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Reduction in thermal stress of marine copepods after physiological acclimation

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Abstract:

We studied the phenotypic response to temperature of the marine copepod *Paracartia grani* at the organismal and cellular levels. First, the acute (2 days) survival, feeding and reproductive performance at 6 – 35 °C were determined. Survival was very high up to ca. 30 °C and then dropped, whereas feeding and fecundity peaked at 23 – 27 °C. An acclimation response developed after longer exposures (7 days), resulting in a decline of the biological rate processes. As a consequence, Q_{10} coefficients dropped from 2.6 to 1.6, and from 2.7 to 1.7 for ingestion and egg production, respectively. Due to the similarity in feeding and egg production thermal responses, gross-growth efficiencies did not vary with temperature. Respiration rates were less sensitive (lower Q_{10}) and showed an opposite pattern, probably influenced by starvation during the incubations. The acclimation response observed in the organismal rate processes was accompanied by changes in body stoichiometry and in the antioxidant defense and cell-repair mechanisms. Predictions of direct effects of temperature on copepod performance should consider the reduction of Q_{10} coefficients due to the acclimation response. Copepod population dynamic models often use high Q_{10} values and may overestimate thermal effects.

Keywords: temperature, thermal performance curves, Q_{10} , oxidative stress, *Paracartia gani*