IEH Undergraduate Intern Mentoring Opportunity

Deadline: **February 22, 2013**
Selections Announced: **mid-March, 2013**

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

Holly Simon / Assistant Professor / OHSU-EBS/CMOP

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

Lydie Herfort / Senior Research Associate / OHSU-CMOP

Project Title: Characterization of Columbia River Estuary hotspots: archaeal and bacterial community structure and gene expression

Context for Project: The Columbia River estuary is traditionally considered a detritus-based ecosystem fueled mostly by organic matter from expired freshwater diatoms. Nonetheless, despite low water residency time (a few days) scientists at CMOP have identified important estuarine microbial hotspots where significant biogeochemical transformations occur. These estuarine microbial hotspots can be events, such as the Estuarine Turbidity Maxima (ETM), or the late summer bloom of the photosynthetic ciliate *Mesodinium rubrum*, or locations, such as the lateral bays. Our goal is to improve our understanding of the Bacteria- and Archaea-driven processes that take place within these hotspots. In turn, this will provide better estimates of the extent of the importance of these hotspots in the functioning of the Columbia River estuary as a bioreactor, and will also establish the impact of river-ocean forcing on these hotspots. This study will be facilitated by the SATURN observation network (multiple sensors throughout the estuary and river) which offers extensive physical and biogeochemical characterization of the Columbia River and its estuary, including the estuarine hotspots.

Brief Description.

This REU project will combine field work, molecular lab work and analysis of environmental data from the SATURN network. The REU student will collect water in the Columbia River estuary and in the river itself, whenever possible taking advantage of the SATURN network stations. Samples will be selected to characterize hotspots and contrasting conditions (e.g. ETM, *M. rubrum* bloom vs. estuarine freshwater, estuarine ocean waters with low and high oxygen concentrations). The REU student will also participate in the summer CMOP ETM cruise, joining the land-based team coordinating sampling of lateral bays while the cruise is taking place. This will also involve adaptive sampling, which will be carried out using the Environmental Sample Processor (ESP), an autonomous, high-resolution instrument. The REU student will extract and purify high-quality RNA and DNA from collected water samples for metagenomics/metatrascriptomics and other analyses. The REU student will also assemble and synthesize

all relevant environmental data associated with the water samples using the data from the SATURN observation network (especially the Data Explorer tool) and the Virtual Columbia River.

CMOP: Please address the scope of research and its relevance to the CMOP mission, particularly how it fits into the CMOP Integrated Research Plan which can be found at www.stccmop.org/files/CMOP_IntegratedResearchPlan.pdf.

EBS: Please describe the project as it relates to research goals of your laboratory group.

Fits into CMOP initiative I, II, II and IV

Proposed Outcomes/Broader Impact:

We anticipate that the REU student will be co-author on the peered-reviewed manuscript that will be generated from this work.

Proposed timeline (within a 10 week span):

Sample collection, nucleic acid extraction, and data analysis will take place throughout the REU internship.

Intern academic experience and skill set should include: Please list majors you would consider, preferred course background, any other needed skills. Please note if you are willing to work with a less experienced intern (freshmen or sophomore) or require a more experienced candidate (junior or senior).

REU student should have a strong background in molecular biology and microbiology, and be willing to participate in intensive field work. A more experienced candidate will be necessary for this work, so ideally the REU student would be a senior.

Please keep in mind that funding restrictions may require parameters on candidate selection.