

## EARLY DEVELOPMENTAL STAGES OF LEPTODIUS EXERATUS (MILNE EDWARDS)

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Early development stages of *Leptodius exeratus*, reared in the laboratory have been described. Stages of egg till the time of hatching have also been studied. Prezoa, first zoea and second zoea have been illustrated and described.

### 1. Introduction

Three species of *Leptodius* occurring in the Karachi area are: *L. exeratus* (Milne Edwards) *L. crossimanus* (Milne Edwards) *L. euglyptus quadripinosus* (Chhappgar). *Leptodius exeratus* is very common and found on the shores having loose pebbles and stones. There is no record of any previous work done on the life history of this species from this area.

### 2. Materials and Method

*Leptodius exeratus* occurs commonly at low water under loose stones. Berried females were obtained from under the stones which were submerged even at low tide. Specimen were carried to the laboratory in sea water and transferred to glass aquaria. The berried crabs may be classified into four groups: (i) Early stage in which eggs are very small and mostly of yellowish colour (ii) Medium stage in which eggs are more developed and become pale or light brown (iii) Mature stage, in which the eggs become well developed having black spot in the middle. (iv) Spent stage, in this stage the eggs rupture by the movement of the abdomen of female crab and the prezoal come-out. It was not always easy to distinguish between the four types except the last one which is more clearly marked out due to the colour and black spots. On September 3rd, the majority of the female crabs were berried of first stage and on October 15th large numbers were found 'spent'. In the same way from April 14th to June 28th there was a large proportion of early and medium stages. Reference to previous work reveals that females become mature with carapace width of approximately 11 mm. The size at which sexual maturity is attained in male has not been ascertained definitely.

The female crabs of spent state were reared in glass aquaria. Since there was no arrangement of circulation of sea water it was changed every 24 hours. It is observed that female crabs of spent state do not feed at all in the aquarium.

The larvae upon hatching swim to the surface of water. They were removed with a pipette and placed in large beakers of freshly obtained sea water, stirred with an electrically operated propeller for aeration.

The larvae were examined every twelve hours and, when any change was observed, some of them were preserved in 70% alcohol. Dead material and sloughed skins were removed or the active larvae transferred to a fresh container already supplied with fresh sea water with some phytoplankton.<sup>3</sup> Fume spent in each stage varies and depends considerably on the relative abundance of food, temperature and salinity of the water and on other factors.

The eggs hatched, while still attached to abdomen, into prezoal which do not swim or move actively except for a little movement of the abdomen. This stage lasts about two to three hours. The first zoea stage, in favourable conditions lasts from two to three days and during this stage larva grows in size. It moults, and becomes second zoea. This stage lasts from four to five days.

### 3. Early Developmental Stages

*Eggs*.—In the early stage the eggs are 0.82 mm. in diameter. In this stage two layers are quite clear (Plate I, Fig. 1). Mature egg is 1.0 mm. in diameter and the eye spot is quite distinct (Plate I, Fig. 2). Pigments are formed and two layers of the egg seem more prominent. The egg of spent stage measured 1.44 mm. in diameter and is the most developed stage of the eggs. (Plate I, Fig. 3). At this stage the outer wall of the egg ruptures by jerks of the abdomen of the female crab and the first and second maxillipeds emerge; eyes are quite prominent and the abdominal segments can be demarcated.

*Prezoa*.—Prezoa is obtained from the spent state; it measures 1.04 mm. in breadth and 2.3 mm. in length; breadth of telson is 0.54 mm. Telson is not forked and does not bear any hair

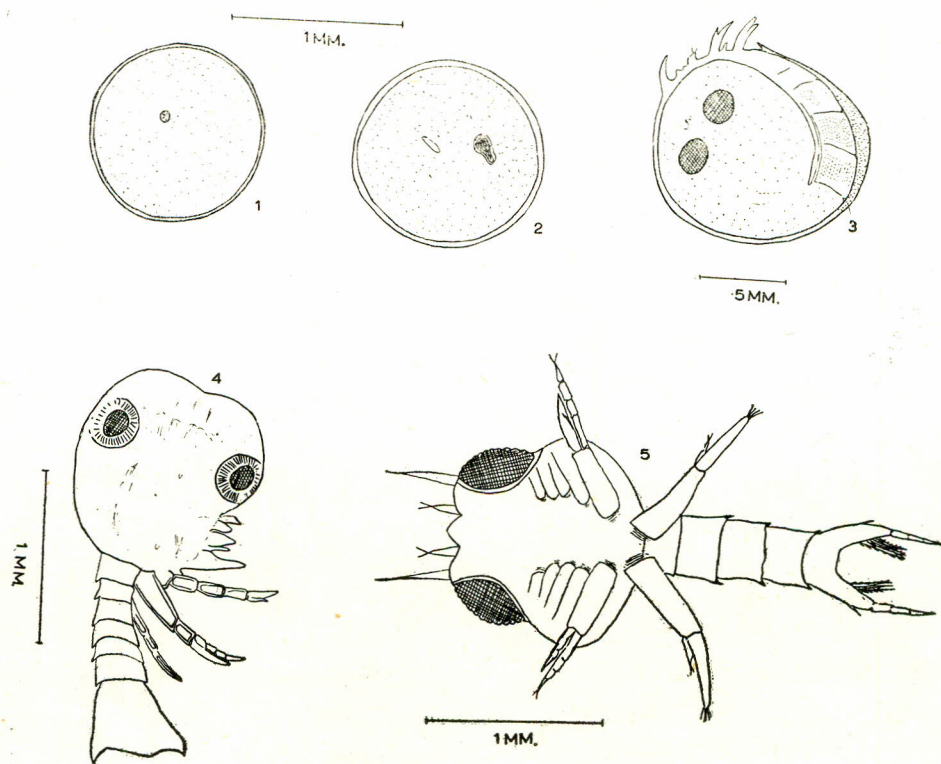


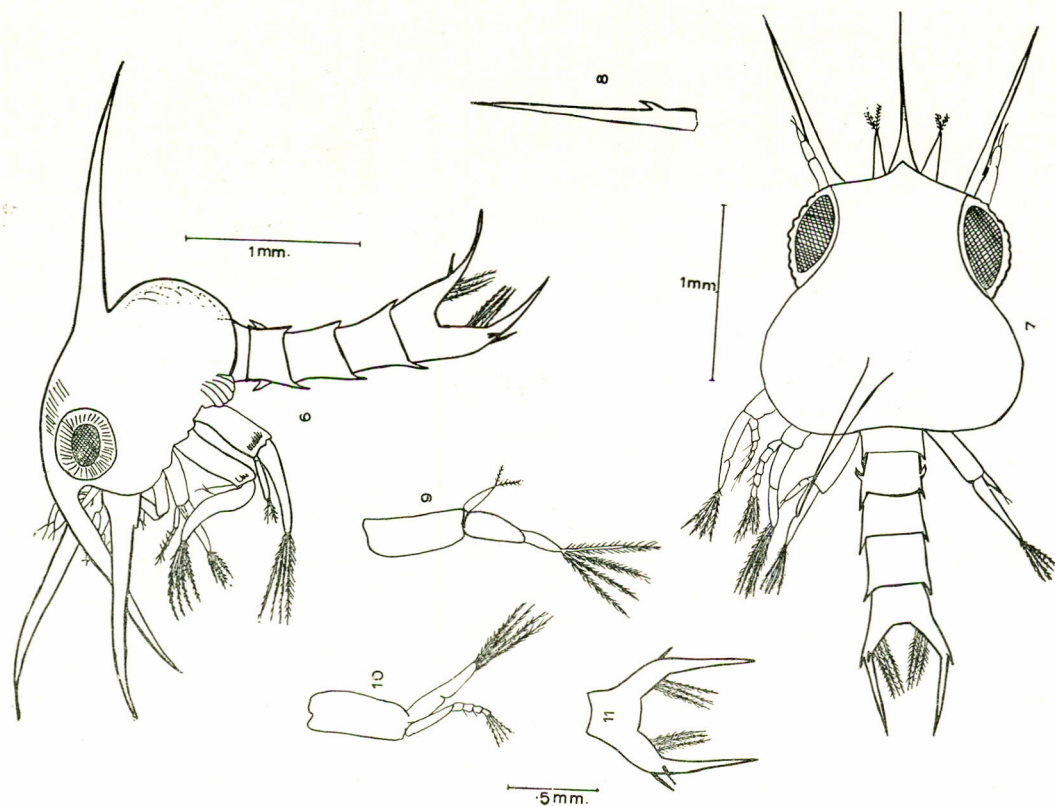
Plate I. *Leptodius exeratus* (Milne Edwards).

(Fig. 1. Medium state. 2. Mature state. 3. Spent state. 4. Prejoa (Dorsolateral view). 5. First Zoea (Ventral view).

or seta. First and second maxillipeds are without setae or swimming hairs. It is still enclosed in the transparent cuticle that covers the spines which appears at the first moult. Sandoz and Hopkins (1944) state that emergence in the prezoal stage results from unfavourable conditions at the time of hatching (Plate I, Fig. 4).

There are four zoeal stages of *Leptodius exeratus* but only two are dealt with here. The first free larva is a typical zoea, measuring 2.90 mm. in length (Plate I, Fig. 5). (Length is measured from the tip of the rostrum to the tip of the telson, excluding the spines). Both the lateral spines are slightly curved, breadth of the carapace is 1.2 mm. First and second maxillipeds are briamous. There are four long terminal setae or 'swimming hairs' on the exopodite. The endopodite is four jointed and the segments are of unequal length. No setae are present at this stage. Abdomen shows only five segments, the last one being fused with telson. The pleopods have not developed yet. Telson is deeply forked with three pairs of long setal spines between the forks and one pair of short spine on outer side of each of the fork (Plate I, Fig. 5).

*Second Zoea.*—It measures 3.32 mm. in length (Plate I, Fig. 6) and 1.46 mm. in breadth of the carapace. Breadth of the telson is 0.45 mm. and frontal spine 1.22 mm. in length. The second abdominal somite has a pair of lateral hooks, but there are no lateral spines on other somites. Essentially it is like the first zoea except that there is a joint at the end of each seta of first and second maxillipeds (Plate II, Figs. 9, 10). Rudiments of the thoracic and abdominal segments are distinct with short backwardly projecting spines on the posterior sides of each segment. One additional spine on the left side of the fork of telson is developed (Plate II, Fig. 11). The posterior spine of the carapace is slightly curved and has an average length of 1.22 mm. The rostral spine is about of the same length but it is almost straight and pointed (Plate II, Fig. 7). There is one pair of short lateral spines on the carapace. The right lateral spine bears small hook near base (Plate II, Fig. 8). The maxillipeds are similar to those of the first zoea except that there are five segments of endopodite of first maxillipeds; all are of unequal length (Plate II, Fig. 6). There are four long terminal setae or swimming hairs on the exopodite, each having a joint at its distal end.



**Plate 2.** *Leptodius exeratus* (Milne Edwards).  
 (Fig. 6. Second Zoea (Lateral view). 7. Second Zoea (Dorsal view).  
 8. Right lateral spine of second Zoea. 9. Second maxilliped.  
 10. First maxilliped. 11. Telson).

It has been possible to get the second zoea moulted in the laboratory only to the third ozeal stage.

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