



CMOP Undergraduate Intern Mentoring Opportunity

Deadline: **March 28, 2011**

Selections Announced: **April 1, 2011**

Name/Title/Institution(s) of senior mentor(s):

Holly Simon/Assistant Professor/OHSU

Name/Title/Institution(s) of frontline mentor(s):

Mouzhong Xu/PhD graduate student/OHSU

Project Title: Combining electrochemical and molecular approaches to “map out” the ecology of sediment microorganisms.

Context for Project: This project applies to both CMOP and EBS. It provides an integration of my NSF CAREER project with CMOP. The goals of the CAREER grant and CMOP are closely related, as the CAREER project investigates roles and diversity of microorganisms that are important for biogeochemical cycling in Columbia River coastal margin sediments.

Brief Description. This project combines field work with molecular and microbiology to study microorganisms with important roles in environmental biogeochemical cycles. Of particular interest is a newly discovered group of archaea that gain cellular energy through the oxidation of ammonia. In order to understand the impact of these microbes on biogeochemical cycling in the Columbia River coastal margin, we are studying their diversity and abundance in sediment microenvironments. This is done partly in the field, using electrochemical probes to measure the sediment microenvironment at very high resolution, and partly in the lab, with cutting-edge molecular methods to quantify the abundance and diversity of the ammonia-oxidizing archaea. Combining results from the two types of measurements provides us with clues about their roles in biogeochemical cycling.

The summer intern doing research on this project will go to the field to collect sediment cores and perform on-site electrochemical analysis to generate high-resolution geochemical profiles. He will additionally transport the sediment cores to the lab, fractionate them and perform a series of molecular analyses on the different fractions. These analyses will likely include DNA extraction, followed by polymerase chain reaction (PCR) amplification of specific genes to determine abundance, and single-strand conformation polymorphism (SSCP) analysis to explore diversity. The intern will combine the results from both types of analyses (electrochemical and molecular) to “map out” the ecology of ammonia oxidizing archaea in sediments.

CMOP: Please address the scope of research and its relevance to the CMOP mission, particularly how it fits into the grand challenge, research themes, and project charters. Please note any ties to CMOP diversity and knowledge transfer goals. Please see the Research Roadmap and Strategic Implementation Plan at <http://www.stccmop.org/forms> for any guidance.

This project relates to the CMOP mission in that it attempts to understand the roles of microbial assemblages relative to ecological function and energy transfers in the Columbia River coastal margin, and the environmental factors controlling spatial patterns of sediment colonization by microbes.

EBS: Please describe project as it relates to research goals of the laboratory group. The internship project is directly related to current studies on this topic in my laboratory.

Proposed Outcomes/Broader Impact:

Results from this project will provide a better understanding of the roles of sediment microorganisms in biogeochemical cycles in the Columbia River coastal margin.

Proposed timeline (within a 10 week span): Collect cores and perform electrochemical analyses over 2-4 weeks, perform molecular analyses over the next 2-4 weeks, integrate results, prepare presentation over the last 2 or so weeks.

Intern academic experience and skill set should include: Any of these: Microbiology, Chemistry, Engineering, Biology, any level.