Response of a cold-water-adapted species, the arctic charr Salvelinus alpinus, to thermal changes : an ecophysiological perspective

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Abstract

In ectotherms, temperature is a key parameter influencing numerous biological traits. It is well known that modifications in environmental temperature are correlated with changes in metabolism and oxygen consumption, which in turn affect the oxidative balance of the organism. However, while the relationship between temperature, oxidative status and life history traits has been raising interest in some model organisms, such information has rarely been documented in non model organisms, in particular in wild populations.
The arctic charr (*Salvelinus alpinus*) is a cold-water-adapted and highly stenothermic salmonid that is widely distributed in subarctic regions. In alpine and peri-alpine lakes, the charr lives at the Southern edge of its native range and seems highly vulnerable to climate change as early life stages are especially known to be sensitive to temperature increase.
In this study, we use a common garden approach to investigate the hypothesis of local adaptation of the species to thermal habitat and assess the adaptive potential of populations. We compare four arctic charr populations originating from thermally contrasted environments by rearing embryos at an optimum (5∘C) or stressful (8.5∘C) temperature. We examine adaptive differences at the population and individual levels in life history traits and physiological traits at the stages of hatching and emergence. The results are then discussed in relation to ecophysiological trade-offs hypotheses between the traits studied.

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