THE IMPACT OF DISSOLVED AMINO ACIDS ON THE PHYSIOLOGY AND ECOLOGY OF THE MODEL DIATOM *PHAEODACTYLUM TRICORNUTUM*

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Marine diatom population dynamics is primarily controlled by processes that regulate ambient concentrations of dissolved nitrogen. While coastal upwelling events increase dissolved inorganic nitrogen (DIN) levels, phytoplankton grazing, viral lysis or terrestrial run-off increases levels of dissolved organic nitrogen (DON). Although diatoms mainly rely on nitrate for growth, it has long been known that various species can also assimilate organic nitrogen compounds. However, the role these substances play in diatom ecology has not been thoroughly explored and the metabolic features enabling this mixotrophic capacity are largely unknown. Using the marine species *Phaeodactylum tricornutum,* we explored the possibility that DON compounds influence normal diatom nitrate metabolism, cell growth and population dynamics. To address this hypothesis, we monitored nitrate-fueled growth of *P. tricornutum* when supplemented with various nitrogenous amino acids. We then administered their spent media to fresh nitrate-grown cultures and monitored culture dynamics in response to these media. We found that while most amino acids could supplement photosynthetic growth, the amino acid L-Asparagine (L-Asn) triggered culture collapse at the onset of stationary phase. Furthermore, the spent medium from L-Asn grown cultures was found to inhibit cell division of *P. tricornutum* fusiform cells, while promoting the proliferation of benthic oval morphotypes. Given these significant responses, we are attempting the identification of the responsible L-Asn-derived metabolites through cell-based assays with candidate molecules, and by using enzyme inhibitors to reveal the involved metabolic pathways. In conclusion, because climate change will likely affect the composition and quantity of the DON pool in coastal environments, our results provide evidence that diatom mixotrophy needs to be fully considered if one aims to understand the environmental controls on diatom population dynamics.