The effect of resource limitation on the temperature dependence of mosquito population fitness

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Abstract

Laboratory-derived temperature dependencies of life history traits are increasingly being used to make mechanistic predictions for how climatic warming will affect disease vector abundance. However, laboratory data are typically from vector populations reared on optimal resource supply, even though natural populations experience fluctuations in resource availability. Here, using laboratory experiments on *Aedes aegypti*, a principal arbovirus vector, we show that low-resource supply significantly depresses its maximal population growth rate ($r_{\max}$) and causes it to decrease from 22 to 32°C. In contrast, at high-resource supply, $r_{\max}$ is not just higher, but also increases across the same temperatures. This striking difference is driven by the fact that resource-limitation significantly increases juvenile mortality, slows development, and reduces lifespan and size at maturity (which then decreases fecundity). Our results suggest that future studies need to account for the effects of resource-limitation when using Ecological Metabolic Theory to predict climatic warming effects on disease vectors.

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