

Effects of constant and stepwise changes in temperature on the species abundance dynamics of four cladocera species

Laboratory experiments with natural zooplankton communities were carried out to study the effects of two contrasting temperature regimes: constant temperature (15, 20, and 25 °C) and graded changes in temperature. The graded regime consisted of repeated sustained (three weeks) controlled stepwise temperature changes of 5 or 10 °C within 15–25 °C on the population dynamics of four dominant species of lake littoral zooplankton, *Daphnia longispina* (Müller, 1785), *Diaphanosoma brachyurum* (Lievin, 1848), *Simocephalus vetulus* (Müller, 1776) and *Chydorus sphaericus* (Müller, 1785). The results show that controlled stepwise changes (positive or negative) in temperature within the ranges of 15–20, 20–25, and 15–25 °C can exert either stimulating or inhibitory effect (direct or delayed) on the development of *D. longispina* and *S. vetulus* populations. The development of *D. brachyurum* and *Ch. sphaericus*, both more steno-thermophile, was only stimulated by a stable elevated temperature (25 °C). These results support the previously formulated hypothesis that, in determining the ecological temperature optimum of a species within a natural community, it is not enough to define its optimum from constant, cyclic or random temperature fluctuations, but also from unidirectional stepwise changes in temperature. These stepwise changes may also induce prolonged or delayed effects.

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