Thermal habitat shifts, but does not always widen, between embryonic and larval stages of fish

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Abstract

Temperature tolerance can vary greatly between ontogenetic stages of the same species and quantifying stage-specific thermal niches is critical for projecting climate impacts. For fish, 'thermal bottleneck' theory posits that temperature ranges are narrower for embryos than for larvae. However, this theory has not been fully validated with in situ evidence, in part due to lack of data on fish embryos, whose morphological similarities belie visual identification. Here, we used DNA barcoding to estimate thermal ranges of embryos and compare with those of larvae, for five species. None of the species we studied align with the predictions of thermal bottleneck theory. Instead, some species of embryos showed wider tolerances than their respective larvae, and all embryos had lower in situ thermal minima than conspecific larvae. Together, our results suggest that fish move through sliding windows, rather than bottlenecks, of thermal habitat as they progress from embryonic to larval stages.

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