

*Does the oil spill induce the change of major nitrifying prokaryotes from Archaea to Bacteria?  
Response of archaeal and bacterial nitrifiers to spilled oil in the Gulf of Mexico*

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Microorganisms have important roles in biogeochemical cycles in marine environments. One of the most important biogeochemical cycles in nature is the nitrogen cycle. For a long time, it has been believed that ammonia oxidation, the first step in nitrification, is performed by a group of chemolithotrophic bacteria called ammonia-oxidizing bacteria (AOB). However, the recent discovery and quantitative studies of ammonia-oxidizing archaea (AOA) completely changed the previous view of ammonia oxidation and sheds light on the ecological significance of Archaea in nature. It has been reported that nitrification is especially sensitive for environmental disturbances. Oil contamination is a worldwide problem and potentially gives negative impact on nitrification. However, the major focus on microbial response was the determination of dominate hydrocarbon degrading bacteria and nothing is known about nitrification inhibition by the crude oil in marine environments. The goal of this project is to clarify the toxicity effects of spilled oil to AOA and AOB. My hypothesis is that the sensitivity of AOA and AOB to spilled oil differs, and the oil contamination could potentially induce a shift in microbial populations from AOA to AOB in nature. Thus, the archaeal role in nitrification could be minimized by oil contamination and taken over by AOB. The result of this study will clarify the risk of previously overlooked ecological disturbance caused by the spilled oil and will bring a large paradigm shift in the marine nitrogen cycle.