservoirs in the subsurface of the ocean sustain complex communities of anaerobic microbes, including archaeal lineages with potential to mediate oxidation of small hydrocarbons such as alkanes. This includes a previously unknown archaeal phylum, Helarchaeota, which belongs to the Asgard superphylum that has the potential for hydrocarbon oxidation. Using metagenomic data from hydrothermal deep-sea sediments in the hydrocarbon-rich Guaymas Basin, two genomes of Helarchaeota were reconstructed. The genomes encode enzymes that are similar to those found in butane-oxidizing archaea, as well as several enzymes potentially involved in alkyl-CoA oxidation and the Wood-Ljungdahl pathway. This suggests that members of the Helarchaeota have the potential to anaerobically metabolize hydrothermally generated short-chain hydrocarbons.