



The first zoeal stage morphology of *Crossotonotus spinipes* (De Man, 1888) and *Pseudopalicus serripes* (Alcock & Anderson, 1895), with implications for palicoidean systematics (Crustacea: Brachyura: Palicoidea)*

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Abstract

Traditionally, *Crossotonotus spinipes* (De Man, 1888) and *Pseudopalicus serripes* (Alcock & Anderson, 1895) were assigned to the Crossotonotinae Moosa & Serène, 1981, and Palicinae Bouvier, 1898, respectively. However, Ng *et al.* (2008: 127) listed a number of major adult characters that suggested both subfamilies should be recognised as distinct families within the Palicoidea Bouvier, 1898 (see also Castro 2010, 2011; Guinot *et al.* in prep.). Recently, ovigerous specimens of *C. spinipes* and *P. serripes* were collected from Okinawajima and Kumejima, central Ryukyu Islands, Japan. The first zoeal stages of both species were hatched in the laboratory, dissected, examined, and the appendages illustrated and described. *Crossotonotus spinipes* first stage zoeas were distinguished by three characters: the absence of lateral carapace spines (present in *P. serripes*), abdominal somite 4 with a pair of dorsolateral processes directed ventrally (absent in *P. serripes*) and the presence of a small lateral spine on the telson (absent in *P. serripes*). These distinguishing features appear to support the recent division of the Palicoidea into two families.

Introduction

In the detailed taxonomic revision of the family Palicidae Bouvier, 1898, by Castro (2000), the morphological differences between the two subfamilies he recognised, Palicinae Bouvier, 1898, and Crossotonotinae Moosa & Serène, 1981, are significant. Most notably, while the last ambulatory leg (pereiopod 5) of palicines are strongly reduced and look almost vestigial, while those of crossotonotines are normal in structure except they are relatively smaller than the other legs. In fact, crossotonotines had been classified with or near majoids, corystids, ocypodids and plagusiids by various authors (see Castro 2000: 569, for review). In their synthesis of global Brachyura, Ng *et al.* (2008: 127) commented that in addition to the characters discussed by Castro (2000) (see Table 1), a detailed unpublished study of the two subfamilies by Guinot *et al.* (in prep.) also revealed major differences, among others, in the morphologies of the thoracic sternum, abdomen, penis and gonopods. To this effect, they proposed that both subfamilies should be recognised as distinct families in the superfamily Palicoidea Bouvier, 1898 (see also Castro 2010, 2011). Unpublished molecular evidence (J. Lai *et al.*) confirms that both families are sister taxa, which split off early in their evolution, not unlike the two families now in the related Dorippoidea MacLeay, 1838 (see Sin *et al.* 2009).

First stage zoeas of species assigned to the Palicidae and Crossotonotidae have been hatched in the laboratory. The purpose of the present is to describe palicoidean zoeas for the first time and compare their zoeal morphology to review if larvae characters support the establishment of two families within the Palicoidea.