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Morphological study of first zoeal stage of *Anchistus custos* (Forsskål, 1775) (Crustacea: caridea: palaemonidae: pontoniinae) reared under laboratory conditions and note on parental mother identity

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Abstract

The present paper is based on the morphological study of first zoeal stage of *Anchistus custos* (Forsskål, 1775). The ovigerous female of *Anchistus custos* was obtained from the mantle cavity of *Pinna bicolor* Gmelin, 1791.

Keywords: Morphological study, *Anchistus custos*. 1st zoea

Introduction

Pontoniine shrimps are a group whose ecology is characterized by symbiotic interactions, recognized for their cryptic behavior and symbiotic associations with bivalves, corals, anemones, sponges and jellyfish (De Grave, 2001, Martinelli, *et al.*, 2008, Okuno and Bruce 2010) [4, 7, 10]. *Anchistus custos* (the watchman prawn) is the common prawn commensal with bivalves of the family pinnid genera *Pinna*, *Atrina* and *Vasum*. (Johnson and Liang, 1966) [8]. This shrimp was first time reported from Pakistan coast by Tirmizi and Kazmi, 1982 [13] and a note was given on its association with *Pinna* by Tirmizi and Kazmi, 1994, 2016 [5]. Larvae of the Pontoniinae are poorly documented world-wide, with larval descriptions known for only ten (about 10.8%) of the 83 genera currently described in the subfamily (Okuno, 1999; Yang and Ko, 2004) [9, 14]. These are represented by 23 species from Atlantic waters, the Mediterranean Sea, the Red Sea, India, Australia, New Zealand, and Fiji. The only record of *Anchistus* larvae is the 1st zoeal stage of *Anchistus custos* by Parsad and Tampi (1958) [11] as *Anchistus inermis* from India.

Materials and Methods

Ovigerous female of *Anchistus custos* (Forsskål, 1775) was found in the mantle cavity of bivalve *Pinna bicolor*. *Pinna bicolor* was obtained from Manora (long 66° 58' 42" E, lat24°47' 30"N) on 23 November, 2011. The ovigerous female was kept in the aquarium in filtered seawater with a salinity of 35-37‰ and pH 7.5-7.9 at room temperature (23 °C-26 °C). The larvae were hatched on 03 December 2011. Newly hatched larvae were segregated and placed, five larvae per beaker (500ml), containing filtered seawater of salinity 35-37‰ and temperature 23 °C-26 °C. *Artemia* nauplii were offered as food. Each beaker was examined daily for exuviae and dead larvae. Temporary slides were made by using glycerin plus 5% formalin (3:1). The specimens were dissected by using tungsten needle under a binocular microscope (Nikon) with 10x/21 magnifications. The illustrations were made with the help of Olympus BX51 microscope (magnifications WHN10X/22 x10 and 20) with Nomarski interference contrast and camera lucida attachment. Measurements (millimeter = mm) of illustrated specimens were made by using stage micrometer. The total length (TL) was determined from the tip of the rostrum to the mid posterior border of the telson. The spent female and the remaining larvae were preserved in formalin and housed in the Marine Reference Collection and Resource Centre, University of Karachi (Cat. No. CARL.256).

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Plate 1: (A) Ovigerous female of *Anchistus custos* (Forsskål, 1775). (B). Host Pinna and pair of commensal *Anchistus custos* (after Tirmizi and Kazmi, 1994) [5].

Results

Description of the larva

Zoea I (Fig. 1A – K)

Size- TL = 01.94mm - 02.00mm

Duration.-2 day.

Diagnostic Features

Carapace (Fig. 1A) - Smooth; rostrum small, distally pointed; eyes sessile.

Antennule (Fig. 1B) - Biramous; inner ramus represented by a long plumose seta; outer ramus with 3 aesthetascs and 1 seta; peduncle 2-segmented.

Antenna (Fig. 1C) - Biramous; endopod with 1 plumodenticulate seta and 1 spine distally; exopod (Scaphocerite) with 8 setae.

Mandible (Fig. 1D) - Well developed.

Maxillule (Fig. 1E) - Coxalendite with 6plumodenticulate setae, basal endite with 2 cuspidate and 3 plumodenticulate setae; endopod with 3 plumodenticulate setae.

Maxilla (Fig. 1F) - Coxalendite with 4 plumodenticulate

setae; basal endites bilobed with 2+3 plumodenticulate setae; endopod with 2 plumodenticulate setae; scaphognathite with 5 setae.

Maxilliped I (Fig. 1G) – Coxopod with 1 seta; basipod with 3 setae; endopod4-segmented with 0,0,1,3 plumodenticulate setae respectively; exopod with 4 long plumose natatory setae terminally.

Maxilliped II (Fig. 1H).-Coxopod broken; basipod with 2 setae; endopod4-segmented with 0,0,1, 1+2+2 plumodenticulate setae respectively; exopod with 4 long plumose natatory setae terminally and 1 simple seta laterally.

Maxilliped III (Fig. 1I).-Coxopod broken; basipod naked; endopod 4-segmented with 0,0,0,2+4 plumodenticulate setae, respectively; exopod with 4 long plumose natatory setae terminally.

Pereiopods I-V (Fig. 1J) - Rudimentary.

Abdomen (Fig. 1A) - 5- somites.

Telson (Fig. 1K) - Long and triangular, posterior margin with 7 pairs of plumosesetae, not all of the same length.

Table 1: Comparison of morphological features of zoea I of *Anchistus custos* (Forsskål, 1775) from Pakistan (present study) and from India. Zoea I:

Characters	<i>Anchistus custos</i> from Pakistan (present study)	<i>Anchistus custos</i> (= <i>A. inermis</i>) from India Parsad and Tampi (1958) [11]
Size:	01.94mm - 02.00mm	1.81 mm
Rostral spine	Present	Absent
Antennule: peduncle outer ramus	2-segmented 3 aesthetascs and 1 seta	Unsegmented 5 aesthetascs and 1 seta
Antenna: Scaphocerite	8 setae	11 setae
Maxillule: Coxal endite	6 setae	4 setae
basal endite	2+3 setae	4 setae
Endopod	3 setae	without setae
Maxilla: Coxalendite	4 setae	3 setae
basal endite	2 + 3 setae	2 + 2 setae
Endopod	2 setae	1 seta
Scaphognathite	5 setae	4 setae
Maxilliped I: Endopod	4-segmented with 0,0,1,3 setae	2-segmented with 0, 1+3 setae
Exopod	4 setae	3 setae
Maxilliped II: Endopod	4-segmented	2-segmented

Exopod	4 setae	3 setae
Maxilliped III: endopod	4-segmented	3-segmented
Exopod	4 setae	3 setae

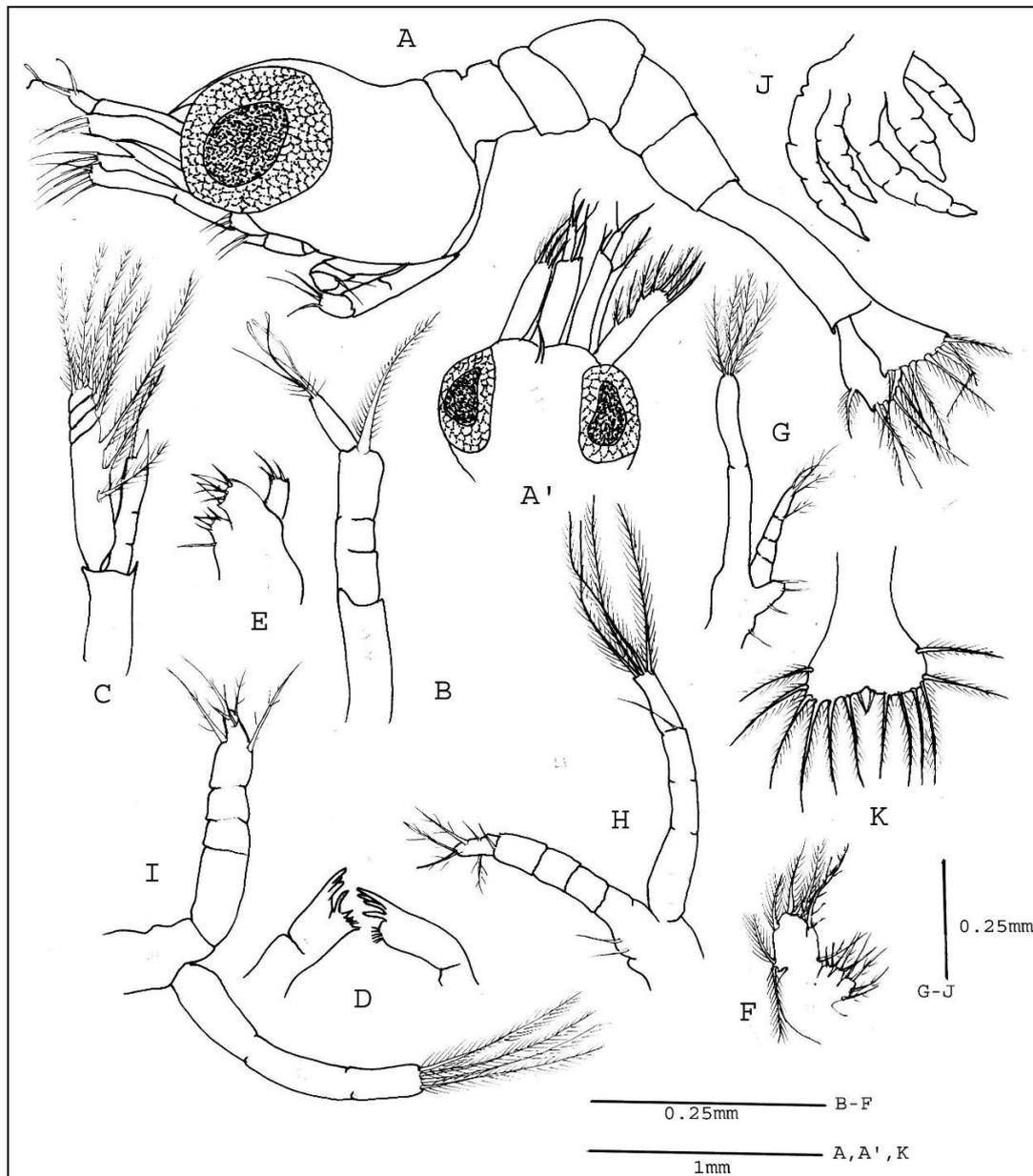


Fig 1: *Anchistus custos* (Forsskål, 1775). Zoea I: A, entire, lateral view; B, antennule; C, antenna; D, mandible; E, maxillule; F, maxilla, G-I, maxilliped I-III; J, pereiopods; K, telson, dorsal view.

Remarks

The present study is the second report of same species from Karachi waters. Yang and Ko (2004) [14] described *Conchodytes nipponensis* from Korea and stated their report as first larval description of a pontoniid species from Asian waters, their statement is quite puzzling as these authors have mentioned at least four references from Asian waters. Unfortunately we were not able to get successive stages, the larvae died at first zoeal stage. The differences noticed in the morphology of the larvae in Indian and Pakistani material are in the size, presence of rostrum, antennule, antenna, maxillule, maxilla and maxillipeds, as mentioned in table 1. Besides difference in size, some setal and segmental

difference; these main difference is the presence of rostrum in the Pakistani *A. custos* which is absent in the Indian *A. custos*. This character was discussed with Dr. Paul Clark (British Museum, NH) by the second author (pers. correspond). According to Paul” your drawing, the rostral spine seems to be extremely small and I note that Parsad and Tampi (1958) [11] say in there description that it is absent. The only explanation is that Parsad and Tampi (1958) [11] overlooked this character and/or their microscope was not as good as the one you are currently using”, we are of the same opinion. The extra spine (antennal?) on the right carapace margin presents the appearance of abnormal variations (fig.2).

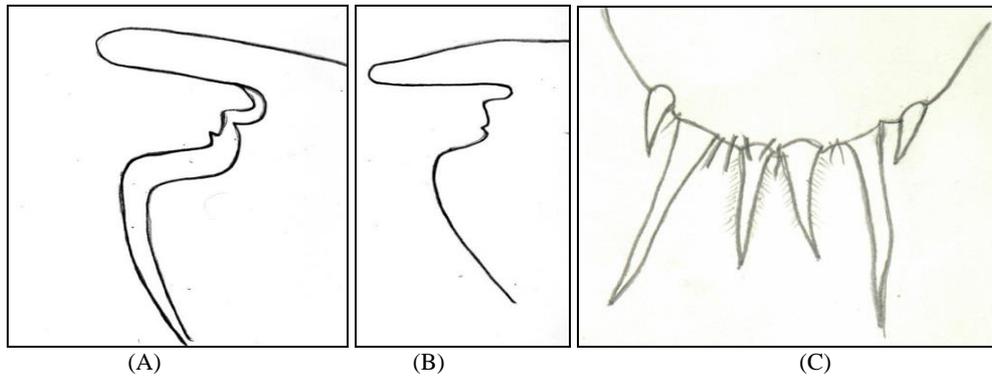


Fig 2: *Anchistus custos* (Forsskål, 1775) ovigerous female. A & B, lateral margin of carapace (B, right side); C, posterior margin of telson

According to Sammy Grave (pers. Coress. second author) "your drawing seems to show a small antennal spine, which should make this *A. custoides*". But our specimen differs from *A. custoides* described by Grave, (1999)^[3]. Therefore we name this specimen as *A. custos* till more material is obtained with an antennal spine.

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