OBSERVATIONS ON THE SPAWNING AND REARING OF *METAPENAEUS DOBSONI* UNDER LABORATORY CONDITIONS

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ABSTRACT

Gravid females of *Metapenaeus dobsoni* (Miers) collected from the fishing grounds off Cochin spawned in the laboratory and the larval development was traced up to Postlarva IV. After 8-9 h of spawning, Nauplius I larvae emerged and they reached Protozoea I, after moulting five more times in 43.30 h. Undergoing two more moults, these larvae attained Mysis I in 178.30 h. These mysis larvae metamorphosed to the Postlarva I, after passing two more substages in 321.30 h (13 days and 8 h). Brief descriptions of the various larval stages are given.

Metapenaeus dobsoni (Miers) is one of the commercially important penaeid prawns forming the major portion of the marine and estuarine prawn landings of India, particularly on the southwest coast. The possibility of culturing this species in the coastal brackish water areas has been pointed out by Mohamed (1973). Though the larval history of the species has been completely described by Menon (1951) based on the materials collected from plankton, records on spawning and rearing of larval forms of the species are limited to the works of Enomoto (1971) and Rao and Kathirvel (1973). The present account embodies the results of two experiments on the spawning and subsequent larval development of *M. dobsoni* under laboratory conditions.

Experiment I

Two gravid females (80 and 86 mm in total length) collected from the fishing ground on 14-3-1975 spawned in a plastic container around midnight and at 06.00 hrs on the next morning about 20,000 eggs were seen at the bottom of the container. The salinity and temperature of the water medium were 33.43‰ and 30.0°C respectively. At 07.30 hrs, the Nauplius I emerged from the eggs. The hatching process was completed at 10.00 hrs. These larvae moulted five more times and reached Protozoea I in 43.30 h after spawning. The mortality rate was low. At this stage, the larvae were fed with pure and mixed cultures of unicellular algae viz. *Synechocystes marina* and *Tetraselmis gracilis*. The mortality at this stage was very high. As a result, only a few specimens reached Protozoea III stage. They reached Mysis I stage in 178.30 h. At this stage the

nauplii of the brine shrimp (*Artemia*) were offered as food. The mysis metamorphosed into Post-larva I in 321.30 h (13 days and 8 h), after passing two more substages. Development was traced up to Postlarva IV.

Experiment II

On a subsequent occasion (19-4-1975), two more gravid females were brought alive to the laboratory and kept seperately in glass troughs (salinity 34.30 ‰ and temperature 29.8°C). The next morning (20-4-1975) one of the specimens (88 mm in total length) started spawning at 06.00 hrs, while going in circles slowly around the trough. The prawn rested at the bottom after completing three or four circles; thus it was noticed that the process of spawning took place in an interrupted manner. This process was going on for an hour. Approximately 50,000 eggs were released and they settled at the bottom. Nauplius I started coming out of the eggs at 15.00 hrs on the same day thus taking 9 h to complete the embryonic development. Though the timings between the larval stages were similar to that of the first experiment the mortality was heavy in the protozoeal stages due to the lack of algal food. Very few specimens reached Mysis I. Further larval development could not be observed.

Description of Larval Stages

Eggs: Spherical in shape and measure 0.34-0.41 mm in diameter; embryonic mass measures 0.21-0.24 mm in diameter; Nauplius I inside the egg measures 0.26 mm in total length. The perivitelline space is clearly visible.

Nauplius I: Total length (TL) — 0.25-0.26 mm; greatest body width (GBW) — 0.15 mm.

Body pyriform, anterior portion wider than posterior; a very small median spine situated posteriorly on the dorsal side; posterior margin rounded, bearing a pair of short setae; setation of appendages similar to those described by Menon (1951).

Nauplius II: TL — 0.26-0.28 mm; GBW — 0.13 mm.

Median spine on the posterodorsal side disappears; posterior region of body elongates and setation on antennule, antenna and mandible become plumose. No increase in the number of setae on caudal furcae.

Nauplius III: TL — 0.28-0.31 mm; GBW — 0.13-0.14 mm.

Body elongated and caudal furcae bilobed, bearing 4 pairs of spines. Number of setae on the appendages similar to those described by Rao (1974) for the substage II.

Nauplius IV: TL — 0.32-0.35 mm; GBW — 0.15-0.17 mm.

Deep notch present in between the caudal furcae, each lobe bearing 5 spines. Segmentation of appendages not clearly visible. One more setae on the

inner side of the antennules. Endopod of antenna with 3 terminal and 2 lateral setae and exopod with 3 terminal and 4 lateral setae. No increase of setae on the mandible.

Nauplius V: TL — 0.35-0.38 mm; GBW 0.15-0.18 mm.

Posterior end of body further elongate and furcal spines increase to 6 on each lobe. Two pairs of maxillae and first 2 pairs of maxillipeds appear as rudiments. No change in the setation of the appendages.

Nauplius VI: TL — 0.36-0.41 mm; GBW — 0.17-0.20 mm.

Frontal organ appear at the anterior end of body. Masticatory portion of mandible well developed; posterior region of body elongates further. Number of setae on the appendages increase.

Protozoea I: TL — 0.69-0.74 mm; Carapace length (CL) — 0.34-0.39 mm.

Body divided into an anterior part covered by a dorsal carapace, middle part of segmented thorax and posterior unsegmented abdomen. Carapace semicircular, with a notch in the middle, on the anterior border. Nauplius eye present; frontal organ quite visible, being slender and pointed. All thoracic segments well differentiated. Abdomen unsegmented; caudal fork bearing 7 spines on each lobe. Setation of various appendages similar to those described by Menon (1951).

Protozoea II: TL — 1.11-1.15 mm; CL — 0.40-0.52 mm.

Movable stalked eyes well developed; a short rostrum appears; frontal organs disappear and thoracic segments get well differentiated. Segmentation of appendages as in the previous substage. Six abdominal segments distinctly marked and telson unchanged, with same spine formula (7+7).

Protozoea III: TL — 1.62-1.64 mm; CL — 0.59-0.74 mm.

Sixth abdominal segment cut off from telson and uropods develop. First 5 abdominal segments, each with a small median spine dorsally, fifth having a pair of lateral spines also. A well developed rostrum in between the supraorbital spines on the anterior border of carapace. No appreciable change in the structure of the appendages. Telson remains as before and bears 7 pairs of spines.

Mysis I: TL, 2.01 mm; CL, 0.61 mm.

Mysis II: TL, 2.26 mm; CL, 0.68 mm.

Mysis III: TL, 2.82 mm; CL, 0.75 mm.

Mysis I, II and III have been described in detail by Menon (1951) and Rao (1974) with which the present materials agree.

Post-larva I: TL, 3.12 mm; CL, 0.81 mm.

In this stage the exopods of pereiopods disappear and setation are developed on the pleopods to make them functional. A pair of prominent hepatic spines appear on the carapace. Posterior margin of telson becomes slightly truncate, with 14 spines. The material agrees in all essential characters with the description of same substage given by Menon (1951) and Mohamed *et al* (1968).

These observations indicate that *M. dobsoni* can be made to spawn and post-larval stages achieved under controlled condition. In the present study the protozoea appeared on the second day (43-47 h) mysis on the eighth (178-211 h) and post-larva on the thirteenth day (321 h) after spawning. These timings agree with those obtained by Enomoto (1971) for *M. dobsoni*. The hatching period recorded in *M. dobsoni* by the present authors is comparable with that of *P. stylifera* (Thomas *et al* 1975) and *M. affinis* (Thomas *et al* MS); but it is less than those given by Hudinaga (1942) for *Penaeus japonicus*, Liao *et al* (1969a and 1969b) for *P. monodon*, *P. semisulcatus* and *M. monoceros* and Raje and Ranade (1975a and 1975b) for *P. merguiensis* and *M. monoceros*.

Menon (1951) recognised 3 naupliar substages in the larval history of *M. dobsoni*, while Rao (1974) differentiated 2 more substages, thus making a total of 5 naupliar substages. But, in the present observations, 6 naupliar substages are recorded. It may be mentioned in this connection that 6 nauplius substages have been described also by Liao *et al.*, (1969b) in *M. monoceros*, Vanichkul (1972) in *M. ensis* and Thomas *et al.* (MS) in *M. affinis*. Raje and Ranade (1975a and 1975b) have distinguished 5 mysis stages based on slight differences, although there is general agreement among all the earlier workers that there are only 3 mysis stages.

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