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The influence of the N source on C allocation in the cyanobacterium *Synechococcus* sp. depends on energy availability

The assimilation of N-NO_3- by algae requires more energy than that of N-NH_4+. Therefore, the availability of either N-source may have appreciable consequences for the energetic budget of cells. This becomes relevant especially when energy (i.e. light) is in short supply. Consequently, the impact of N assimilation on the overall energy budget of phytoplankton may vary appreciably depending on the season, the time of the day and the position of cells in the water column. Furthermore, C:N stoichiometry has physiological and structural constraints and a change in the C:N ratio is reflected by the cell organic composition, with obvious consequences for trophic webs. In this work, we used the cyanobacterium *Synechococcus* sp. UTEX 2380 to investigate if and to what extent N availability and chemical form influenced growth, elemental stoichiometry and carbon allocation, under N or light limitation, in the presence of either NO_3- or NH_4+ as the N-source. When energy was limiting, *Synechococcus* grew faster in NH_4+ than in NO_3-, and had higher C (20%), N (38%), S (30%) cell quotas (a similar trend was also found for Fe, Zn, and Cr). Also, more C was allocated to protein, with a decrease of the carbohydrate/protein ratio, whereas the lipid/protein ratio did not change. Energy limitation also led to higher (129%) biomass productivity. We interpreted these results as an indication that, under energy limitation, the use of the least expensive N source allows a greater investment into growth and altered cell organic composition.

Biography

Zuoxi Ruan has great passion in research of Algal Physiology and Ecology. Two main lines of research have characterized his scientific activity: 1) Patterns of energy and C allocation in microalgae, which was done by investigating C and N acquisition and assimilation, and by studying different patterns of C allocation in macromolecular pools, allow to link algal cell biology and ecology with respect to the interaction between nutrient use and C allocation; 2) CO_2 concentrating mechanisms and carbon fixation in calcifying and non-calcifying phytoplankton and their interaction with ongoing global changes (ocean acidification and UV) were carried out by investigation of C acquisition, calcification and photosynthesis, as may provide an insight into the change of organic and inorganic pump in the future.

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