

## THE BRACHYURAN LARVAE OF WEST PAKISTAN HATCHED IN THE LABORATORY

Part III.—Portunidae: *Thalamita* (Decapoda: Crustacea)

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Three species of genus *Thalamita* have been hatched in the laboratory and early larval stages obtained, figured and described. Prezoa and first zoea of *T. crenata* (Milne-Edwards), *T. prymna* (Herbst), and first and second zoea of *T. admeta* (Herbst) are described.

**Introduction**

Out of 19 species of family Portunidae, recorded from Karachi,<sup>1,2</sup> three belonged to the genus *Thalamita*, which are dealt herewith. Only prezoa and first zoea of *T. crenata* (Milne-Edwards) have been described by Prasad and Tampi<sup>3</sup> and criticized by Chhapgar.<sup>4</sup> Description of the prezoa and first zoea of *T. prymna* (Herbst) and first and second zoea of *T. admeta* (Herbst) is new to science.

Lebour<sup>5</sup> reared *Portunus puber* (L.) and many workers described larvae of *Carcinus maenas* (Penn.) in Britain; Churchill,<sup>6</sup> Hopkins<sup>7,8</sup> and Costlow, Rees and Bookhout<sup>9,10</sup> described the larvae of *Callinectes sapidus* (Rathbun) in America; Aikawa<sup>11,12,13</sup> worked on the Genus *Portunus* and *Charybdis*; Arriola,<sup>14</sup> on *Scylla serrata*; Yatsuzuke<sup>15</sup> on *Charybdis japonica*; Prasad and Tampi<sup>3</sup> on *Neptunus pelagicus*; Naidu<sup>16</sup> on *Neptunus sanguinolentus* and *Scylla serrata*; Chhapgar<sup>4</sup> *N. sanguinolentus*, *N. pelagicus* and *Charybdis orientalis*; and Sin<sup>17</sup> on *Scylla serrata* but the genus *Thalamita* has so far been neglected.

**Materials and Method**

Ovigerous females of *T. crenata*, *T. prymna* and *T. admeta* were collected from Buleji rocks, Manora island, Break waters, West Wharf, and Korangi creek, Karachi during 1964-65.

Rearing methods were used as described by Costlow and Bookhout.<sup>10</sup> Temperature and salinity were maintained at 30°C and 35 ppt respectively throughout the experiments.

**Moulting Periods.**—Eggs of *T. crenata* and *T. prymna* hatched into prezoa which moulted after 6-7 hr into the first zoea which could not survive longer than 3 days and died without moulting. Eggs of *T. admeta* hatched into first zoea and no prezoal stage was found. First zoea hatched after 5 days into the second zoea which died after 2 days before moulting.

1. *Thalamita crenata* (Milne-Edwards)

**Prezoa:** It is 1937 $\mu$  in total length; the dorsal spine is longer than the rostral spine of the cephalothorax (220 and 191 $\mu$  respectively); rudimentary lateral spines (58 $\mu$ ) emerge on the cephalothorax.

**Abdomen:** Pair of lateral knobs of the second segment point outwards and of the third segment bent downwards; postero-lateral spines of three to five segments overlap the next; telson fork depth is slightly more than its body length (117 and 103 $\mu$  respectively); one small and one large spine on the prong of the telson.

**Antennule:** is short (88 $\mu$ ) and bears two aesthetes and one seta.

**Antenna:** Protopodite (191 $\mu$ ) is as long as the rostral spine of the cephalothorax; bears small teeth; exopodite (58 $\mu$ ) bears two setae.

**Mandible** bears four large and several small teeth on dorsal and ventral side.

**Maxillule** bears six plumose setae on coxal endite; five setose spines on basal endite; six long plumose setae on terminal and one small seta on basal segment of the endopodite.

**Maxilla** bears four (2+2) plumose setae on coxal endites; six setae (3+3) on basal endites; two terminal and two sub-terminal setae on the endopodite; four thick plumose setae emerge on the margin of scaphognathite which terminates as a thick setose spine.

**First maxilliped** has no seta on the basis; four swimming setae emerge on the exopodite; five segmented endopodite has setation 3,2,1,2,4+1 respectively.

**Second maxilliped** has no seta on the basis; four swimming setae emerge on the exopodite; three segmented endopodite bears 1,1,5 setae respectively.



First zoea (Fig. 2) is  $1544\mu$  in length; the dorsal spine is longer than the rostral spine of the cephalothorax ( $367$  and  $264\mu$  respectively); a pair of lateral spines is present ( $100\mu$ ) (Figs. 1a and c) eight to ten sharp and small teeth on postero-lateral margin.

Abdomen (Figs. 1 d and f); Pair of lateral knobs of second segment blunt and pointing outwards and of third segment pointed and bent downwards; postero-lateral spines of segments three and four are long and segment five small; telson (Fig. 1 e); fork depth is more than its body length ( $191$  and  $117\mu$  respectively); one small lateral and one large dorsal spine on the prong of telson.

Antennule (Fig. 2 a) ( $100\mu$ ) bears two long aesthetes and one small seta.

Antenna: (Fig. 2b) Protopodite ( $264\mu$ ) is as long as the rostral spine of the cephalothorax; long, sharp teeth on either side of the distal half; exopodite ( $132\mu$ ) bears two setae.

Mandible (Fig. 2c) bears four large and several small teeth on dorsal and ventral sides.

Maxillule (Fig. 2d) bears six ( $2+4$ ) plumose setae on coxal endites; five setose spines on basal endite; six long plumose setae on terminal, one small seta on basal segment of the endopodite.

Maxilla (Fig. 2e) bears four ( $2+2$ ) plumose setae on coxal endites; eight ( $4+4$ ) on basal endites; five ( $3+2$ ) setae on the unsegmented endopodite; four long and thick plumose setae on the margin of scaphognathite which terminates as a long and thick setose spine.

First maxilliped (Fig. 2f) has nine plumose setae on the basis; four setae on the exopodite; five segmented endopodite has setation  $2,2,1,2,4+1$  respectively.

Second maxilliped (Fig. 2g and h) has three plumose setae on the basis; four swimming setae on the exopodite; three segmented endopodite bears  $1,1,5$  setae respectively.

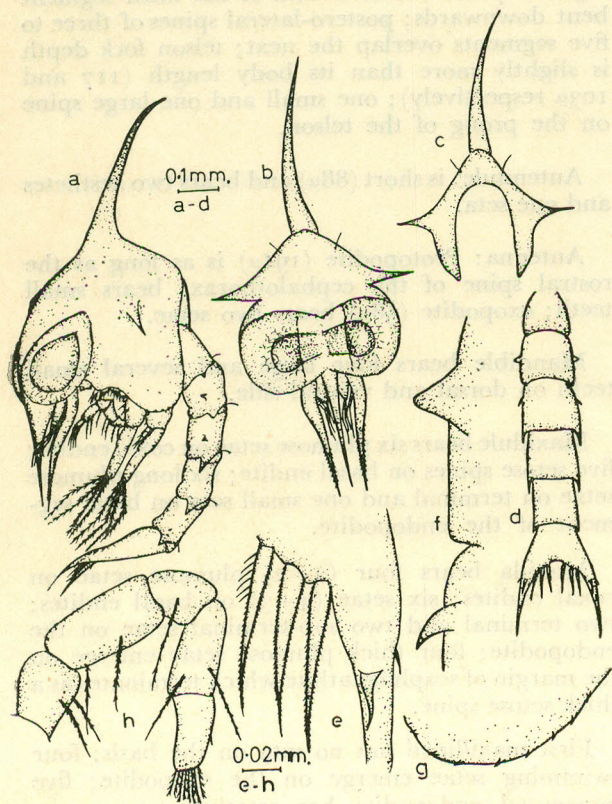


Fig. 1.—First zoeal stage of *Thalamita crenata* (Milne—Edwards). (a) Side view of first zoea; (b) front view of cephalothorax; (c) back view of cephalothorax; (d) abdomen plus telson; (e) prong of telson; (f) lateral knob and hook of second and third abdominal segments; (g) lateral margin of cephalothorax; (h) endopodite of first maxilliped.

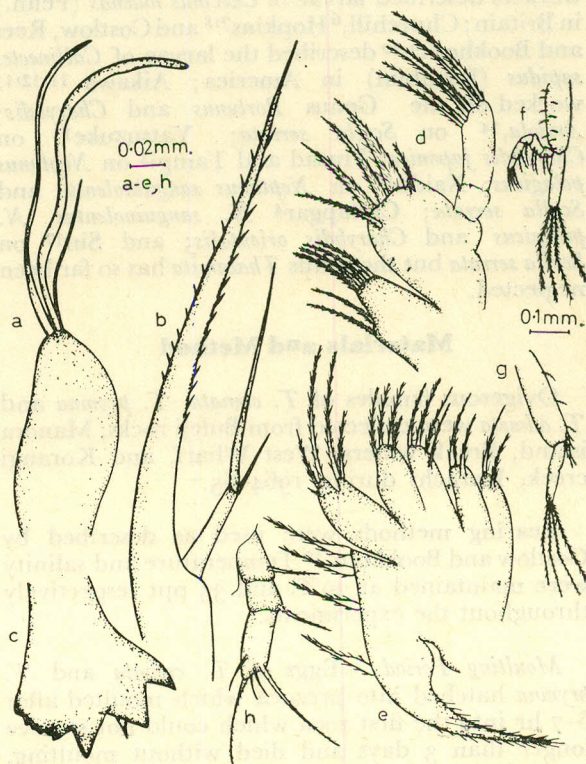


Fig. 2.—Limbs and mouth parts of first zoeal stage of *Thalamita crenata* (Milne—Edwards). (a) Antennule; (b) antenna; (c) mandible; (d) maxillule; (e) maxilla; (f) first maxilliped; (g) second maxilliped; (h) endopodite of second maxilliped.



2. *Thalamita prymna* (Herbst).

Prezoea: It is  $1397\mu$  in length; the dorsal spine is longer than the rostral spine of the cephalothorax ( $150$  and  $200\mu$  respectively); rudimentary lateral spines also emerge ( $73\mu$ ) at right angles to the cephalothorax.

Abdomen: Pair of lateral knobs of second segment pointing upwards and of third segment, downwards; postero-lateral margins of segment three only extend as small spines; telson fork depth is more than its body length ( $147$  and  $117\mu$  respectively).

Antennule is short ( $117\mu$ ); bears three aesthetes.

Antenna: Protopodite ( $220\mu$ ) is longer than the rostral spine of the cephalothorax; bears teeth on the distal spine; exopodite ( $100\mu$ ) bears two setae.

Mandible bears six large teeth.

Maxillule bears four plumose setae on coxal endite; five thick setose spines on basal endite;

six long plumose setae on terminal and one small seta on basal segment of the endopodite.

Maxilla bears nine ( $4+5$ ) plumose setae on coxal endites; eight ( $4+4$ ) on basal endites; three terminal and two sub-terminal setae on unsegmented endopodite; four thick plumose setae on the margin of scaphognathite which terminates as a long setose spine.

First maxilliped has eleven plumose setae on the basis; four swimming setae emerge on the exopodite; five segmented endopodite has setation  $3,2,1,2, 4+1$  respectively.

Second maxilliped has three setae on the basis; four swimming setae emerge on the exopodite; three segmented endopodite bears  $1,1,4$  setae respectively.

First zoea (Fig. 3 and 4). It is  $1544\mu$  in length; the dorsal spine is longer than the rostral spine of the cephalothorax ( $441$  and  $294\mu$  respectively); a pair of lateral spines ( $88\mu$ ) present (Fig. 3 a and b).

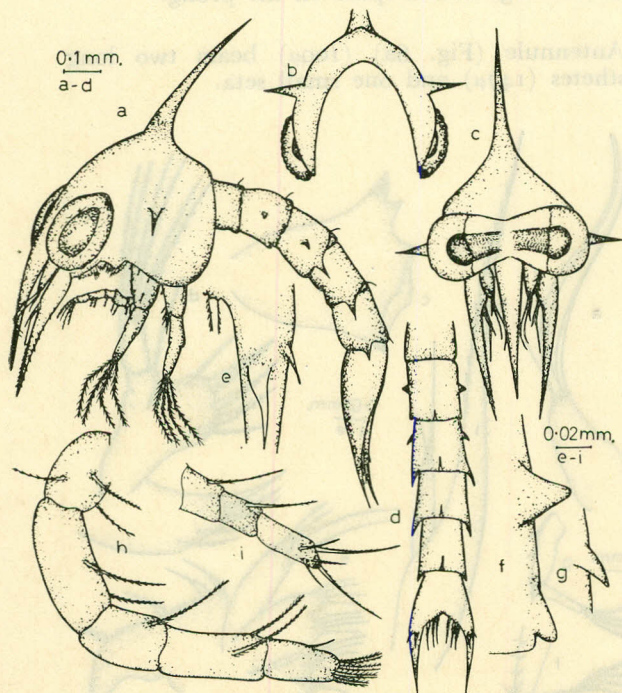


FIG. 3.—First zoeal stage of *Thalamita prymna* (Herbst). (a) Side view of first zoea; (b) back view of cephalothorax; (c) front view of cephalothorax; (d) abdomen plus telson; (e) prong of telson; (f) lateral knob of second abdominal segment; (g) lateral hook of third abdominal segment; (h) endopodite of first maxilliped; (i) endopodite of second maxilliped.

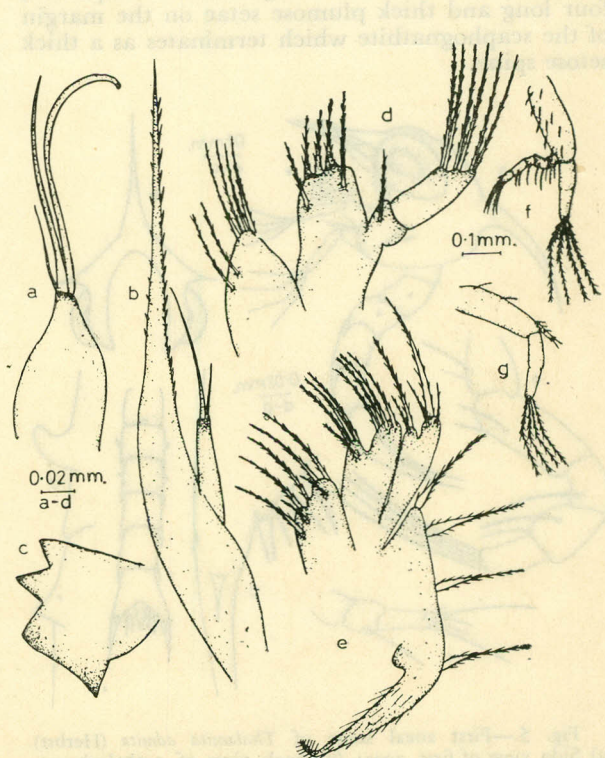


FIG. 4.—Limbs and mouth parts of first zoeal stage of *Thalamita prymna* (Herbst). (a) Antennule; (b) antenna; (c) mandible; (d) maxillule; (e) maxilla; (f) first maxilliped; (g) second maxilliped.



Abdomen (Fig. 3 d, f and g): Lateral knobs of segment two blunt and pointing outwards and of segment three pointed and bent downwards; postero-lateral spines of three to five segments overlap the next; telson (Fig. 3e): fork depth is more than its body length (195 and 128 $\mu$  respectively); one small lateral spine and one large dorsal spine present on the prong.

Antennule (Fig. 4a) (117 $\mu$ ) bears two long aesthetes (147 $\mu$ ) and one small seta.

Antenna: (Fig. 4b) Protopodite (367 $\mu$ ) is longer than the rostral spine of the cephalothorax; bears small teeth on either side of the distal half; exopodite (100 $\mu$ ) bears two setae.

Mandible (Fig. 4c) bears four large teeth.

Maxillule (Fig. 4d) bears six (2+4) plumose setae on coxal endite; five thick setose spines on basal endite; six long plumose setae on terminal and one small seta on the basal segment of the endopodite.

Maxilla (Fig. 4e) bears seven (3+4) plumose setae on coxal endites; eight (4+4) setae on basal endites; three terminal and two sub-terminal plumose setae on the unsegmented endopodite; four long and thick plumose setae on the margin of the scaphognathite which terminates as a thick setose spine.

First maxilliped (Fig. 4f and 3 h) has eleven plumose setae on the basis; four swimming setae on the exopodite; five segmented endopodite has setation of 3,2,1,2, 4+1 respectively.

Second maxilliped (Fig. 4g and 3i) has three setae on the basis; four swimming setae on the exopodite; setation of the three segmented endopodite is 1,1,5 respectively.

### 3. *Thalamita admeta* (Herbst) (Fig. 5-8).

First zoea (Fig. 5 and 6). It is 1397 $\mu$  in total length; the dorsal spine is longer than the rostral spine of the cephalothorax (404 and 301 $\mu$  respectively); a pair of lateral spines (88 $\mu$ ) (Fig. 5 a and b).

Abdomen: (Fig. 5c and d) Pair of lateral knobs of second segment pointing upwards and of third segment pointing outwards; postero-lateral margin of segments three to five extend as downwardly pointed spines, overlapping the next segment; telson (Fig. 5g): fork depth is more than its body length (205 and 89 $\mu$  respectively); one small lateral and one large dorsal spine on the prong.

Antennule (Fig. 6a) (100 $\mu$ ) bears two long aesthetes (147 $\mu$ ) and one small seta.

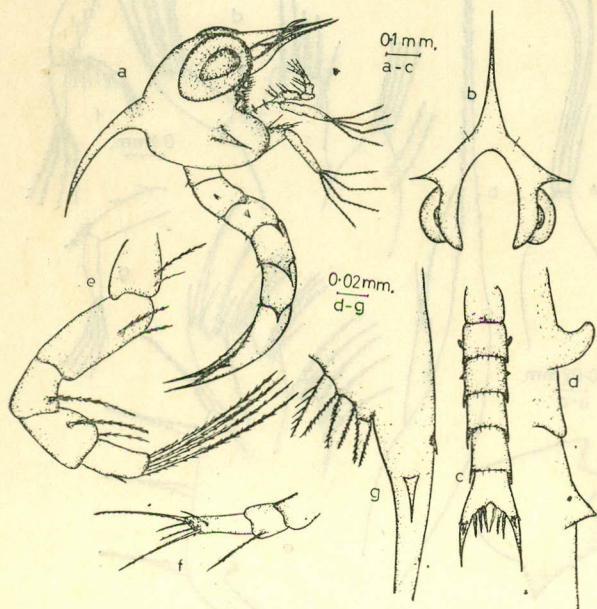


Fig. 5.—First zoeal stage of *Thalamita admeta* (Herbst). (a) Side view of first zoea; (b) back view of cephalothorax; (c) abdomen plus telson; (d) lateral knob and hook of second and third abdominal segments; (e) endopodite of first maxilliped; (f) endopodite of second maxilliped; (g) prong of telson.

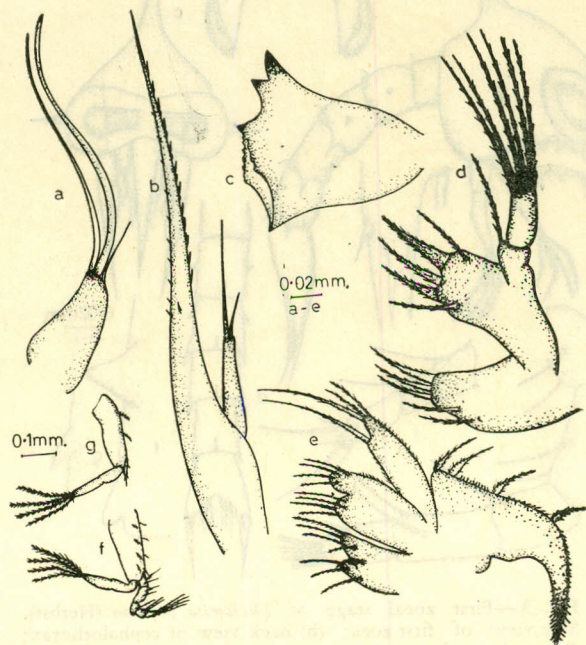


Fig. 6.—Limbs and mouth parts of first zoeal stage of *Thalamita admeta* (Herbst). (a) Antennule; (b) antenna; (c) mandible; (d) maxillule; (e) maxilla; (f) first maxilliped; (g) second maxilliped.



Antenna (Fig. 6b): Protopodite ( $304\mu$ ) is scanty larger than the rostral spine of the cephalothorax; bears sharp long teeth on either side of the distal half and one on the dorsal surface in the middle; exopodite ( $117\mu$ ) bears two setae.

Mandible (Fig. 6c) it bears four large and several small teeth on dorsal and ventral sides.

Maxillule (Fig. 6d) bears five ( $2+3$ ) plumose setae on coxal endites; five setose spines on basal endite; six long plumose setae on terminal and one small seta on the basal segment of the endopodite.

Maxilla (Fig. 6e) bears eight ( $3+5$ ) plumose setae on coxal endites; eight ( $4+4$ ) setae on basal endites; three terminal and one sub-terminal plumose setae on the unsegmented endopodite; four thick plumose setae on the margin of scaphognathite which terminates as a thick setose spine.

First maxilliped (Figs 6f and 6g) has eight plumose setae on the basis; four swimming setae on the exopodite; setation of the five segmented endopodite is 2, 2, 1, 2, 4+1.

Second maxilliped (Figs. 6g and 5f) has two plumose setae on the basis; four swimming setae on the exopodite; three segmented endopodite has 0, 1, 5 setae respectively.

Second zoea (Fig. 7 and 8). It is  $1691\mu$  in total length; the dorsal spine is longer than the rostral spine of the cephalothorax ( $477$  and  $382\mu$  respectively) the lateral spines are well-developed ( $100\mu$ ) now in this stage (Fig. 7a and c); eyes have become stalked (Fig. 7b); lateral knobs of segments two and three are shown in figures 7e and f; two small spines are added to inner surface of the telson (Fig. 7 d and g).

Antennule (Fig. 8a) has four aesthetes ( $220\mu$ ) and one seta.

Antenna (Fig. 8b and c) has a bifurcation near the tip of the protopodite.

Mandible (Fig. 8d) has five large teeth.

Maxillule (Fig. 8e) bears six ( $2+4$ ) plumose setae on the coxal endites; six setose spines on the basal endite.

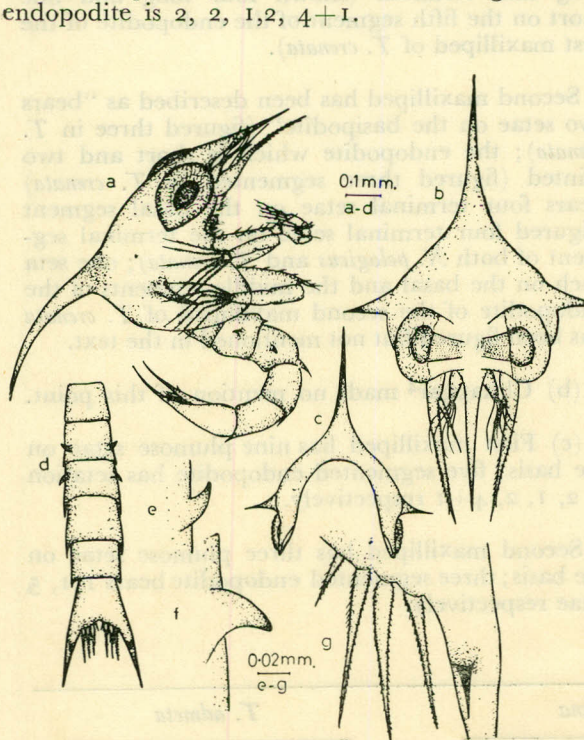


Fig. 7.—Second zoeal stage of *Thalamita admita* (Herbst). (a) Side view of second zoea; (b) front view of cephalothorax; (c) back view of cephalothorax; (d) abdomen plus telson; (e) lateral knob of second abdominal segment; (f) lateral hook of third abdominal segment; (g) prong of telson.

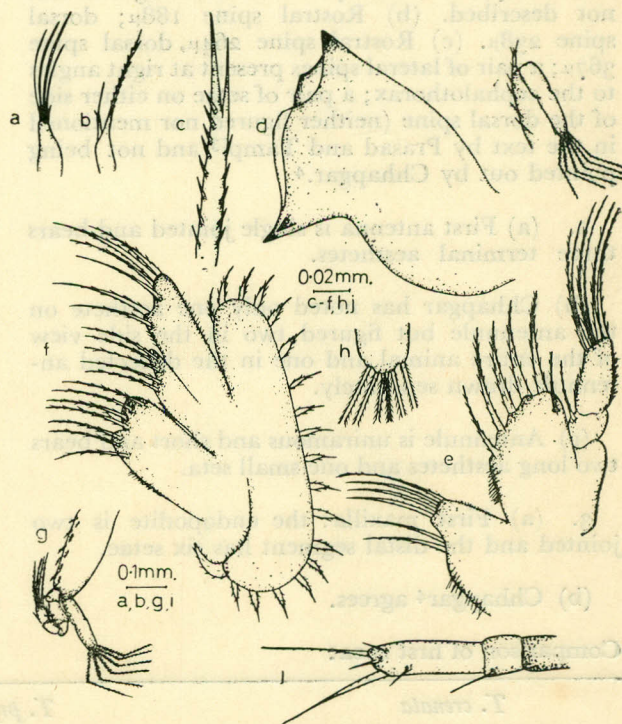


Fig. 8.—Limbs and mouth parts of second zoeal stage of *Thalamita admita* (Herbst). (a) Antennule; (b) antenna; (c) tapered process formed by the protopodite of antenna; (d) mandible; (e) maxillule; (f) maxilla; (g) first maxilliped; (h) tip of exopodite of first maxilliped; (i) second maxilliped; (j) endopodite of second maxilliped.



Maxilla (Fig. 8f) has seven (3+4) plumose setae on the coxal endites; five (2+3) setae on the basal endites; four terminal and two sub-terminal plumose setae on the endopodite; eighteen thick plumose setae are on the margin of the scaphognathite which terminates as a thick setose spine.

First maxilliped (Fig. 8 g and h) has six terminal swimming setae on the exopodite.

Second maxilliped (Fig. 8 i and j) has six swimming setae on the exopodite; three segmented endopodite has 0, 1, 5 setae respectively.

### Discussion

The description of the prezoa and first zoea of *T. crenata* by Prasad and Tampi<sup>3</sup> based upon larvae, hatched from eggs, has some discrepancies which are listed below. Observations of Prasad and Tampi being designated as (a) and criticism of Chhapgar<sup>4</sup> as (b) and those found in this study as (c).

1. (a) Rostral spine 230 $\mu$ ; dorsal spine 275 $\mu$  (it is described as posterior spine, which has a curved tip); lateral spine has been figured but not described. (b) Rostral spine 188 $\mu$ ; dorsal spine 238 $\mu$ . (c) Rostral spine 264 $\mu$ , dorsal spine 367 $\mu$ ; a pair of lateral spines present at right angles to the cephalothorax; a pair of setae on either side of the dorsal spine (neither figured nor mentioned in the text by Prasad and Tampi<sup>3</sup> and not being pointed out by Chhapgar<sup>4</sup>).

2. (a) First antenna is single jointed and bears three terminal aesthetes.

(b) Chhapgar has noted only one aesthete on the antennule but figured two in the side view of the entire animal and one in the dissected antennule drawn separately.

(c) Antennule is uniramous and short and bears two long aesthetes and one small seta.

3. (a) First maxilla: the endopodite is two jointed and the distal segment has six setae.

(b) Chhapgar<sup>4</sup> agrees.

(c) Maxillule (described as first maxilla by Prasad and Tampi,<sup>3</sup> bears six long plumose setae on terminal and one small seta on the basal segment of the endopodite.

4. (a) Second maxilla 'the endopodite bears only four setae.'

(b) No objection raised by Chhapgar.<sup>4</sup>

(c) Maxilla (described as second maxilla by Prasad and Tampi,<sup>3</sup> bears five (3+2) setae on the endopodite.

5. (a) First and second maxilliped have the same structure as those of the first zoea of *N. pelagicus* (the first maxilliped of *N. pelagicus* has been described, however, as having five setae on the basipodite but shown six setae on the basipodite of first maxilliped of *T. crenata*; the endopodite is five jointed; two setae are present on the proximal segment (only one setae shown in the figure of the first maxilliped of *T. crenata*) as well as the second segment which is the longest; the third segment has no setae while the fourth bears two setae and of the five on the last segment three are long and terminal (shown four long and one short on the fifth segment of the endopodite of the first maxilliped of *T. crenata*).

Second maxilliped has been described as "bears two setae on the basipodite" (figured three in *T. crenata*); the endopodite which is short and two jointed (figured three segmented in *T. crenata*) bears four terminal setae on the basal segment (figured four terminal setae on the terminal segment of both *N. pelagicus* and *T. crenata*); one seta each on the basal and the middle segments of the endopodite of the second maxilliped of *T. crenata* has been figured but not mentioned in the text.

(b) Chhapgar<sup>4</sup> made no mention of this point.

(c) First maxilliped has nine plumose setae on the basis; five segmented endopodite has setation 2, 2, 1, 2, 4+1 respectively.

Second maxilliped has three plumose setae on the basis; three segmented endopodite bears 1, 1, 5 setae respectively.

### Comparison of first zoea:

<i>T. crenata</i>	<i>T. prymna</i>	<i>T. admeta</i>
Total length 1544 $\mu$	Total length 1544 $\mu$	Total length 1397 $\mu$
Dorsal spine 367 $\mu$	Dorsal spine 441 $\mu$	Dorsal spine 404 $\mu$
Rostral spine 264 $\mu$	Rostral spine 294 $\mu$	Rostral spine 301 $\mu$

(Continued)



(Continued from page 80)

Eight to ten sharp and small teeth on the postero-lateral margin of the cephalothorax.	No such teeth.	No such teeth.
Pair of lateral knobs of the second segment blunt and pointing outwards and of the third segment pointed and bent downwards.	Pair of lateral knobs of the second segment blunt and pointing outwards and of third segment pointed and bent downwards.	Pair of lateral knobs of the second segment pointing upwards and of third segment pointing outwards.
Protopodite of antenna as long as the rostral spine of the cephalothorax.	Protopodite of antenna longer than the rostral spine of the cephalothorax.	Protopodite of antenna scantily longer than the rostral spine of the cephalothorax.
Length of Protopodite 264 $\mu$	Length of protopodite 367 $\mu$	Length of protopodite 304 $\mu$
Maxillule bears six plumose setae on the coxal endites.	Maxillule bears six plumose setae on the coxal endites.	Maxillule bears five plumose setae on the coxal endites.
Maxilla bears four plumose setae on the coxal endites; five setae on the endopodite.	Maxilla bears seven plumose setae on the coxal endites; five setae on the endopodite.	Maxilla bears eight plumose setae on the coxal endites; four setae on the endopodite.
First maxilliped bears nine setae on the basis; five segmented endopodite has setation 2,2,1,2, 4+1 respectively.	First maxilliped bears eleven setae on the basis; five segmented endopodite bears 3,2 1,2,4+1 setae respectively.	First maxilliped has eight plumose setae on the basis; setation of five segmented endopodite is 2,2,1,2, 4+1.
Second maxilliped has three setae on the basis; three segmented endopodite bears, 1,1, 5 setae respectively.	Second maxilliped has three setae on the basis; setation of three segmented endopodite is 1,1,5.	Second maxilliped has two setae on the basis; three segmented endopodite has 0, 1, 5 setae respectively.

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