



## Nickel limitation and zinc toxicity in a urea-grown diatom

Egleston, Eric S., François M. M. Morel

Limnol. Oceanogr., 53(6), 2008, 2462-2471 | DOI: 10.4319/lo.2008.53.6.2462

**ABSTRACT:** When growing on urea as a nitrogen source, diatoms must accumulate nickel (Ni), a cofactor in the urease enzyme, which hydrolyzes urea. The uptake of Ni at low ambient concentrations is particularly challenging in view of the slow rate of reaction of the Ni<sup>2+</sup> ion with uptake ligands. As expected, cultures of the model diatoms *Thalassiosira weissflogii* and *Thalassiosira pseudonana* become limited at very low Ni concentrations when growing on urea but not on nitrate or ammonium as a nitrogen source. At high Ni concentrations, urea-grown cultures of *T. weissflogii* exhibit similar accumulation of various other metals to nitrate-grown cultures and the same sensitivity to zinc and copper (Zn and Cu) concentrations. But at low Ni concentrations, *T. weissflogii* cells growing on urea accumulate excess Zn and exhibit extreme sensitivity to Zn toxicity. It appears that Zn accumulates in cells growing at low Ni concentrations by uptake through the up-regulated Ni transport system. The resulting sensitivity of Ni-limited cells to Zn (or to other metals that may be taken up via the Ni transport system) may limit the use of urea as a source of nitrogen in the oceans by some phytoplankton species.

### Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

### Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles are moved into Open Access after three years.

