Studying hot-spring fish to understand behavioural and physiological adaptation to high temperature

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Résumé

Climate change poses a significant threat to biodiversity, so there is a pressing need to understand the capacity of populations to respond and adapt to increasing temperatures. Ectotherms are particularly vulnerable to changes in ambient temperature, because this directly influences their body temperature. Ectotherms are therefore expected to adapt to climate change through plastic and/or evolutionary changes in a wide range of behavioural and physiological traits. To better understand these plastic and evolutionary responses to temperature, we are using a novel approach of comparing populations of threespine sticklebacks (Gasterosteus aculeatus) found in geothermally warmed waters ('hot springs') and adjacent ambient-temperature lakes in Iceland. This unique natural experiment provides repeated and independent examples of populations experiencing contrasting thermal environments for many generations over a small geographic scale, thereby avoiding the confounding factors associated with latitudinal or elevational comparisons. We are taking advantage of this study system to study (i) plastic responses by looking at within-population variation at different temperatures and (ii) evolutionary responses by comparing warm- and cold-adapted populations at a common temperature. We have found strong divergence in many behavioural, physiological, and morphological traits between warm- and cold-adapted fish, which I will summarise in this talk. These findings provide valuable insights into how fishes and other ectotherms may adapt in a warming world.

Mots-Clés: climate change, metabolic rate, ecophysiology, social behaviour, fish, stickleback

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