

Nursery Life of the Marine Prawn, *Metapenaeus dobsoni* (Miers) in the Mandovi Estuary, along Goa Coast, India

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The nursery phase of *M. dobsoni* was sequentially traced in the Mandovi estuary of Goa (west coast of India). Peak postlarval ingress occurred between November and March. Of the total, 83.5% was distributed at the lower reaches of the estuary. Seasonal variation in abundance was discernible. Initial growth occurred in the shallow region of the estuary bordered by mangroves and later in the deeper waters of the open estuary. Optimum attainable size in the estuarine environment was 50-60 mm. Salinity did not seem to play a decisive role in their immigration and growth.

It has been established that estuaries form the nursery ground for several economically important species of penaeid prawns¹⁻⁴. The Mandovi estuary in Goa is inhabited by the postlarval and juvenile stages of a number of species of penaeid prawns⁵⁻⁸. Of these, *Metapenaeus dobsoni* is the most dominant species, contributing the major share of the commercial marine prawn catches from the Goa coast. In the present work, the nursery life of this species in the Mandovi estuary has been sequentially traced and the role of salinity in their immigration and growth is discussed.

Materials and Methods

The Mandovi estuary, which opens into the Arabian Sea through the Aguada Bay, is bordered by mangroves covering an area of 7 km². Zooplankton samples were collected from the lower (st 1), middle (st 2) and upper reaches (st 3) of the estuary (Fig. 1). Oblique hauls from near the bottom to surface were made during high tides using a HT net (0.25 m² mouth area, 0.3 mm mesh width), equipped with a calibrated flow meter. Postlarval stages of the species in question were sorted from the samples. Salinity of the water column was recorded with the help of a temperature-salinity bridge. Juvenile specimens of the species were collected from the open estuary as well as a shallow region bordered by mangroves (Fig. 1). Total length of each specimen was measured.

Observations/samplings were made fortnightly (January-December 1981) and the monthly mean values were calculated. Seasons have been classified into monsoon (June-September), postmonsoon (October-January) and premonsoon (February-May) based on the seasonal southwest monsoon.

Results

Salinity—Salinity distribution pattern was more or less similar at all the stations (Fig. 2); however, there was a gradual diminution from lower to upper reaches. Drastic reduction occurred during monsoon at all the stations attaining almost limnetic condition at st 3 and 1.5×10^{-3} at st 1. After the monsoon the salinity increased steadily to attain the maximum during the peak summer ($33.9-36.7 \times 10^{-3}$).

Postlarvae—Distribution of postlarvae exhibited large variations between stations, months and seasons (Fig. 3). They occurred in relatively large numbers at st 1, except during the monsoon season, forming 83.5% of the total. Their density (no.m⁻³) at this station progressively increased during the postmonsoon season to culminate at the peak in January (38) followed closely by March (37). Station 2 accounted for 13.7% of the total and at st 3 they were rare or absent.

Seasonal variation in postlarval abundance was quite conspicuous. Postmonsoon season contributed 52.7% of the total while it was only 5.5% during

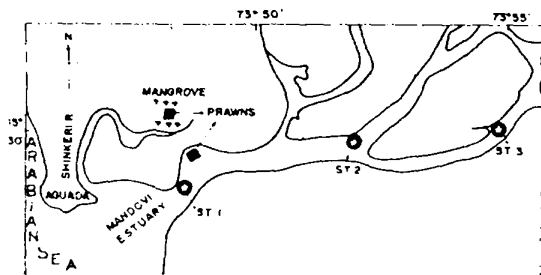


Fig. 1—Location of sampling stations

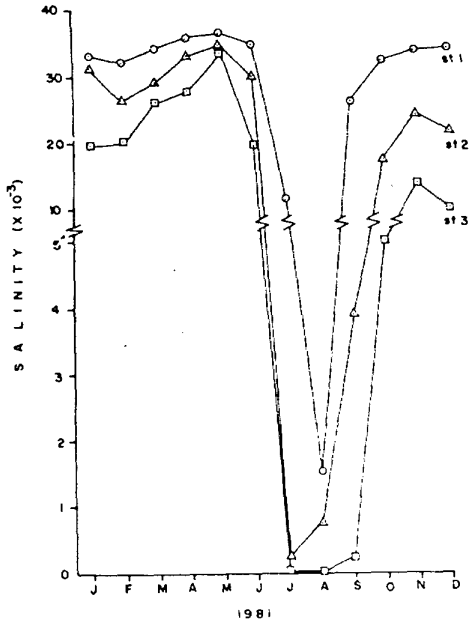


Fig. 2—Monthly variation in salinity in Mandovi estuary

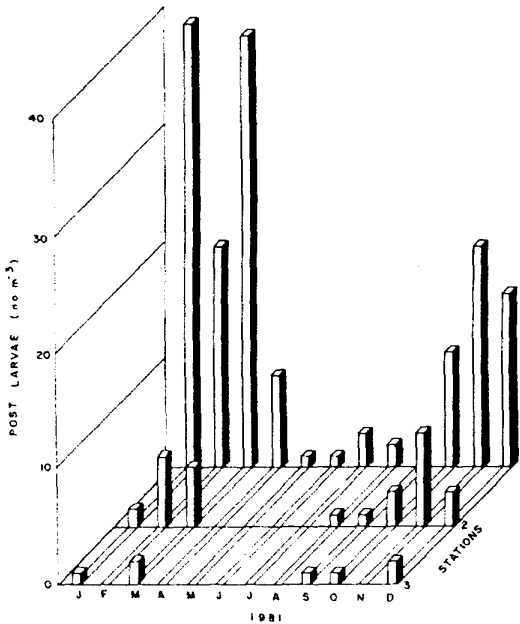


Fig. 3—Postlarval distribution of *M. dobsoni* at different stations in Mandovi estuary

the monsoon season. November through March was found to be the significant period of their ingress into the estuary (10.4-30%).

Juveniles—Juvenile stages of different size groups inhabited the estuary. But, during most of the

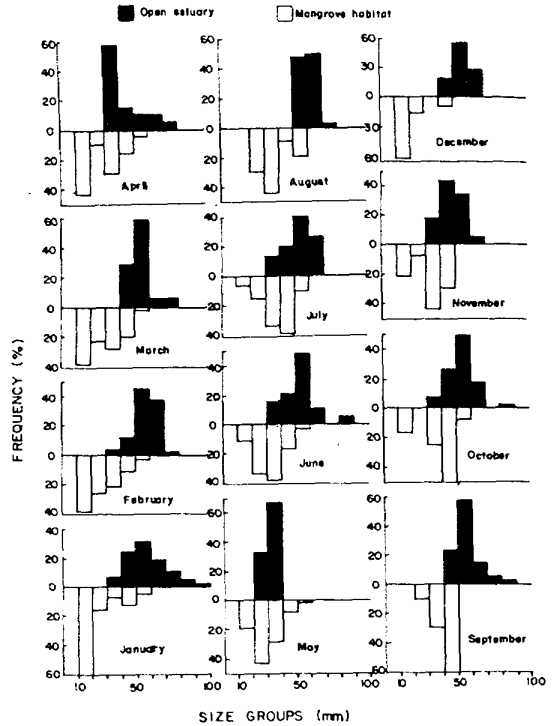


Fig. 4—Monthly length-frequency distribution of *M. dobsoni* juveniles in Mandovi estuary

months smaller size groups up to a length of 40 mm dominated the collections from the mangrove habitat while in the open estuary they seldom occurred and those >40 mm length dominated the population (Fig. 4). Apparently this suggests that the postlarvae initially settle down and grow to juveniles in the shallow region of the estuary bordered by mangroves and later migrate to the deeper waters of the open estuary.

It could reliably be assumed that a significant portion of the postlarval population settle down in the mangrove region closer to the lower reaches of the estuary as the postlarvae were abundant here. The smallest size group (10-20 mm) occurred in varying numbers in the mangrove region except during the monsoon season and predominated the population between December and April (38.3-62.5%) (Figs 4 and 5A); in other words, intense recruitment and settlement occurred during this period. Thus, it can be seen that the period of juvenile occurrence in the mangrove region conforms with the postlarval recruitment into the estuary.

The juvenile population was arbitrarily grouped as early juveniles (<40 mm) and late juveniles (>40 mm). The early juveniles formed 86.5% of the total population in the mangrove region and out-

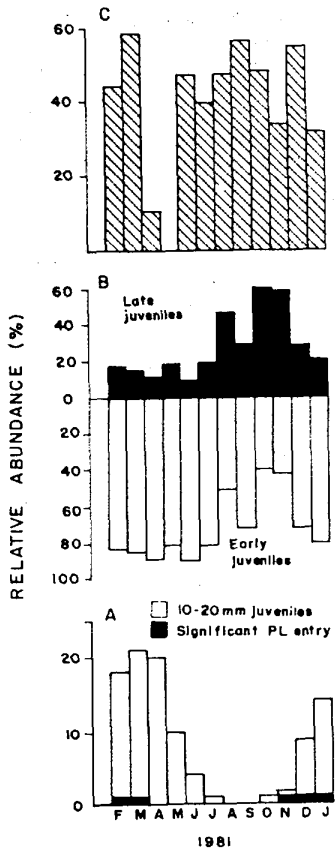


Fig. 5—Relative monthly abundance of *M. dobsoni*, (A) 10-20 mm size group (B) early and late juveniles in mangrove region (C) 50-60 mm size group in open estuary

numbered the late juveniles during most of the months (Fig. 5B). It is thus apparent that < 40 mm prawns formed the mainstay of the juvenile population in the mangrove region of the estuary.

A sizeable population inhabiting the open estuary comprised late juveniles in the size range of 40-70 mm (87%) and the predominant group during most of the months was 50-60 mm (Fig. 5C). Obviously this is the optimum attainable size in this habitat. A size of 50-60 mm could be attained within 5-6 months by this species⁹. This agrees closely with the juvenile residence period reported for the same species from the Cochin backwaters². Thus, it could be deduced from this study that juveniles of *M. dobsoni* occurring along the Goa coast grow initially in the shallow mangrove region bordering the lower reaches of the estuary and later move into the deeper waters of the open estuary, and under normal circumstances they grow to 50-60 mm within 5-6 months before emigrating to the sea.

Discussion

Postmonsoon was identified as the active breeding period of *M. dobsoni* in the coastal waters of Goa while poor breeding was observed during the monsoon season^{5,6,10,11}. The postlarval ingress into the Mandovi estuary thus reflects clearly its breeding behaviour in the coastal waters.

The low saline conditions prevailing in the estuaries have been attributed to be primarily responsible for the entry of postlarval penaeids into the estuarine habitat¹²⁻¹⁴ as this is reported to augment their growth by efficient conversion of food^{15,16}. Although salinity in the estuaries is relatively lower than in the open sea, the present results do not fully agree with the above argument since postlarvae occurred more in the lower reaches where the salinity was higher than in the middle and upper reaches. Moreover, the maximum number of postlarvae were also encountered (November-March) when the salinity in the estuary was high ($> 32 \times 10^{-3}$). Observations made from some other estuaries also do not support the low salinity theory. In the Australian estuaries, postlarval abundance of some species of penaeid prawns occurred in wide salinity ranges and at times in very high salinity also¹⁷⁻¹⁹. In the Mexican lagoon system, on the other hand, postlarval entry occurred regardless of salinity changes²⁰. The present results also point out that salinity alone in the estuary may not form a decisive factor in their immigration and growth.

Substratum preference for settlement is known for several species of penaeid prawns. Some of them prefer the mangrove region of the estuary²¹⁻²⁴. Within the estuary also, habitat preference varies from species to species depending on the growth stage. For instance, early juveniles of *Penaeus merguensis* inhabit the shallower waters of the upper reaches in the mangrove estuary of the Gulf of Carpentaria and emigrate to deeper waters with increasing size²¹. Analogous observations were made in other species of penaeid prawns^{19,25-27}. Similar type of habitat preference is exhibited by different size groups of *M. dobsoni*. This type size distribution within the nursery ground may be attributed to their physiological needs with growth or food preference²⁸.

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