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Department of Marine Sciences
Presents a Seminar by

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Towards understanding micronutrient metabolism in eukaryotic marine phytoplankton

Transition metals play critical roles for biology and surface water concentrations of iron and zinc are depleted to those that would seem to select for strategies to increase uptake and/or decrease cellular requirements. I will present some of our efforts to better understand Fe uptake in diatoms and substitution of Zn with cobalt or cadmium in the coccolithophore Emiliania huxleyi. One well understood Fe uptake pathway is the reductive-oxidative pathway, best described in S. cerevisiae and for which gene models have been identified in coastal diatoms such as Thalassiosira pseudonana. Our ongoing work suggests T. pseudonana may take up iron using some homologs from this pathway but with fundamental mechanistic differences. More importantly, discovery based -omic approaches and emergent reverse genetics methods have revolutionized our understanding of an exceptional high affinity iron uptake system with implications for behavior in a future acidified ocean. In some regions where Fe is not limiting, Zn concentrations are low enough where phytoplankton growth should be Zn-limited, but evidence for such limitation is not straightforward due to possible substitution of Zn with Cd or Co. We quantified 5,710 proteins in the cosmopolitan coccolithophore Emiliania huxleyi (a dominant species in low zinc waters) under varied Zn, Cd or Co availability to assess responses to Zn limitation and possible substitution by Cd. We did not find any putative metalloproteins that were up-regulated exclusively under Cd or Co supported growth. Rather, our results suggest that growth optimized Co and Cd concentrations lead to Zn substitution via cambialism (possibly in variants of a δ-carbonic anhydrase) rather than expression of novel Cd-specific enzymes.

Host: Senjie Lin
Time & Date: 11:00 am, Friday, April 30, 2021

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