ASLO 2013 NEW ORLEANS

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EXPERIMENTAL EVIDENCE OF THIAMINE AUXOTROPHY IN THE ALGAE O. LUCIMARINUS AND THE SEARCH FOR MICROBIAL 'ALLEVIATORS' OF O.LUCIMARINUS THIAMINE GROWTH LIMITATION

Thiamine (also called vitamin B1) is an important molecule within living cells due to its function as an enzyme cofactor and riboswitch effector. Dissolved thiamine concentrations appear to be very low in the ocean (~10-100 pM). Nevertheless, several strains of marine algae lack the ability to synthesize thiamine. Based on complete genome data, *Ostreococcus lucimarinus*, an abundant picoeukaryotic algae isolated from coastal waters off southern California, is a thiamine auxotroph. In laboratory-based bioassay experiments we confirm that *O. lucimarinus* is a thiamine auxotroph. Also, growth of *O. lucimarinus* was thiamine limited in cultures containing a bacterial community that was coincidentally obtained from a single *O. lucimarinus* colony isolated via pour plating. This suggests that some bacteria found in 'close association' with *O. lucimarinus* are a poor source of thiamine (or its precursors). Furthermore, the potential for thiamine synthesizing microbes (single strains of bacteria and algae) to promote growth of thiamine limited, bacterial-free, *O. lucimarinus* cultures is being tested and results from those experiments will be presented.

Oral presentation

Session #:SS79

Date: 2/21/2013

Time: 17:30

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AGGREGATION CONTINUUM: A CONTEXT FOR BACTERIAL STRUCTURING OF PELAGIC MARINE ECOSYSTEMS

The ecosystem roles of pelagic heterotrophic bacteria are highly variable, both quantitatively and qualitatively, but currently we do not fully understand what causes the role variability. For instance, bacterial carbon demand and growth efficiency are well known to be highly variable. As an example of qualitative role variability bacteria may as net suppliers of regenerated nutrients (to the

phytoplankton) but they can also become avid competitors with the phytoplankton for the inorganic nutrients. Such role variability has profound biogeochemical consequences. This tutorial will propose that bacterial role variability is, in large part, a function of the aggregation state of the organic matter with which bacteria interact. We will propose conceptualizing the aggregation state of the pelagic system as a dynamic continuum—as a unifying framework for bacterial role variability and ecosystem connectivity.

Oral presentation

Session #:SS20

Date: 2/19/2013

Time: 17:45

ISME 2012 Copenhagen

Atomic Force Microscopy, high-speed confocal laser microscopy and NanoSIMS study of marine Synechococcus-heterotrophic bacteria interactions study reveals species specificity and potential biogeochemical consequences

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Marine bacteria are important players in oceanic biogeochemical cycles. They intimately interact with the size continuum of organic matter, that comprehends truly dissolved molecules, colloids up to organisms. Using Atomic Force Microscopy (AFM), we discovered that a substantial and variable fraction (average 30% ±17.8; range 0% to 66%) of "free-living" heterotrophic bacteria in samples from coastal and open Pacific Ocean environments were intimately associated Synechococcus (a major primary producer). Moreover, by AFM imaging, under environmental conditions, we have investigated the cell-surface organic matter architectures of the Synechococcus-heterotrophic bacteria association and their adhesive properties. We studied the nature and the physiological outcome of the associations. A suite of heterotrophic bacteria cultures (Vibrio spp., Alteromonadales, Flavobacteriaceae) was tested with Synechococcus cultures (WH8102, CC9311) for their interactions. The attachment varied from 20% to 100%, this raises questions about the nature of the association. High-speed confocal microscopy showed a range of behavior responses on the bases on speed variation and time of physical interactions of the Alteromonadales and Vibrio spp. towards WH8102, CC9311. These results suggest that phylogenetically diverse bacteria show response to diverse Synechococcus clades. We set up a stable isotope

experiment to estimate the carbon and nitrogen exchange at the single cell level in the Synechococcus-heterotrophic bacteria association. 13C bicarbonate and 15N ammonium chloride were added to the natural assemblage and the labeled was followed over 48 h in a dark-light cycle. We will discuss our results in the context of microscale bacterial interactions and their biogeochemical consequences in the oceanic carbon cycle.