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Diversity of Archaeal Ammonia Oxidizers in Freshwater Wetland and Terrestrial Environments

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DIVERSITY OF ARCHAEAL AMMONIA OXIDIZERS IN FRESHWATER WETLAND AND TERRESTRIAL ENVIRONMENTS

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Nitrification, the oxidation of ammonia to nitrite and nitrate, is a key step of the nitrogen cycle that is catalyzed only by microorganisms. The first step in nitrification, the oxidation of ammonia, is catalyzed by the enzyme ammonia monooxygenase, which is encoded by the gene amoA. Previously ammonia oxidation was thought to be restricted to certain groups of Proteobacteria. However, recent studies have shown that some nonextremophilic Archaea are capable of catalyzing nitrification and contain amoA, but very little is known about the diversity and distribution of Archaeal ammonia oxidizers. In this study molecular techniques were used to detect Archaeal ammonia oxidizers in freshwater wetland sediments and terrestrial soils. PCR primers designed to specifically target Archaeal amoA were used to amplify Archaeal amoA genes from these environmental samples, and the genes recovered were cloned and sequenced. The sequences we collected were then compared to Archaeal amoA sequences downloaded from Genbank. Phylogenetic analysis showed that our sequences were most closely related to sequences from terrestrial and freshwater habitats and were distinct from sequences obtained from marine habitats. In addition, our terrestrial and wetland sequences formed several distinct clusters in the phylogenetic tree.