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The influence of iron on extended elemental stoichiometries in diazotrophs

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Nitrogen fixing cyanobacteria are autotrophic prokaryotes that require specific trace metals, such as iron (Fe), cobalt (Co), copper (Cu), molybdenum (Mo), manganese (Mn) and zinc (Zn), as cofactors in enzymes. Metalloenzymes regulate physiological processes that are key to life, such as photosynthesis, nitrogen fixation and respiration. Iron is the main limiting trace nutrient in the ocean, and iron status is thought to influence the requirements of other trace nutrients via metal cambialism (Saito et al., 2008). Nevertheless other trace nutrients also influence productivity in certain regions of the ocean (Browning et al., 2017).

We studied the effect of iron on extended elemental stoichiometries, including carbon (C), nitrogen (N), phosphorus (P), Fe, Co, Cu, Mo and Mn in mono-batch cultures of two diazotrophic cyanobacterial strains (*Cyanothece* sp. ATCC51142 and *Trichodesmium erythreum* IMS101, respectively). Cellular iron quotas (expressed relative to C) were lower for *Trichodesmium* than for *Cyanothece*. Furthermore *Trichodesmium* appeared to require more Co, Cu and Mn than *Cyanothece* so that the two organisms had distinct extended elemental stoichiometries. Reduction of available iron resulted in decreased Fe quotas and increased quotas for Co, Cu, Mn and Mo in *Trichodesmium*, but not for *Cyanothece*. Our results are discussed in the context of elemental use efficiencies, which describe the elemental quota normalized to growth rate in order to probe the impact of iron limitation on the requirements of other essential trace nutrients.

References

- Browning, T.J., Achterberg, E.P., Rapp, I., Engel, A., Bertrand, E.M., Tagliabue, A., and Moore, C.M. (2017). Nutrient co-limitation at the boundary of an oceanic gyre. *Nature* 551, 242. doi: 10.1038/nature24063.
- Saito, M.A., Goepfert, T.J., and Ritt, J.T. (2008). Some thoughts on the concept of colimitation: Three definitions and the importance of bioavailability. *Limnology and Oceanography* 53, 276-290. doi: 10.4319/lo.2008.53.1.0276.

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