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ON THE SEASONAL OCCURRENCE OF EARLY JUVENILES OF *PENAEUS CANALICULATUS* (OLIVIER) IN KOVALAM BACKWATER NEAR MADRAS, WITH NOTES ON THEIR CULTIVATION AND SPECIFIC IDENTITY

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ABSTRACT

Drag net collections during night carried out in the bar mouth area of Kovalam Backwater near Madras has indicated the seasonal occurrence of early juveniles of *Penaeus canaliculatus* during May-July 1986. Healthy and live juveniles numbering 100 were reared in an enclosed sandy-bottom pond for a period of 90 days, during which time, they grew from an initial size of 45 mm to 119 mm, registering a monthly growth of 24.6 mm in total length. The colour pattern observed in early juveniles of the species has been compared with that of *P. japonicus*, a closely related species occurring in the study area. The photographs are provided as a guide for easy identification of these two species in their juvenile stages. The possibility of utilising this new seed resource in the context of prawn culture in the sandy lagoon areas is discussed.

INTRODUCTION

THE STRAY occurrence of the rare penaeid prawn *Penaeus canaliculatus* (Olivier) has been reported in the Indian estuaries and backwaters (Suseelan and Muthu, 1979; George and Suseelan, 1982; Suseelan and Kathirvel, 1982; Nandakumar, 1984), coastal lake (Paulraj, 1976), inshore waters (Nandakumar, 1980) and oceanic islands (Thomas, 1974, 1977; Silas and Muthu, 1976). Recently, Suseelan *et al.* (1982) have reported the occurrence of *P. canaliculatus* in the trawl net operations during night off Neendakara in the southwest coast of India.

In the course of routine weekly drag net operations conducted to study the abundance of penaeid prawn seed in Kovalam Backwater near Madras, during December 1985 to December 1986, the early juveniles of *P. canaliculatus* were encountered in small numbers in May-July 1986. The live and healthy specimens were utilised for field culture purpose in the Mariculture Farm of the Institute at Muttukadu. The results pertaining to the abundance of early juveniles, their cultivation and colour pattern observed for specific identity of *P. canaliculatus* are presented here.

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MATERIAL AND METHODS

Totally 50 observations were made between December 1985 to December 1986 in a fixed station in the sandy bar mouth area of Kovalam Backwater near Madras (Lat. $12^{\circ} 46' N$; Long. $80^{\circ} 18' E$), of which, 14 collections in May-July 1986 contained the early juveniles of

The size mentioned in the text is pertaining to the total length (TL) in mm, measured from tip of rostrum to tip of telson. For growth studies, apart from total length, measurements such as carapace length (CL), body length (BL) and total weight (TW) were also considered, following the pattern of Motoh (1981). The live and healthy prawns numbering 100

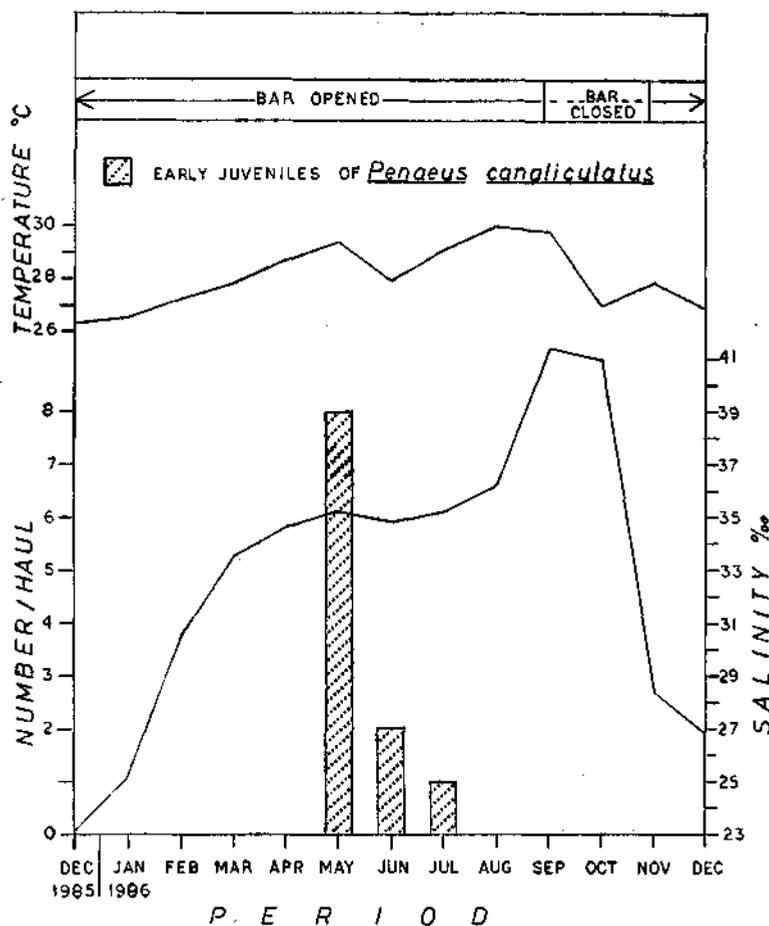


FIG. 1. Occurrence of early juveniles of *P. canaliculatus* in relation to temperature and salinity in Kovalam Backwater.

P. canaliculatus. The collections were made during 2100-2300 hrs in the night by operating a drag net 10 m long (mesh size 18 mm) between fixed points. On each observation day, 4 hauls were made and the average number per haul was considered as an index of abundance.

were stocked between 5-5-'86 and 15-5-'86 in an enclosed pond (0.4 ha) with sandy bottom at Mariculture Farm, Muttukadu and reared along with earlier stocks of *P. japonicus* (No: 2,000) and *P. latisulcatus* (No: 400) for a period of 90 days, on a supplementary diet of

the backwater clam (*Meretrix casta*). The feeding rate was 5% of their body weight. The temperature and salinity of the bar mouth area as well as those of the culture pond were recorded at the time of each observation. The data on *P. canaliculatus* alone are considered here.

observed in *P. canaliculatus* and *P. japonicus* were photographed to aid for specific identification of these two species.

OBSERVATIONS

Seasonal occurrence

In the drag net collections, the early juveniles of *P. canaliculatus* were encountered along with those of the related species viz. *P. japonicus*,

The period of occurrence of early juveniles of *P. canaliculatus* and the average monthly values of water temperature and salinity of

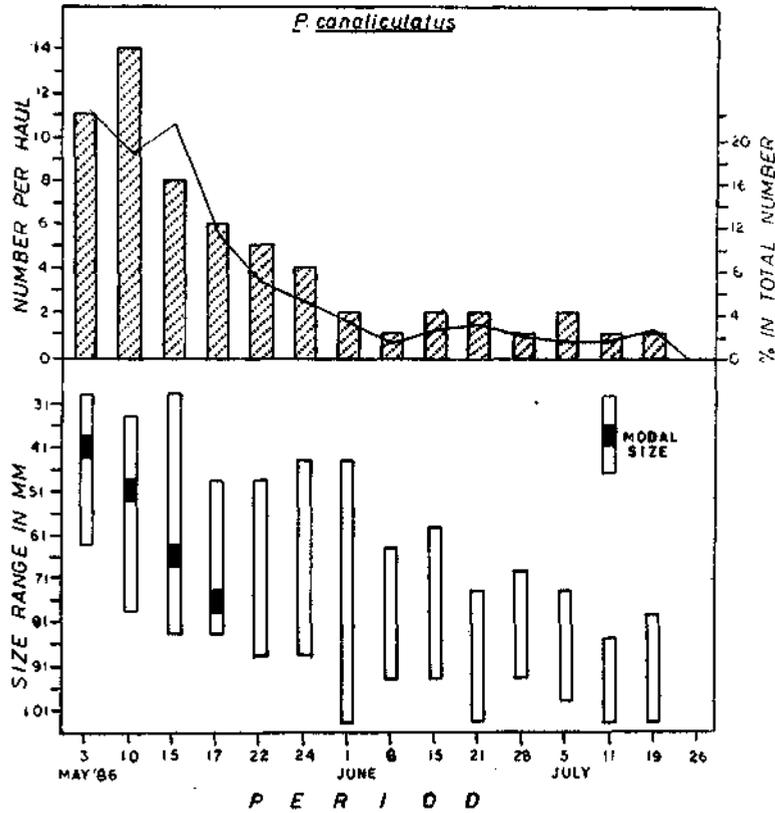


FIG. 2. Abundance and size distribution of early juveniles of *P. canaliculatus* caught in the drag net operations in Kovalam Backwater.

to which, the former resembled closely. Though these two closely related species could be separated from each other by the armature of the telson, the distinct colour pattern on carapace and abdomen made it easy to sort them out in the field. The colour patterns

Kovalam Backwater during December 1985 to December 1986 are indicated in Fig. 1. Though the period of observation was extended from December '85 to December '86, the occurrence of *P. canaliculatus* was noticed only during May-July '86, when the

temperature (27.9° to 29.4°C) and salinity 34.9 to 35.8 ppt) were at their maximum. The bar mouth was open during this period. The number of juveniles caught per haul varied from 1 to 14, the maximum (11 to 14) being in May.

Abundance and size distribution

The abundance and size distribution (5 mm interval) of *P. canaliculatus* observed in May-July are given in Fig. 2. During the period between May and July 1986, 15 observations were made, 6 in May, 5 in June and 4 in July. The highest number per haul (11 to 14) was recorded during the first two days of collection, which decreased to 4-8 in the subsequent collections in May and to 1-2 in June and July. However, the collection made on 27-7-'86 did not contain this species. The percentage by number shared by *P. canaliculatus* among the total number of juveniles of other penaeid prawns was higher (19 to 22%) in the first three days of observations and thereafter it declined gradually.

The overall size range of juveniles ranged from 31 to 103 mm in total length. The presence of smaller groups (31-35 to 46-50 mm) in May and larger groups (61-65 to 101-105 mm) in June-July was indicative of the recruitment of a single brood during the entire period of observation. The shifting of the dominant mode was seen during the first 4 days of sampling. As the fourth day (17-5-'86) sample consisted of 13 specimens, the larger mode observed on that day was not considered. The smaller size group found at 41-45 mm on 3-5-'86 has progressed to 66-70 mm on 15-5-'86, showing an increase of 25 mm in 12 days. Though the size of juveniles caught in June and July was larger, the number caught was less (4 to 20 in all the four hauls on each observation). Hence, no prominent mode could be observed (Fig. 2).

Cultivation in earthen pond

The initial values of temperature and salinity (at 1100 hrs) of the rearing pond at the time of stocking were 29.1°C and 26.24 ppt respectively. As the culture operation progressed, these values steadily increased due to the prevailing summer heat and the resultant evaporation and reached a peak of 29.9°C and 36.23 ppt at the end of August '86.

The growth attained in terms of length and weight by *P. canaliculatus* during 90 days rearing is indicated in Fig. 3. The initial average size (45.0 mm in TL) at stocking progressed to 70.6, 89.7, 94.8, 108.3, 113.9 and 119.0 mm on the 15th, 30th, 45th, 60th, 75th and 90th day of culture respectively, registering a growth of 74 mm in length in the 3 month period. The rate of growth per month was 24.6 mm. The corresponding total weight on the 15th to 90th day was 2.7, 5.6, 6.7, 9.9, 11.6 and 15.0 g respectively. The monthly increment of carapace length, body length and total weight was 6.0 mm, 21.6 mm and 4.5 g respectively. It is interesting that an increase of 44.7 mm (TL) was recorded in the first 30 days of cultivation, following a similar, but still faster growth of 25 mm in 12 days in the early juveniles sampled from the bar mouth area in the present investigation.

Colour pattern of early juveniles

Among the juveniles caught from the wild, the specimens below 50 mm size did not have distinct banded colouration on carapace, abdomen and telson. The lateral view of the feeble chromatophore pattern observed in the last abdominal segment of *P. canaliculatus* and *P. japonicus* (both measuring 40 mm in TL and 10 mm in CL) is given in Fig. 4. In *P. canaliculatus*, there are two vertical bands, comprised of dark blue chromatophores, running parallel upto the middle portion of the abdominal segment where they become connected by a horizontal band. The first band is further extended down and turned horizontally towards the distal margin of the

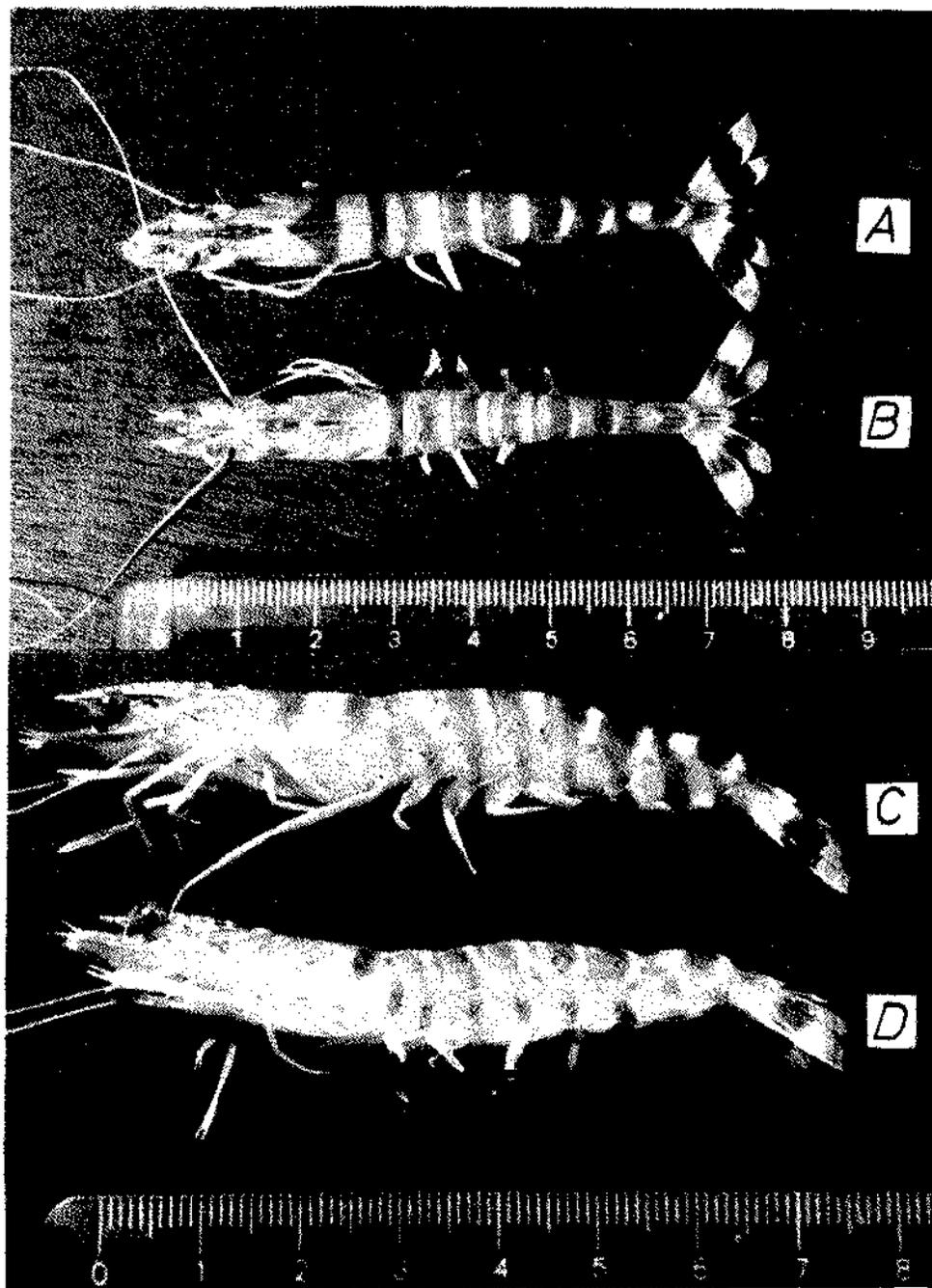


PLATE I. A. Dorsal view of *P. canaliculatus*, B. Dorsal view of *P. japonicus*, C. Lateral view of *P. canaliculatus* and D. Lateral view of *P. japonicus*.

segment. In *P. japonicus*, the first band terminates in the middle, while the second broader one runs down to half the height of the segment, curves back and runs obliquely backwards towards the distal margin of the segment.

downwards upto half the height of carapace in lateral view (Plate I C). Such a colour marking is absent in *P. japonicus* (Plate I B). However, in both the species, alternate to crimson-red and pale yellow bands are present on the abdominal segments. In *P. canal*

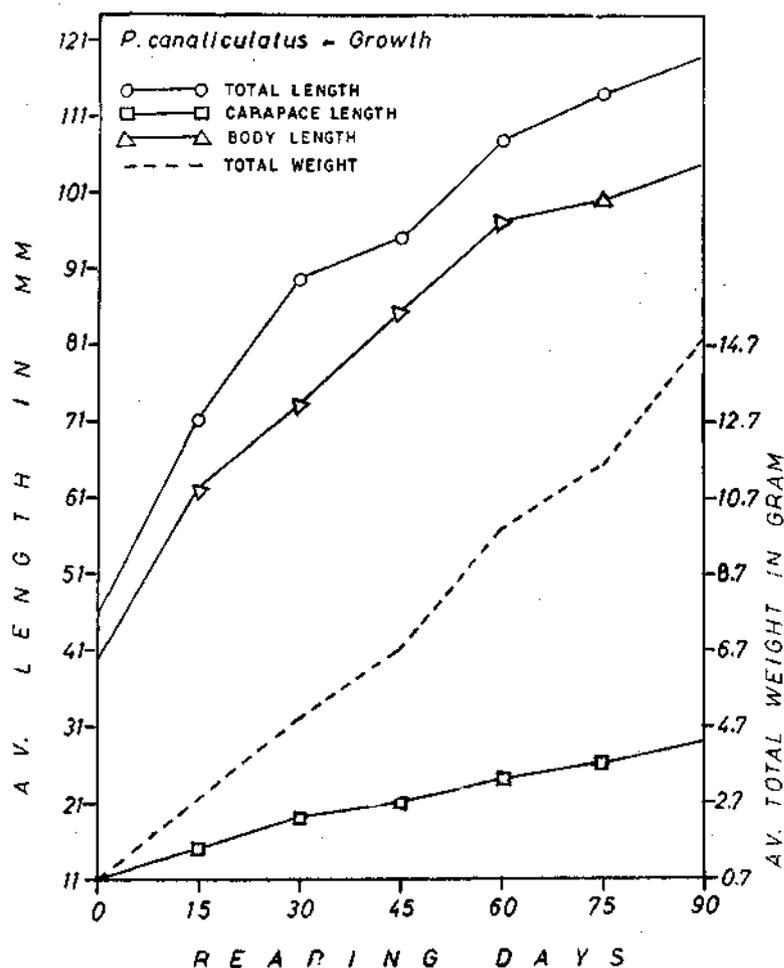


FIG. 3. Growth in pond-reared juveniles of *P. canaliculatus*.

The colour pattern observed in *P. canaliculatus* (TL 77 mm; CL 23 mm) and *P. japonicus* (TL 74 mm; CL 22 mm) is given in Plate I. The striking colour pattern in *P. canaliculatus* in dorsal view (Plate I A) is the presence of a triangular crimson-red patch in the middle of the carapace, which is extended

there are eight larger crimson-red bands reaching the ventral margin of the pleura (Plate I C), while the two bands present in the last abdominal segment do not reach the ventral margin of the pleura in *P. japonicus* (Plate I D). The different chromatophore pattern present in the sixth abdominal segment

in specimens measuring upto 50 mm in TL and the colour pattern present in carapace and abdomen in larger juveniles of these two species could be considered as an aid for easy separation of live specimens without referring to any other morphological characters.

DISCUSSION

Earlier studies on the juvenile penaeid prawns of Kovalam Backwater by Muthu (1973) and Isaac Rajendran and Sampath (1975) have not recorded the occurrence of *P. canaliculatus* which may probably be due to their daytime sampling. However, the present investigation has brought to light the seasonal occurrence of early juveniles of *P. canaliculatus* in the same area during the night

and Muthu (1979), indicating the less euryhaline nature of the species.

The size group distribution of early juveniles of the species has indicated a single wave of recruitment during May. The absence of the species from August onwards till the closure of the bar mouth on 11-9-'86 in the study area suggests the total migration of the species from the backwater environment to the sea within this period.

The growth of the juveniles caught from the backwater appears to be fast (25 mm in 12 days), although the sample size is too small to draw any definite conclusions. However, the pond-reared juveniles exhibited a monthly growth of 24.6 mm, which is comparable with the record of 20.4 to 24.0 mm/month in *P. japonicus*

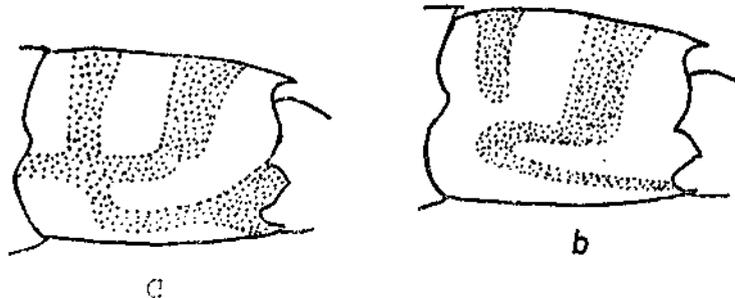


FIG. 4. The chromatophore pattern in the last abdominal segment of : a. *P. canaliculatus* and b. *P. japonicus*.

collections. Rich abundance of adult population of the same species during night trawling along the southwest coast of India has also been reported by Suseelan *et al.* (1982) indicating the nocturnal habit of the species.

The occurrence of the species in the study area is restricted to May-July, when the temperature and salinity values of the backwater were at their maximum and the bar mouth was open. Such seasonal occurrence of postlarvae of *P. canaliculatus* in relation to higher temperature and saline conditions of Cochin Backwater has been recorded by Suseelan

by Seno (1910), Kubo (1956), Shigueno (1975) and Kathirvel and Selvaraj (MS).

For specific identity of closely related species in crustaceans, colour photographs were used by Berry (1974) for depicting different colour patterns of the spiny lobsters of the *Panulirus homarus* group and by Gore (1977) for the swimming crabs *Callinectes ornatus* and *C. similis*. Miquel (1983) who described the colour pattern of the adults of *P. canaliculatus* and *P. japonicus*, did not provide the same for juvenile stages. In general, the colour pattern on the abdomen of juveniles of these

two species measuring above 70 mm in TL resembles those described by Miquel (1983).

The present attempt in depicting the chromatophore pattern in juveniles of *P. canaliculatus* and *P. japonicus* measuring 40 mm in TL and colour pattern on carapace and abdomen of those measuring above 70 mm in TL would

be helpful in the easy separation of the juvenile specimens of these two species in the field.

The present observations on the location of the nursery ground for this rare penaeid prawn and the successful cultivation of the juveniles in confined pond show the possibilities of utilising this new seed resource in the context of prawn culture in the sandy lagoons along our coastal areas.

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