

Uptake of diazotrophic amino acids by mesozooplankton from the Baltic Sea

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What is the quality of nitrogen from N₂-fixation by cyanobacteria (diazotrophic nitrogen) for the marine ecosystem? Cyanobacteria dominate large sea areas where nitrate is limiting so that N₂-fixation is the only new nitrogen source. Pathways of diazotrophic nitrogen into the planktonic food web include direct grazing by heterotrophs, release of different DON compounds during different growth phases facilitating bacterial growth and microbial degradation leading to the release of ammonium and subsequent phytoplankton growth. Direct feeding on cyanobacteria may be the most effective way to get nitrogen since complex nitrogenous compounds, including essential amino acids are ingested without any losses to the microbial food web. For the first time we detected the end-to-end transfer of ¹⁵N₂ from its fixation by cyanobacteria into their amino acids and via grazing into the amino acids of heterotrophic zooplankton by GC-C-IRMS analysis. Field experiments with mesozooplankton grazing on the cyanobacterium *Nodularia spumigena* from the Baltic Sea showed exponential uptake of diazotrophic essential and non-essential amino acids by zooplankton within 24h. Essential amino acids from cyanobacteria were more accumulated in mesozooplankton than non-essential amino acids. The results are discussed in the context of preferential uptake of essential amino acids to maintain constant body C: N ratios in zooplankton during times of nitrogen limitation.