Individual variation in growth and physiology of symbionts in response to temperature

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Abstract

In many cases, understanding species level responses to climate change requires understanding variation among individuals in response to such change. For species with strong symbiotic relationships, such as many coral reef species, genetic variation in symbiont responses to temperature may affect the response to increased ocean temperatures. To assess variation among symbiont genotypes, we examined the population dynamics and physiological responses of genotypes of Breviolum antillogorgium in response to increased temperature. We found broad temperature tolerance across genotypes, with all genotypes showing positive growth at 26, 30, and 32? C. Genotypes differed in the magnitude of the response of growth rate and carrying capacity to increasing temperature, suggesting that natural selection could favor different genotypes at different temperatures. However, the historical temperature at which genotypes were reared was not a good predictor of temperature response, suggesting a lack of adaptation to temperature over hundreds of generations. We found increased photosynthetic rates and decreased respiration rates with increasing temperature, and differences in physiology among genotypes, but found no significant differences in the response of different genotypes to temperature. In species with such broad thermal tolerance, selection experiments on symbionts outside of the host may not yield results sufficient for evolutionary rescue from climate change.

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