

COMPARATIVE STUDY OF THE ZOEAE OF THE SAND CRABS, PHILYRA CORALLICOLA (ALCOCK), PHILYRA GLOBOSA (FABRICIUS) AND DESCRIPTION OF FIRST ZOEAE OF LEUCOSIA PUBESCENS (MIERS) (DECAPODA: CRUSTACEA)

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The paper deals with the comparative study of first zoeal stages of three crabs of subtribe Oxystomata found in Karachi. Zoeae of *Philyra corallicola* and *Leucosia pubescens* were obtained by rearing the crabs in the laboratory. Description of zoea of *P. globosa* was taken from Chhapgar for comparison. Measurements of zoeae were taken which indicate that zoeae of *P. globosa* is larger than zoeae of *P. corallicola*. Significant structural differences are also recorded.

Introduction

The first zoeal stage of every species of crabs can be distinguished by its specific individual characters. It can be obtained by having the eggs hatched in the laboratory. Once the identification is established it can be further collected from the plankton for obtaining the rest of the zoeal stages by moulting. In view of this the authors have made comparative study of first zoeae of the three different species of subtribe *oxystomata* found on Karachi sandy shore and offshore waters. There is a profound transformation at metamorphosis in crabs and the pre-zoea, zoea and megalopa stages are quite distinct from each other. The fundamental structural peculiarities possessed by the first zoeae are retained without much change throughout the subsequent zoeal stages. This makes the identification of the first zoea of any species a useful starting point to envisage the possibilities of later development.

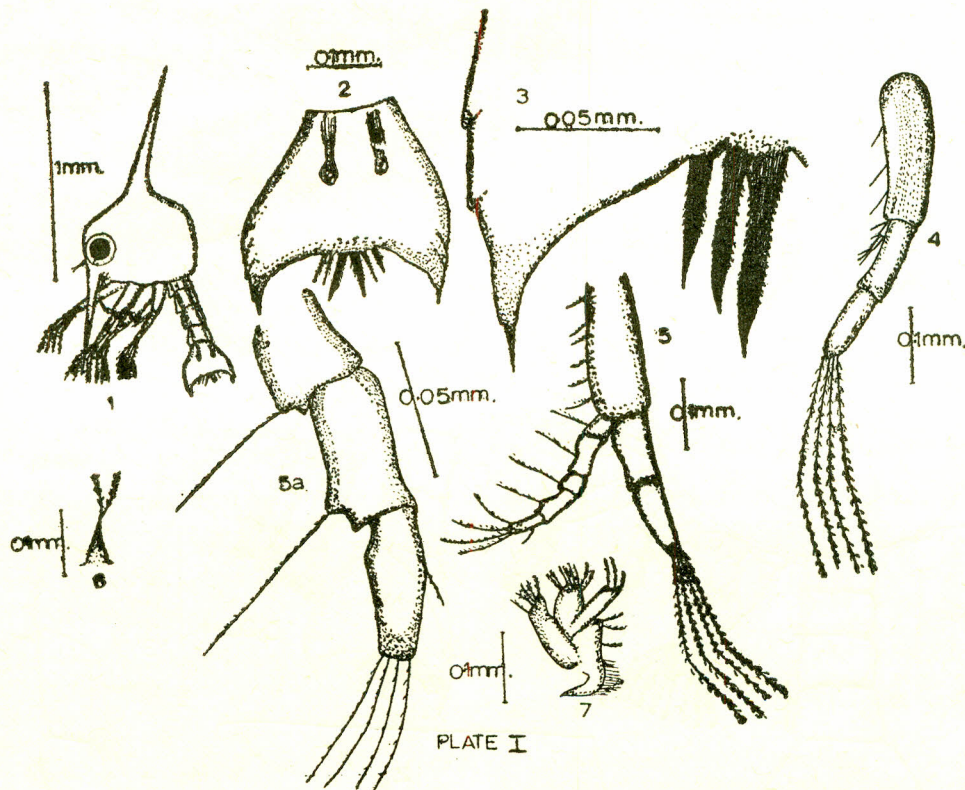
No study of this type has so far been reported from Karachi but in India, Mc Cann,¹ Menon,² Naidu,^{3,4} Chacko,⁵ Prasad and Tampi,^{6,7} and Chhapgar⁸ have worked on the life histories of some species of crabs and the study of zoeae was made. This paper includes the complete description of zoeae of *Leucosia pubescens* and *P. corallicola*.

Materials and Method

Collection was made from Sandspit, Hawkes Bay, Manora Island, and Korangi Creek, Karachi, and berried female were brought to the laboratory in sea water. Rearing experiments were done during summer of 1962, in the laboratory of the Marine Fisheries Department. Crabs were kept

in glass aquaria with sea water. They were fed on bits of shrimps, mussel, and fish. The eggs, dark brown in colour, were found to be well developed when captured. They did not hatch until after four days. Pre-zoeae were obtained soon after the hatching but they were not markedly different from each other and hence left out of comparison. The first zoeae of *P. corallicola* and *L. pubescens* lived for 80 hours, and were then preserved. Drawings were made with the help of camera lucida. Measurements were taken with the help of micrometer eye piece. Description of zoea of *P. globosa* is based on the study of its life history by Chhapgar.⁸

Description of First Zoeae of P. corallicola.—The first zoeal larva (Plate 1, Fig. 1) is characterized in this species by the presence of a long spine directed vertically upward on the thorax, and by the spine-like rostrum directed vertically downward. The larva swims with the help of first and second maxillipeds. It has a short angular carapace and a slender, segmented abdomen. The eyes are strongly pigmented. There are well-developed masses of pigment on the dorsal side of the abdominal segments. The first maxilla (Fig. 7) consists of a short, narrow and bilobed exopodite. The inner lobe bears 8 setae and outer one bears 3. The one-lobed endopodite bears 5 setae. First and second maxillipeds (Figs. 4 and 5) are large and with exopodites equipped with terminal long feather-like bristles. The first maxilliped (Fig. 5) consists of a short base with an exopodite of two segments bearing four long plumose setae and an endopodite of five segments each of which bears one setae except the apical segment which bears 4 large terminal and one small proximal setae. There are 6 plumose setae on basipodite on its inner side. The second



Figs. 1, First Zoea of *Philyra corallicola* (Alcock) (side view); 2, Telson; 3, Telson (a part enlarged); 4, Second maxilliped; 5, First maxilliped 5a, Endopodite of First maxilliped (enlarged); 6, Antennule; 7, First maxilla.

maxilliped (Fig. 4) is similar to the first except that it is comparatively small and its endopodite has only two segments with three short hairs at the tip. Antennule (Fig. 6) is an unjointed process with 2 setae. There is a deep cleft in the thorax through which the abdomen comes out consisting of five segments and a telson. The telson (Figs. 2 and 3) is devoid of pigment. Between the forks of telson are six plumose setae. The middle pair of setae is larger and the two extreme pairs are smaller. The dorsal and rostral spines are equal in length and similar in form and shape. The characteristic features of the zoea of *P. corallicola* are the absence of lateral spines on the thorax and the presence of a well-developed, flat, forked and plate-like telson, the outer margins of which bear two serrations near the tip of the forks.

Measurements:

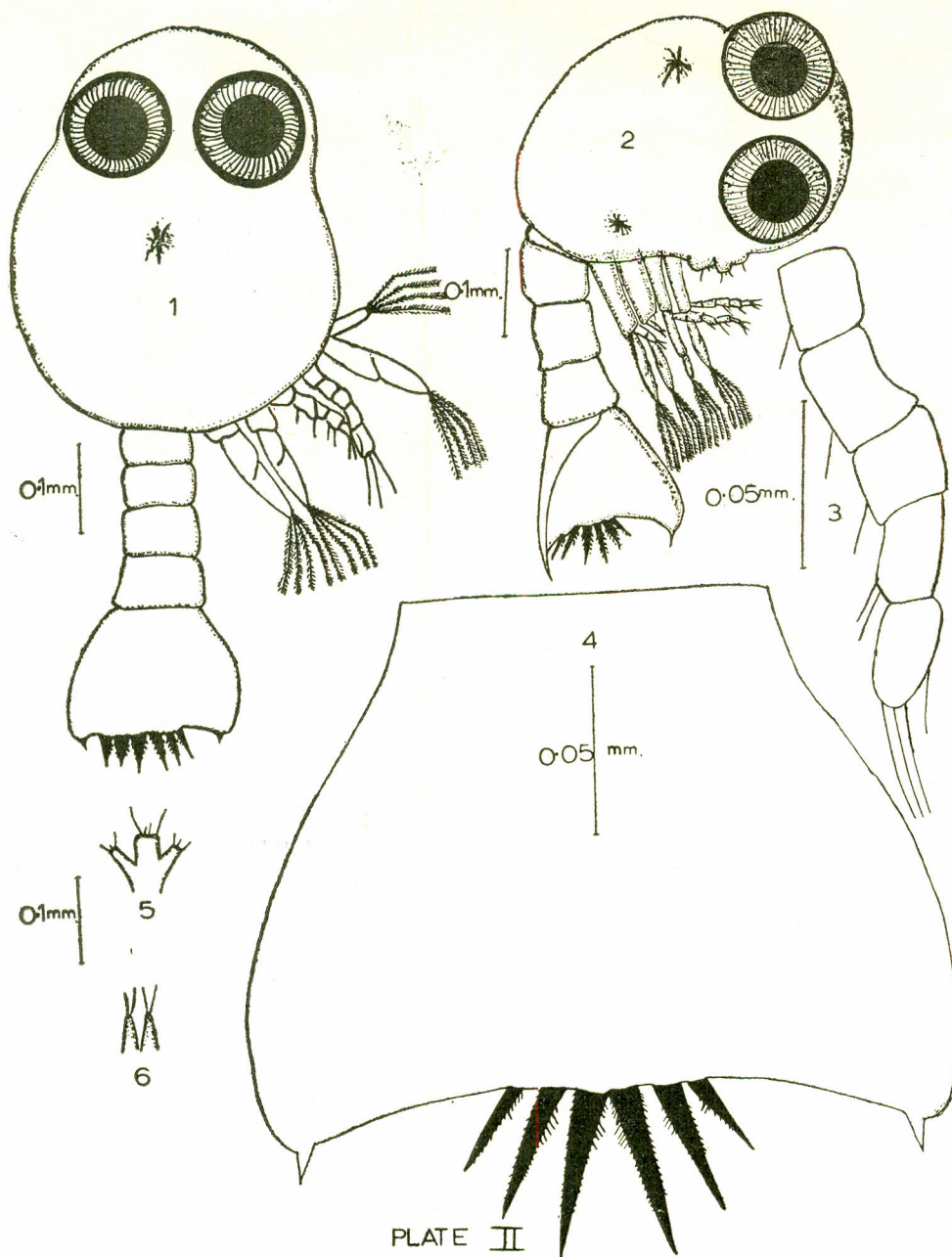
Total length from front to the tip of telson = 1.136 mm.
Length of dorsal spine = 0.756 mm.

Length of rostral spine = 0.756 mm.
Distance between the tip of the dorsal spine to the tip of the rostral spine = 1.945 mm.
Length of abdomen including telson = 0.159 mm.
Length of telson = 0.265 mm.

Description of First Zoea of Leucosia pubescens (Miers) Plate II.—Following are the diagnostic characters of the first zoea of *Leucosia pubescens*: Dorsal, rostral, and lateral spines are absent; telson flat not deeply forked; lateral margin of telson entire, curved, ends posteriorly in a spine; six setae on the posterior margin of telson of which the middle pair of setae are longer than the extreme pairs. All the six setae are bipinnate. Thoracic region round; subequal abdominal segments without marginal spines. Primary chromatophores (Fig. 2) apparent even after preservation of the larvae in 5% formaline. Pigments are found on the dorsal and lateral surface of carapace. Eyes are well pigmented. Regions and margins of carapace are smooth. Antennules (Fig. 6) very small, without hairs; antenna is also very small but it is slightly

longer than the antennules. First maxilliped (Fig. 2) with setae on exopod; setae extended and plumose; the endopodite is five segmented and is

armed with 1-1-1-2-4 pre-axial setae from proximal to distal segments. Second maxilliped (Fig. 2) with endopodite armed with 1-1-2 pre-axial setae



Figs. 1, First Zoea of *Leucosia pubescens* (Miers) (dorsal view); 2, First Zoea (lateral view); 3, Endopodite of first maxilliped; (enlarged); 4, Telson (enlarged); 5, First maxilla; 6, Antennule.

from proximal to distal segments.

The following measurements are taken from preserved specimen.

Total length=0.857 mm.

Length of telson=0.18 mm.

Length of abdomen including telson=0.428 mm.

Carapace length=0.428 mm.

Breadth of telson (greatest)=0.214 mm.

Breadth of telson (smallest)=0.11 mm.

Length of largest middle spine of telson=0.04 mm.

Length of abdominal segments (average)=0.1 mm.

Description of First Zoeae of Philyra globosa (Fabricius) as given by Chhapgar.—The carapace is rounded. Dorsal spine is slightly longer than the rostrum and is straight; no lateral spines. The antenna is a rudimentary stump without any aesthetes. The maxillae are drawn closely up against the body. The first maxilla consists of a short, narrow, one jointed exopodite bearing two setae distally and one in the middle; and two large, broad endites bearing six and four setae. The first maxilliped consists of a short

base with an exopodite of two segments bearing four long non-plumose setae, and an endopodite of five segments with four short hairs at the tip and several other along it. The four hairs at the tip of the exopodite are constant, and indicative of the first zoea. The second maxilliped is similar to the first except that endopodite has only one segment with two short hairs at the tip.

The abdomen consists of five segments and a telson. It bears a pair of hook-like lateral knobs on the second segment and a pair of rounded knobs on the third segment. There is also a pair of irregularly oval pigmented spots on the fourth and fifth segments on the base of the telson and one below and behind the dorsal spine. The telson is in the form of a flat triangular plate, with six setae in the centre, and a lateral spine on each side. The setae are plumose in their basal half and naked distally. The fifth abdominal segment is slightly constricted where it joins the telson.

Measurements.—Body length=1.26 mm.; Body width=0.4 mm.; Dorsal spine=0.33 mm.; Rostral spine=0.26 mm.;

Comparison.—First zoea of *P. corallicola* is compared with the zoea of *P. globosa* in Table I.

TABLE I.

| <i>S. No.</i> | <i>Philyra globosa</i> | <i>Philyra corallicola</i> |
|---------------|--|--|
| (1) | (2) | (3) |
| (1) | Body length = 1.26 mm. Body width = 0.4 mm. Length of dorsal spine = 0.330 mm. Length of rostral spine = 0.26 mm. | Body length = 1.136 mm. Body width = 0.546 mm. Length of dorsal spine = 0.756 mm. Length of rostral spine = 0.756 mm. |
| (2) | Carapace is short and round. Dorsal spine is slightly longer than the rostral spine and is straight. | Carapace is short and angular. Dorsal spine and rostral spine are equal in length and are straight. |
| (3) | First maxilliped consists of a short base with an exopodite of two segments leaving four long non-plumose setae and an endopodite of five segments with four short hairs at the tip. | First maxilliped consists of a large base and two segmented exopodite and is equipped with four terminal fans of long feather-like bristles and endopodite of five segments equipped with non-plumose setae. |
| (4) | Second maxilliped has one segmented endopodite with short hairs at the tip. | Second maxilliped has two segmented endopodites with two short hairs at the tip. |
| (5) | Rudiments of chelipeds have appeared as buds. | No rudiments of chelipeds are seen. |

continued:—

Table 1 Continued:—

| (1) | (2) | (3) |
|---|---|-----|
| (6) Abdomen bears five segments and a telson; it bears a pair of hook-like lateral knobs on the second segment and a pair of round knob on the third segment. | Abdomen bears five segments on a telson. It does not possess any lateral hook at second segment nor knob at the third segment. | |
| (7) A pair of irregularly oval pigmented spots on the fourth and fifth segments on the base of the telson and one below and behind the dorsal spine. | There are massess of pigments on the dorsal side of the segments; telson is devoid of pigments. | |
| (8) Telson is flat triangular plate with six setae is the centre, and a lateral spine on each side. The setae are plumose on their basal half and naked distally. | Telson is flat, forked and plate-like. The outer margin is cut near the tip of the fork twice on either side; between the forks of telson are six plumose setae, middle pair is longer, terminal one smaller. | |
| (9) Fifth abdominal segment is slightly constricted. | Fifth abodominal segment simply joins the telson, without making a constriction. | |

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