

Exploring Ammonia-oxidizing Archaea within the Ascidian Tunic

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Improvements in molecular methods have led to the discovery of ammonia-oxidizing Archaea (AOA) that belong to the Phylum Crenarchaeota. Previously considered ecologically insignificant, AOA are now recognized as major contributors to global nitrogen cycling, especially in coastal marine environments. Yet, little is known regarding AOA within marine invertebrate microbiomes. Though most host-associated archaeal studies have focused on marine sponges, preliminary studies have identified AOA in other marine invertebrates including ascidians (or “sea squirts”). qPCR and sequencing were used to compare AOA relative abundance and survey microbiome diversity within the tunic of ascidian species sampled globally. Findings reveal diverse bacterial and archaeal communities within ascidian tunics and overall, Crenarchaeota (which includes AOA) was the most abundant archaeal taxa. Proteobacteriota and Cyanobacteriota were the most abundant bacterial phyla. Among nitrifying microbes (AOA, ammonia-oxidizing bacteria, and nitrite-oxidizing bacteria), AOA dominated these communities in all samples. The stolidobranchean genus *Polyandrocarpa* showed the greatest AOA relative abundance among all ten ascidian species surveyed. With confirmed prevalence of AOA within the tunic, future microscopy exploration is necessary to explore AOA localization, while nutrient incubation experiments can be employed to estimate the ecological impacts of ascidians and AOA on coastal nitrification rates.

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