Predator induction of spine length in larval Leucorrhinia intacta (Odonata)

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ABSTRACT

Questions: Do larvae of a dragonfly with a broad habitat distribution have longer abdominal spines when they co-exist with fish, and are these differences the result of phenotypic plasticity?

Hypothesis: Phenotypic plasticity will result in larvae having longer spines when they are exposed to cues from predatory fish.

Organism: Larvae of Leucorrhinia intacta (Odonata: Libellulidae).

Research site: Natural ponds and cattle tanks on the E.S. George Reserve in southeast Michigan.

Methods: We compared the morphology of larvae collected from two natural ponds before and after a drought resulted in the extirpation of fish from one pond. We also compared spine morphology of larvae reared in an experiment where they were either exposed to caged fish or empty cages. Finally, we use a phylogeny for this genus to begin reconstructing the evolutionary history of plasticity and spine morphology within Leucorrhinia.

Results: Larvae collected from ponds with fish present had longer spines than larvae collected from ponds without fish. In the experiment, exposure to fish resulted in longer spines for some but not all of the spines measured. These results indicate that at least some of the variation in spine length is the result of plasticity. Leucorrhinia intacta is not a sister species to a European Leucorrhinia in which similar plasticity has been found. Mapping plasticity on to the phylogeny of this genus indicates that either plasticity is ancestral to the two major clades of this genus or that it has arisen independently twice.

Keywords: habitat distribution, Leucorrhinia, phenotypic plasticity, predator–prey interactions

INTRODUCTION

Anti-predator morphological defences are common in prey species and can be either fixed or phenotypically plastic in response to varying predator conditions. Induced morphological defences have been documented in numerous animal taxa in response to the presence of predators (see reviews in Havel, 1987; Tollrian and Harvell, 1999; Lass and Spaak, 2003; Benard, 2004). Spatial
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