DIURNAL ACTIVITY OF THE PRAWN *PENAEUS SEMISULCATUS* DE HAAN

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INTRODUCTION

Several authors have reported that penaeid prawns remain active above substratum at night and stay quiet, buried in sand during the day (Fuss, 1964; Fuss and Ogren, 1966; Wickham, 1967; Hughes, 1968). Menon and Raman (1961) also suggested increased nocturnal activity in Indian penaeid prawns. Kutty (1967) pointed out the burrowing habit of *Peneaeus semisulcatus* and estimated the metabolism of the buried prawn; his short term observations, however, did not indicate that *Penaeus indicus* has the burrowing habit. Burrowing methods of *Metapenaeus mansoni* have been described by Dall (1958) and those of *Penaeus duorarum* by Fuss (1964).

It appears that the burrowing habits of the penaeid prawns are more or less similar. As evident, precise information on the burrowing behaviour, emergence from the substratum and activity of the Indian prawns are wanting. The authors had occasion to observe the activity rhythm of a group of penaeid prawns, *Penaeus semisulcatus* reared in the sea water aquarium of the Institute primarily for a series of experiments on metabolic adaptations. The present observations, though not strictly planned, appeared to be of interest especially since much is yet to be known about the behaviour of the Indian prawns and are therefore presented here.

MATERIAL AND METHODS

The prawns were caught from Palk Bay off Mandapam. Seven individuals of *P. semisulcatus* (12-16 cm. in T.L.) kept in running sea water in a rectangular tank (75 X 55 X 40 cm.) with glass walls on four sides were observed for over a fortnight. The depth of water in the tank was about 34 cm. with 5-10 cm. depth of sand in the bottom. The tank was kept open but for a plastic-meshed lid, to natural day light and was placed at a distance of one metre from a large open window. The sea water flowing through the tank was at a temperature of 28-30°C., salinity close to that of 100% sea water (35 p.p.t.) and dissolved oxygen near air saturation. The observations were made on the group of prawns only after they had been in the aquarium for over two months. Prior to the period of observations the animals were fed with chopped clam meat once daily at 10-11 a.m.

RESULTS AND DISCUSSION

The number of active (non-buried) prawns at different times of day observed for 16 days, from 5-10-1966 to 21-10-1966, is graphically shown in Fig. 1. Feeding times

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of the prawns during the experimental period are indicated in the figure. A clear indication of increased activity as judged from the number of prawns active (those

remaining above the sand) during the night is quite evident. Wickham (1967) has found a direct correlation between activity measured as numbers of passes made
by a shrimp across a vertical line on the wall of the observation chamber and number of individuals exposed in a group. On both days 1 and 2 most of the prawns have emerged by dusk (19 hours) and by morning (6 hours) they have burrowed into the sand. On day 3 most of the animals have emerged on presenting the food, which is again observed on day 5. On days 6, 7 and 8 the animals were not fed but there is indication that some, if not all, of the prawns have emerged at times close to the time at which they were being fed previously. Such indications were noted on subsequent days (days 10, 11, 14 and 16) as well. Hughes (1968) has clearly demonstrated a feeding rhythm in *Penaeus duorarum*. It has been shown that the emergence cycle of prawns has a distinct endogenous component (Fuss and Orgen, 1966; Hughes, 1968). The latter is subject to modification by various environmental factors, the most important of which is light (Fuss, 1964; Fuss and Orgen, 1966; Wickham, 1967; Hughes, 1968). It appears that but for the influence of the feeding rhythm under the conditions prevailing in the present experiments activity of the prawns might have been suppressed considerably during the day light hours. This aspect cannot be elaborated further because emergence could be caused by various other factors also (Fuss and Orgen, 1966; Wickham, 1967; Hughes, 1968).

It has been suggested that prawns emerge at dusk and remain active at night to avoid their predators. The burrowing behaviour surely protects the prawns from the predators during the day. It also appears to be of advantage to the animals to stay quietly buried, for a buried prawn expends least energy, its metabolic rate being close to the standard (basal) level (Egusa, 1961; Kutty, 1967). The energy saved thus can be used for 'useful' activities such as growth and reproduction. From this context it may be worthwhile comparing the food conversion efficiency and growth rate of prawns with and without the burrowing habit. Correlation of the behaviour of the commercially important prawns and the fluctuations in their diurnal and seasonal catches can indeed be of much value (Subramanyam, 1965; George et al., 1967; Barr and McBride, 1967).

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