CMOP Undergraduate Intern Mentoring Opportunity

Deadline: **March 28, 2011**
Selections Announced: **April 1, 2011**

Name/Title/Institution(s) of senior mentor(s): Tawnya Peterson, PhD, Center for Coastal Margin Observation and Prediction

Name/Title/Institution(s) of frontline mentor(s): Michelle Maier, Graduate Student, Center for Coastal Margin Observation and Prediction

Project Title: Characterizing phytoplankton and parasitic fungal communities in the Columbia River coastal margin.

Context for Project: Phytoplankton are a key component of biogeochemical cycling in rivers and oceans and are the base of the aquatic food web. Freshwater diatoms dominate the lower Columbia River estuary in spring and summer months and their health plays a vital role in the success of higher trophic levels including salmon. In lakes, fungal parasites have shown to halt diatom growth during spring blooms and act as an organic carbon source for zooplankton. In river ecosystems, the role of fungal parasites of diatoms has not yet been elucidated, however preliminary data from the lower Columbia River show high prevalence of fungal infections during spring diatom blooms.

Brief Description: This summer project will work to identify what fungal parasites are present in the lower Columbia River and determine if fungal parasites are diatom species specific. Identification of species specificity will help in determining the role the parasites play in phytoplankton bloom dynamics and diatom species succession. Primer sets will be developed to identify the fungal parasites present during the spring bloom in the lower Columbia River estuary (SATURN-05). These probes will then be used to describe the presence of potential fungal parasites in additional environments in the Columbia River coastal margin (SATURN-03, Baker Bay, Willapa Bay). Work will also be done to identify the controls on the phytoplankton bloom dynamics in spring 2010 & 2011 (light, nutrients, grazing, parasitism), in addition to laboratory culture experiments. This project fits into the research roadmap of the Center for Coastal Margin Observation and Prediction under Theme II 'Coastal Margin Science Programs', Program II.2 'State & Variability', Project II.2.3 'Characterizing communities'. Communities assessed will include phytoplankton community composition during spring blooms, community of fungal parasites, and community of zooplankton.

Proposed Outcomes/Broader Impact: The primary outcome of the summer project will be to develop specific primer sets for phytoplankton parasites present in the Columbia River coastal margin. These probes could potentially be available for the ESP (Environmental Sample Processor) planned for deployment at SATURN-03. Tracking of fungal parasites may help in identifying their impact on biogeochemical cycling and food web dynamics in the Columbia River. The intern will learn molecular techniques including DNA extraction, PCR (polymerase chain reaction), gel electrophoresis and cloning, and microscopy techniques including phytoplankton taxonomy, fluorescent staining, and use of novel

instruments (FlowCAM). The intern will also assist with sample collection in the field and in maintaining *in situ* biogeochemical sensors part of the SATURN observation network in the lower Columbia River at SATURN05 (Beaver Army Terminal).

Proposed timeline (within a 10 week span):

Week 1 (June 6-10): Literature review and background reading, Organize primers to be used, Download sequences from NCBI, Sample collection (BAT), Lab Meeting (Fri).

Week 2 (June 13-17): DNA extraction, PCR, Gel electrophoresis.

Week 3 (June 20-24): Continued molecular work from week 2, SATURN05 USGS Trip (Wed), Sample collection & filtration, Lab Meeting (Fri).

Week 4 (June 27-July 1): Make media & reagents, Clone & sequence samples, Prepare lab experiments.

Week 5 (July 5-8): Microscopy, Sample collection (Willapa Bay), Lab Meeting (Fri).

Week 6 (July 11-15): Molecular work & Lab experiments.

Week 7 (July 18-22): Continued molecular work, Lab Meeting (Fri).

Week 8 (July 25-29): Sample collection (BAT), Analyze chlorophyll samples.

Week 9 (Aug 1-5): Finish samples, Write paper & work on presentation, Lab Meeting (Fri).

Week 10 (Aug 8-12): Wrap-up, Final presentation & Paper.

Intern academic experience and skill set should include: Majors considered include Biology, Microbiology, Molecular Biology, Zoology, Oceanography, and Environmental Science in addition to other science majors. Courses taken with a lab component would be helpful but not required (junior or senior preferred).