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THE INDUCED MATURATION AND LARVAL REARING OF THE KING PRAWN *PENAEUS LATISULCATUS* KISHINOUYE UNDER CONTROLLED CONDITIONS*

Introduction

The King prawn *Penaeus latisulcatus* Kishinouye, one of the large-sized penaeid prawns, attains a maximum size of 203 mm in total length. Stray occurrence of its juveniles in the estuaries and backwaters and adults in the inshore seas has been reported from the Indian coasts. However, it supports a fishery of considerable magnitude in Thailand and Australian waters. The eggs and larvae of the species have been successfully reared under controlled conditions in Japan (Shokita, S., *Biol. Mag. Okinawa*, **6**: 34-36, 1970) while a semi-commercial hatchery for seed production has been set up in Australia (Pownall, P.C., *Aust. Fish.*, **32** (12): 2-4, 1973 and 33 (5): 11-14, 1974).

Based on the collection of early juveniles of King prawns from the bar mouth area of Kovalam backwater (Lat. 12°46′ N; Long. 80°18′ E) during May–June 1986, culture of the species was taken up at the Mariculture farm of the Institute, Muttukadu, 36 km south of Madras.

After rearing for two and a half months, a few grown-up specimens were transported to the field laboratory at Kovalam, where the female specimens were subjected to eye ablation treatment. The results of induced maturation, subsequent spawning and larval rearing of the King prawn are presented here.

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Broodstock

On the night of 2nd August, 1986, 8 specimens (three impregnated females and five matured males) of the King prawn were collected from the culture pond at Muttukad and transported to Kovalam laboratory and stocked in a one-tonne rectangular fibreglass tank having a layer of (5 cm) fine sand spread over three-fourth of the floor, to suit the burrowing habit of the species. The size of the specimens is given below:

Sl. No.	Total length (mm)	Carapace length (mm)	Total weight (g)	Sex
1	114	28	11.37	Female
2	112	27	11.10	,,
3	108	26	10.66	,,
4	111	24	10.63	Male
5	105	23	8.73	,,
6	118	27	13.15	,,
7	112	24	10.79	,,
8	99	22	8.27	,,

After acclimatising in the broodstock tank for two days, the right eye of the females was removed by using an electrocautery apparatus on 5–8–1986. The broodstock tank was covered with a black plastic sheet throughout the course of the experiment to prevent the penetration of light. Every day, prawns were fed once, at a rate of 20% of their body weight, with fresh backwater

clam *(Meretrix casta)* meat at 1730 hrs. The unutilised feed was removed the next day morning. Also, the sediments from the bottom of the tank were siphoned out daily. The little amount of water drawn out along with the sediments was replaced by fresh filtered seawater. Other than this no exchange of water was done. To maintain the pH in the range of 8.0 to 8.2 sodium carbonate was added at a rate of 15 g/m^3 per day for 3 days continuously and thereafter at an interval of 2 days. The salinity of the seawater used in the broodstock tank varied from 33.00 - 34.12‰. The temperature (at 1000 and 1500 hrs) and pH values recorded daily in the broodstock tank during 5-8-1986 to 3-9-1986 are shown in Fig. 7.

Fig. 1. Eggs with developed nauplius.

Moulting, mating and spawning

All the females (Sl. No. 1 to 3) underwent moulting between 6 and 11 days after ablation, resulting in the loss of the spermatophores in the thelycal plates. However, one of the females (Sl. No. 3) was found with freshly deposited spermatophore after moulting, which could have been the result of the mating by one of the males present in the broodstock tank. During the first

Fig. 2. Group of nauplius VIth Stage.

15 days after ablation, no development of ovary was observed. Afterwards, the development of ovary was a slow process. Though the three females appeared with a thin streak of ovary, it was assumed that some more time might be needed for further development. Nevertheless, one female (Sl. No. 2) spawned on 31-8-1986, 25 days after ablation. The spawning occurred in the broodstock tank itself. All the eggs released were unfertilised, as anticipated. The other two females were removed from the broodstock tank and placed individually in 200 l spawning tanks.

The female (Sl. No. 1) specimen did not spawn, but the absorption of ovary was witnessed. The third specimen (Sl. No. 3) spawned partially at 0230 hrs on 3-9-1986 and released 24,800 viable eggs. The diameter

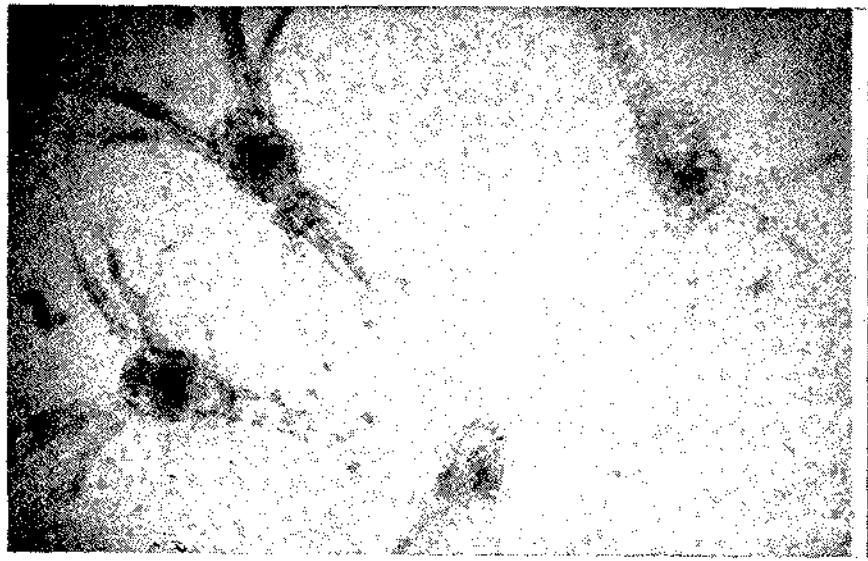

Fig. 3. Protozoea Ist Stage.

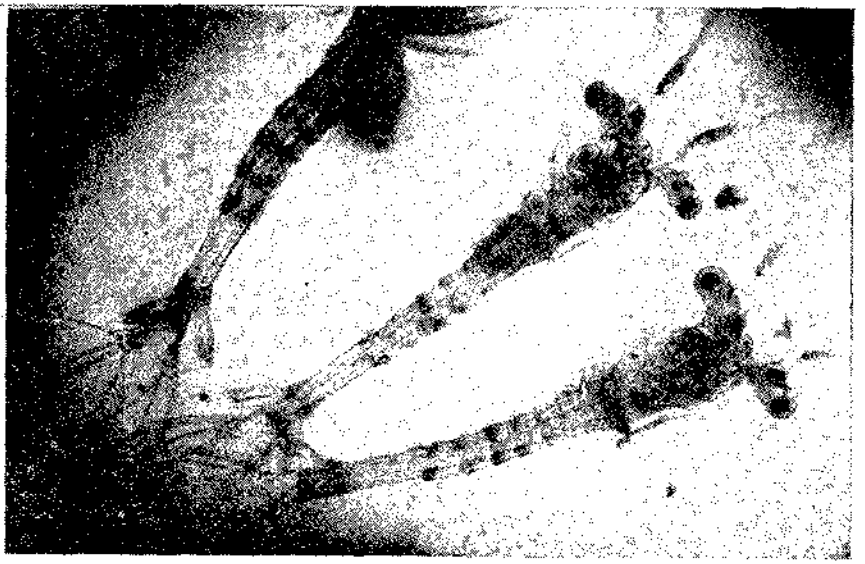

Fig. 4. Protozoea IInd Stage.

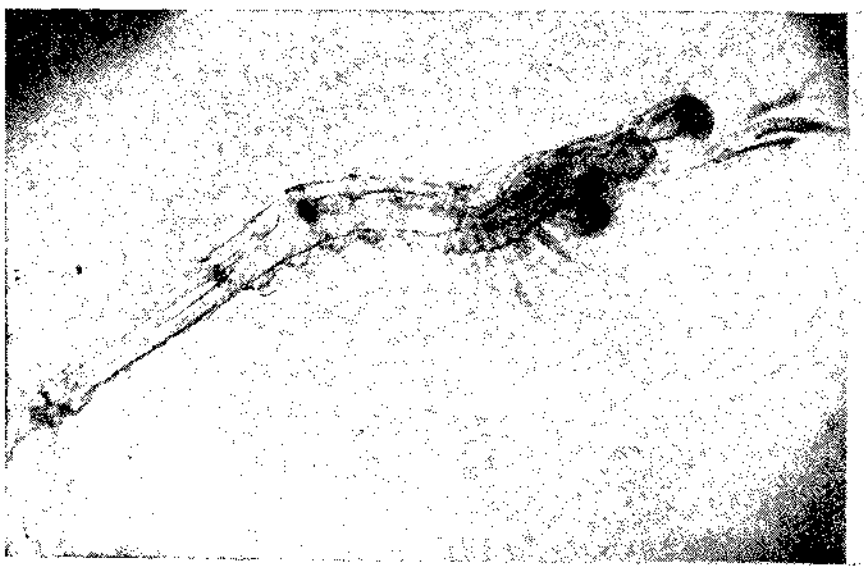

Fig. 5. Mysis IInd Stage.

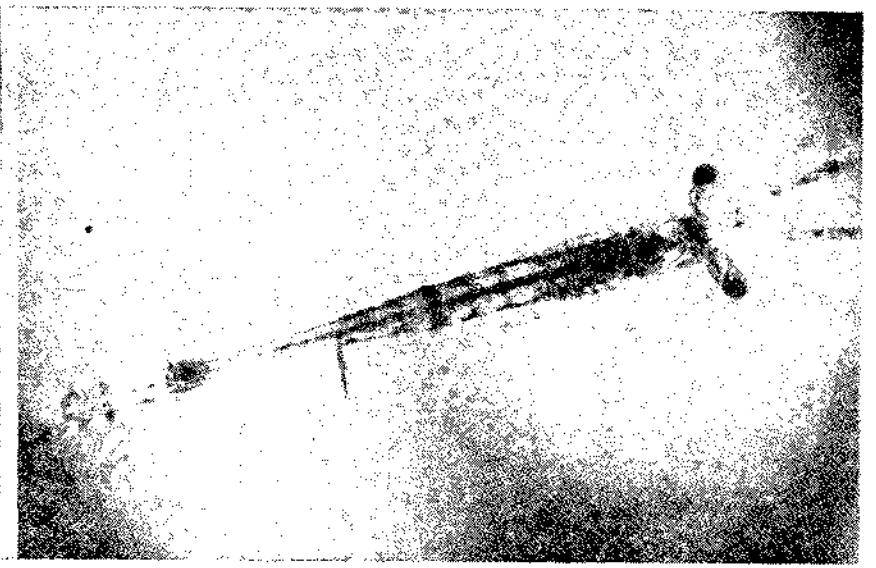

Fig. 6. Postlarva Ist Stage.

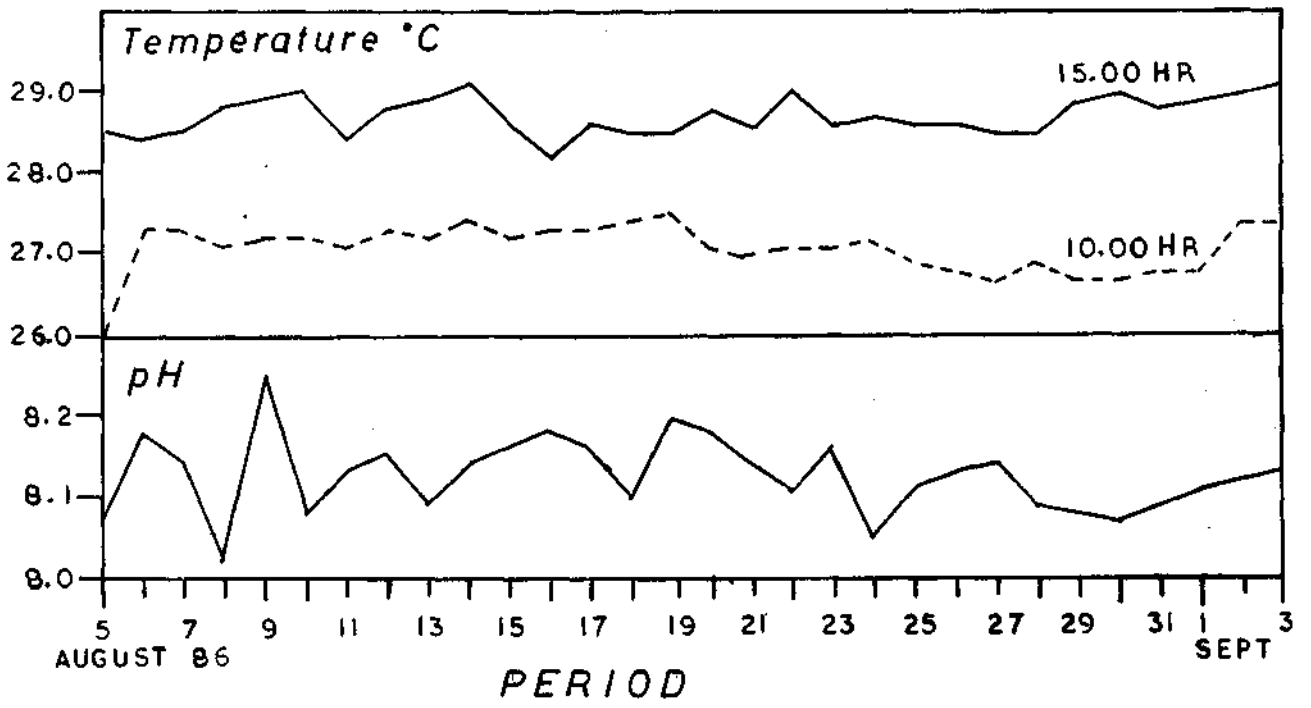

Fig. 7. Water temperature (1000 hrs and 1500 hrs) and pH values recorded in the broodstock tank during the period 5-8-'86 to 3-9-'86.

of eggs varied from 0.263 to 0.280 mm with an average value of 0.270 mm (Fig. 1). The time taken between ablation and spawning was 28 days. Due to the partial spawning and smaller size of the spawner, the number of eggs released was very less. Totally 20,000 nauplii emerged, the hatching rate being 80.6%.

Larval rearing

The hatched out nauplii (Fig. 2) were stocked in a one-tonne rectangular tank. When the larvae metamorphosed to N-6 stage (nauplius), 50 l of separately maintained unicellular diatom culture (*Chaetoceros* spp.) was provided as the feed for the protozoea 1 larvae (Fig.3). From protozoea I to postlarva I stage (Figs. 4–6), 90 l of diatom culture was given daily as feed for the larvae.

The temperature in the larval rearing tank was 26.7°C at 0600 hrs but rose to a maximum of 29.8°C at 1400 hrs and afterwards declined to 29.0°C at 1800 hrs, 28.0°C at 2200 hrs and 27.8°C at 0400 hrs. It took 12½ hrs for the development of eggs before hatching. The duration of the substages of nauplius larvae varied from 3 to 5 hrs and that of protozoea 27 to 30 hrs. In mysis stage, it ranged from 26 to 29 hrs. In all, it took 9 days and 1½ hrs to attain postlarva I from the time of spawning.

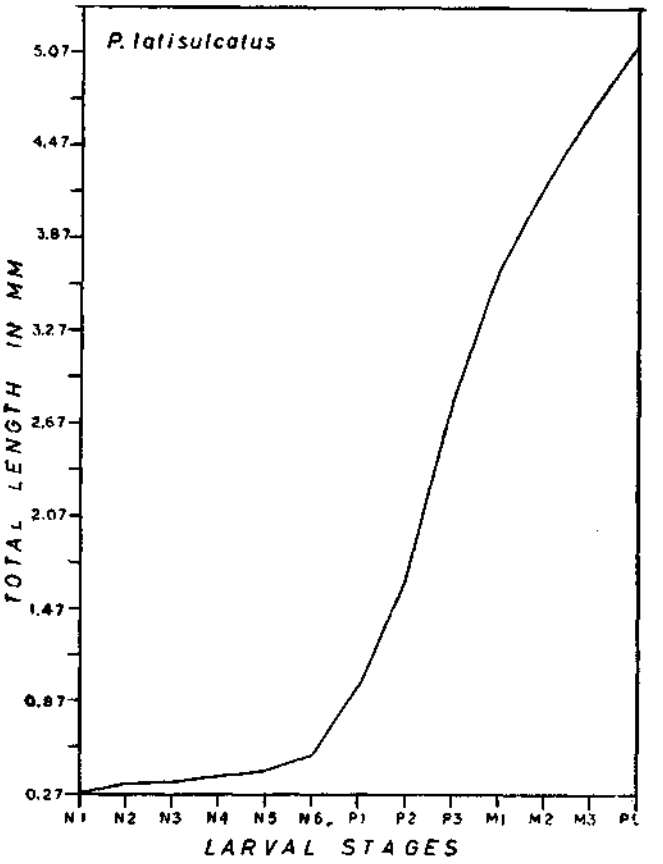

Fig. 8. Growth recorded at different larval stages of *Penaeus latisulcatus*.

Larval growth and survival

At every substage of the nauplius, protozoea and mysis and also at postlarva I, the total length was measured to study the growth during larval development and the average size for each stage is plotted in Fig. 8. In the naupliar stage, 50% increase in length was seen from I to VI stage, while it was 65.6% from protozoea I to protozoea III. However, the growth was less from mysis I to III (22.8%).

The number of larvae that survived in each stage is given below:

Nauplius I	:	20,000
Protozoea I	:	15,950
Mysis I	:	9,780
Postlarva I	:	7,485

Remarks

This is the first time in India that an experiment conducted on the maturation and larval production of *Penaeus latisulcatus* under controlled conditions has yielded fruitful results. The longer duration between ablation and spawning and also lesser number of eggs released may be because of the small size of the prawns. The larvae of King prawn are sturdy brightly coloured right from the naupliar stage. The time taken for the attainment of postlarva I from spawning (9 days at 26.7–29.0°C temperature range) agrees with the results obtained in Japan (Shokita,1970) and Australia(Pownall, 1974). As this species has attained the marketable size of 30 g in 5–6 months of field culture trials conducted in Australia (Pownall, 1974), it is evident that this species could play a promising role in the context of developing marine prawn culture in the coastal waters of our country.