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Case-repair in three genera of caddisflies (Trichoptera)

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Abstract

Case-building is energetically expensive and case-repair may be a viable alternative to rebuilding for caddisflies when the case is damaged. In this study, we damaged the larval cases of 3 Trichoptera genera: *Lepidostoma* spp.; *Neophylax rickeri* Milne, 1935; and *Onocosmoecus unicolor* (Banks, 1897). We manually damaged the anterior, middle, or posterior portions of the larval case. We measured case lengths before damage, immediately after damage, and after allowing 2 days for repair. Overall, 74.2% of *Lepidostoma* spp. (n=31), 23.5% of *N. rickeri* (n=34), and 50.0% of *O. unicolor* (n=44) repaired their cases. *Lepidostoma* spp. had the highest odds of repair (2.88:1), followed by *O. unicolor* (1:1). *Neophylax rickeri* (0.308:1) was unlikely to repair its case after damage. For all genera, the percentage of the damaged portion repaired by location was not statistically significant. In *Lepidostoma* spp., at all locations, the average percentage of the damaged portion repaired was greater than 100% (larvae repaired the damage fully and continued to add material to the anterior end of the case). The occurrence of repair across the 3 genera at all damage locations suggests that the behavior may be beneficial for protection and more energetically favorable than entirely rebuilding the case, however life history may influence the likelihood of repair.

Key words: case-building, Integripalpia, energetics, case material, silk

Introduction

Caddisfly cases are diverse in their appearance, and vary in the materials used for construction and the shape, structure, and size of the case. All case-building larvae depend on their cases for survival. Specifically, cases provide physical (Otto & Svensson 1980, Nislow & Molles 1993) and camouflage protection (Otto & Svensson 1980, Otto & Johansson 1995, Nislow & Molles 1993) against predators and aid in respiration (Hansell 1974, Wiggins 1996). Cases also reduce aggression and cannibalism in temporary wetland habitats (Wissinger *et al*. 2004), and the presence of predators in the habitat influences preference of case type and material (Boyero *et al*. 2006). Cases offer protection from desiccation in temporary pools and organic cases hold water more efficiently than mineral cases (Zamora-Muñoz & Svensson 1996). Mineral cases have been shown to offer better protection than organic cases, and risk of predation for larvae with cases made of organic materials is higher for damaged cases with decreased length (Otto & Svensson 1980). However, there are tradeoffs between the energetic cost of building a case and predator protection; mineral cases are more energetically expensive to construct than leaf cases (Becker 2001) because silk is energetically expensive and more silk is used in the construction of mineral cases (Stevens *et al*. 1999, Stevens *et al*. 2000). Because of these potential costs, case-repair, in which only damaged portions of cases are

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