



## Morphology of the complete larval development of the symbiotic crab *Sestrostoma balssi* (Shen, 1932) (Varunidae: Gaeticinae)

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### Abstract

Larval development of the symbiotic crab *Sestrostoma balssi* (Shen, 1932) (Varunidae: Gaeticinae) inhabiting Russian waters of the Sea of Japan is described and illustrated for the first time from material reared in the laboratory. The development includes five zoeal and a single megalopal stages. The first megalopa was attained at 20–22°C 35 days after hatching. The present paper is the first description of the complete larval development in the genus *Sestrostoma*. The larvae of *S. balssi* share all principal characters of the family Varunidae but are distinguished from the typical varunid larvae by the absence of a well-developed antennal exopod in the zoea and the presence of an 8-segmented antennal flagellum in the megalopa.

**Key words:** Varunidae, taxonomy, larvae, zoea, megalopa, Sea of Japan

### Introduction

A symbiotic crab *Sestrostoma balssi* (Shen, 1932) associated with annelids, echiurans and thalassinideans, has been reported from Japan, China and Taiwan (Itani *et al.* 2002; Davie & Ng, 2007). In 2009, the species was found in Russian waters of the Sea of Japan, in burrows of large ghost shrimps, *Upogebia major* (De Haan, 1841) and *U. issaefi* (Balss, 1913) (Upogebiidae) (Marin *et al.* 2011, in press). The presence of mature and juvenile specimens indicates the occurrence of a stable population of this species in the investigated region. This finding appreciably expands the habitat of *S. balssi* in the Sea of Japan, which had been previously collected from Soya Strait, Hako-date Bay, Toyama Bay, Hiroshima Bay and Sone-higata (Itani *et al.*, 2002).

The larvae of *S. balssi* are unknown. The aim of this study is to give a description of the complete larval development of *S. balssi* based on the laboratory reared material. The present paper is the first description of the complete larval development in the genus *Sestrostoma*.

### Material and methods

This study was undertaken on the Vostok Marine Biological Station of the Institute of Marine Biology (Russian Academy of Sciences), Vostok Bay, Sea of Japan in June, 2010. An ovigerous female of *Sestrostoma balssi* was collected in the burrow of a large ghost shrimp, *Upogebia major*, at a depth of 1 m. The female was maintained in an aquarium with aerated seawater until hatching of the larvae. After hatching larvae were concentrated at the edge of the aquarium using a direct light source, transferred to 1-L glass vessels with filtered and UV-sterilized seawater and reared to the megalopal stage at a temperature of 20–22°C and a salinity of 32‰. The density of larvae was about 100 specimens per litre. The water in the vessels was changed daily.

The larvae of varunid crabs are rather small (carapace length is about 0.5 mm), so nauplii of *Artemia* sp., the usual food of decapod larvae under laboratory conditions, are not suitable for their nutrition at least at the early