

ICES/PICES 6ZPS 2016 S5: The role of microzooplankton in marine food webs

Title: Nutrition & Elemental Stoichiometry of Zooplankton Life Stages

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Copepod development is not only highly dependent on the availability of phytoplankton, but also on the availability of the right nutrients within the phytoplankton. Higher carbon to nutrient ratios of phytoplankton correlate with increased dissolved CO₂ in ocean waters, therefore climate change may have negative implications on food quality for copepods. Copepods, being generally more nutrient rich than phytoplankton, have rigid metabolic needs, and must adjust their feeding behavior and/or metabolic rates in order to compensate for imbalances in food stoichiometries. As copepods develop, their demand for nutrients, such as phosphorus, shifts; with the highest phosphorus demand predicted to occur during the naupliar stages. To assess how food quality will affect body size, grazing rates, and internal stoichiometry of *Parvocalanus crassirostrus* at different development stages, we conducted a feeding experiment with *Tisochrysis lutea* at both high carbon:phosphorus (C:P) and low C:P ratios. With temperatures reaching a record of 31 °C this summer in Hawai'ian waters, we examined how food quality and temperature interact to affect *P. crassirostrus* grazing and growth rates at 25°C, 28°C, and 31°C. We predict that copepods will have higher grazing rates on high C:P food to compensate for low P availability, but this pattern will reverse with increased temperature, as respiration increases faster with temperature than growth, so the extra C will be required for respiration. This study will provide important predications as to how copepods will be affected by the interactive effects of decreases in food quality and increased temperature expected with climate change.

Keywords: Copepod nauplii, food quality, climate change, stoichiometry

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