Microbial Cycling of Marine High Molecular Weight Dissolved Organic Matter

Microorganisms play a central role mediating biogeochemical cycles in the ocean. Marine dissolved organic matter (DOM) is a major source of carbon, nutrients, and energy to microbial communities. Yet insight into the underlying metabolism and reactions driving the degradation of DOM is limited partly because its exact molecular composition is difficult to constrain and appropriate microbial model systems known to decompose marine DOM are lacking. This thesis identifies marine microorganisms that can serve as model systems to study the metabolic pathways and biochemical reactions that control an important ecosystem function, DOM turnover. To accomplish this goal, bacterial isolates were obtained by enriching seawater in dilution-to-extinction culturing experiments with a natural source of DOM, specifically, the high molecular weight (HMW) fraction (>1 kDa nominal molecular weight). The phylogeny, genomes, and growth characteristics of the organisms identified through this work indicate that HMW DOM contains bioavailable substrates that may support widespread microbial populations in coastal and open-ocean environments. Detailed studies of the biochemical changes exerted on HMW DOM by selected bacterial strains are providing new insights into the processes driving the aerobic microbial decomposition chain in the upper ocean.

Thursday March 31, 2016 3:00 p.m. MSB 100