Article

Morphological and molecular description of the late-stage larvae of *Alima* Leach, 1817 (Crustacea: Stomatopoda) from Lizard Island, Australia

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Abstract

Alima pacifica and *A. orientalis* are stomatopods commonly found at Lizard Island, Great Barrier Reef, Australia. There are currently no descriptions that link the larvae to the adult morphotype despite the frequent occurrence of the last larval stage of these two species. We used DNA barcoding of the cytochrome oxidase I (COI) gene to link the last stage larvae of *A. pacifica* and *A. orientalis* to the respective adult morphotype. Detailed morphological descriptions of the late larva of each species are provided and compared to other described last-stage *Alima* larvae. These data support previous studies that suggest paraphyly of the genus *Alima*.

Key words: Crustacea, Stomatopoda, Lizard Island, Australia

Introduction

With the declining state of coral reefs it has become essential to enhance our knowledge of integral members of these complex, threatened habitats. Stomatopod crustaceans, which live in burrows in rock, coral, or sand, are important members of coral reef communities both as prey for predatory fishes and as predators of small reef fishes and invertebrates. Though stomatopods occur globally, coral reefs are home to more species of stomatopods than any other habitat (Reaka *et al.* 2008). In certain regions of the Indo-Australian Archipelago as many as 50 species of stomatopods can be found on a particular coral reef (Reaka *et al.* 2008). Much research on stomatopods has taken place at coral reef field sites, such as Lizard Island on the Great Barrier Reef, Australia where on the Lizard Island reef platform alone, 31 species are known to occur (R. Caldwell, personal communication).

Many benthic invertebrates in coral reef communities rely on pelagic larval phases for recruitment. Since most species descriptions are based solely on the adult, it is often a challenge to identify larvae captured from the zooplankton. These identification challenges severely limit studies that aim to understand the biology of invertebrate larvae and ultimately how populations of reef invertebrates are connected.

The life history of stomatopods includes multiple pelagic larval stages. Larvae hatch from an egg mass brooded in the burrow, remain in-situ through several propelagic stages and then ascend into the water column. With a single molt, the last-stage larva metamorphoses into a postlarva and settles to the adult benthic habitat. While all stages of stomatopod larvae can be easily distinguished from other crustacean larvae, identifying them to species can be difficult. Identification has been accomplished either by hatching larvae from a known mother or by rearing captured larvae through to adulthood. Both of these methods are limited by laboratory culture. Many species of stomatopods are difficult to culture, severely limiting the number of species for which the larval stages have been described. Of the approximately 500 extant species of stomatopods, descriptions of the entire series of larval stages exist for a mere six species (Schram *et al.* in press). The number of larval stages can range from as few as three (*Heterosquilla tricarinata* Claus, Greenwood & Williams 1984) to as many as eleven (*Oratosquilla oratoria* De Haan, Hamano & Matsuura 1987; *Pterygosquilla schizodontia* Richardson as *Squilla armata*, Pyne