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Title: Stoichiometry and microzooplankton: how one predator response to food quality impacts the ecosystem around him.

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Abstract: In the marine food-web, microzooplankton is a key link between primary production and the higher trophic level. However, despite this crucial role, microzooplankton is often represented in a very simplistic way, with its grazing assumed to be only dependent on prey size and abundance. Here we have tested the effect of phytoplankton stoichiometry (a proxy for food quality) on the higher trophic levels of the planktonic food web by introducing Stoichiometric Modulation of Predation (SMP) into the European Regional Seas Ecosystem Model. The introduction of SMP remarkably alters nutrient cycling and mesozooplankton seasonality, increasing the difference in seasonal dynamics for the higher trophic levels. In addition, we explored the sensitivity of the system to changes in nutrient concentration, either a decrease (oligotrophication) or an increase (eutrophication). Our simulations suggest that the reduction of environmental nutrients reduces the quality (i.e. increases the C:N:P ratios) more than the quantity of phytoplankton (given as C-biomass). However, the relatively high phytoplankton biomass is not palatable for micozooplankton due to the high C to nutrient cellular ratios; as consequence, the biomass of the consumers (both microzooplankton and the mesozooplankton feeding on it) declines. This mechanism could have important consequences on the whole marine food web, by reducing the carbon transfer to the higher trophic levels (i.e. reducing the herbivorous food web) and channelling more primary produced carbon into the detritus (supporting the microbial loop).

Keywords: stoichiometry, microzooplankton, higher trophic level, ecosystem dynamics, food web

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