

# MATURATION OF *METAPENAEUS MOYEBI* (KISHINOUE) IN GOA ESTUARIES

S. R. SREEKUMARAN NAIR, C. T. ACHUTHANKUTTY & A. H. PARULEKAR  
*National Institute of Oceanography, Donapaula, Goa, 403 004.*

Nair, S. R. S., C. T. Achuthankutty & A. H. Parulekar. Maturation of *Metapenaeus moyebi* (Kishinouye), in Goa Estuaries. *Proceedings of the National Seminar on Aquaculture Development in India—Problems and Prospects*, Trivandrum, 27–29 November, 1990. pp. 115 to 118.

## ABSTRACT

An assessment of the stake net fishery in the Mandovi and Zuari estuaries of Goa revealed that *Metapenaeus moyebi* (Kishinouye), a penaeid prawn hitherto rarely recorded in Indian waters, formed a good percentage of the estuarine prawn fishery of Goa. At one study point it formed as much as 30.77% of the stake net fishery. Also, 35.1% of the males caught were with fully developed spermatophores. Interestingly, females in maturity stages III and IV were caught from one estuary. Our data shows that this species is not only of importance in the estuarine prawn fishery of Goa, but also suggests the possibility of this species attaining sexual maturity and spawning within this estuarine habitat.

## INTRODUCTION

Penaeid prawns are known to undergo their early development and growth in estuarine environment and migrate back to the sea for maturation and spawning (Wickins, 1976). *Metapenaeus burkenroadi* Kubo, now synonymised by Holthuis (1980) as *M. moyebi* (Kishinouye), rarely occur along the Indian coast and are reported only in small numbers from the southern parts of India (George, 1969; Kurian and Sebastian, 1976; Fischer and Bianchi, 1984). This species was sighted in mature condition at barmouth of the Pulicat Lake (Muthu and Manickam, 1973) and in the estuaries of Cochin and Goa (George, 1969; 1980). The above reports however, record only stray occurrences of this species and incidentally mention the presence of a few mature specimens. On the contrary, we observed the maturation of *M. moyebi* in two estuaries of Goa for a period of 5 months and also studied the abundance and distribution.

## MATERIALS AND METHODS

Prawn samples were regularly collected from stake net catches once a month from February to June 1990 from 4 selected sites in the Mandovi-Zuari estuarine system of Goa (Fig. 1). These 4 sampling sites were chosen to represent the lower and upper reaches of the estuarine system upto which estuarine prawn fishery exists in Goa. All samples were analysed for species composition, total length, weight, sex and maturity stages. Exploratory trawlings were made in the Mandovi estuary and also in the nearshore waters (Fig. 1). Hydrographical parameters were determined by standard methods of collection and analysis (Strickland and Parsons, 1962).

## RESULTS

### Environmental parameters

Water temperature, salinity, dissolved oxygen and pH of bottom water were determined at all the stations. The maximum

and minimum temperature values recorded were 32.5 and 26°C respectively, during the period of study. The bottom salinity in the Mandovi estuary ranged between 12.90 and  $32.05 \times 10^{-3}$  while in the Zuari estuary, the range was between 15.77 and  $34.7 \times 10^{-3}$ . Dissolved oxygen varied from 3.39 to 4.9 ml/dm<sup>3</sup> in the Mandovi estuary and 3.1 to 4.3 ml/dm<sup>3</sup> in the Zuari estuary. The pH values ranged between 7.0 and 8.05.

### Distribution and abundance

Of the 11 species of penaeid prawns trapped in the stake nets, *M. moyebi* formed on an average, 7.7% of the total catch. This species was caught from all the 4 sampling stations almost during the entire period except in April and June at St. 2, in February at St. 3 and in May at St. 4. The percentage of this species to the total penaeid catch was between 0.57 (St. 4, June) and 30.77 (St. 3, March). The male to female ratio from the four sampling sites averaged 1.6:1.

Maximum number of this species from the Zuari estuary was collected during April from St. 3 and from the Mandovi estuary during March from St. 1 where it formed about 20.06% of the total penaeid prawn catch.

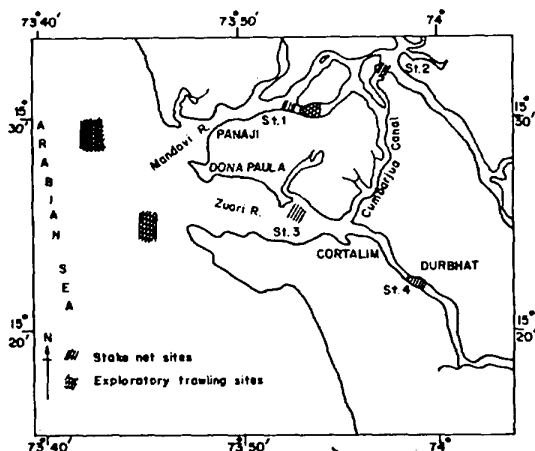


Fig. 1. Study area and station locations

This species was represented in the catches by 31–40 to 91–100 mm size classes. But the maximum represented size range was 41–60 mm in all collections except in February when 61–100 mm size specimens dominated at St. 4.

### Male maturation

Only males carrying clearly visible spermatophores were included in the matured group. The smallest size at which such matured males were caught from both the estuaries was 40 mm. 35.1% of the males caught had spermatophores attached to them. Males of 31–40 mm size class onwards showed full maturation in the Zuari estuary while in the Mandovi it was only from 41–50 50 mm size class.

### Female maturation

Females caught in maturity stages III and IV (Rao, 1968) are considered mature in the present study. Most of the matured females were caught at St. 1, where nearly 4% of the females caught were in matured condition. Majority of the matured females belonged to the size class 71–80 mm although a few females of the size class 51–60 mm also had matured ovaries. Experimental trawling conducted near St. 1 (indicated in Fig. 1) also revealed identical results. Matured females were caught in the months of February and June.

### DISCUSSION

It was interesting to observe that this species constitute a fairly good percentage of the penaeid prawns caught in the Mandovi-Zuari estuarine system of Goa and also attain maturity in the estuarine environment. The presence of stage IV females of this species at stations 1 and 2 suggests strong possibilities of their breeding inside the estuarine system because females with such advanced

ovaries may not be able to reach the sea in time for spawning.

The bottom waters at St. 1 in the month of June when maximum of matured females were caught had salinity of  $18.79 \times 10^{-3}$ , temperature 29°C and pH 7.55. This suggests the possibility of *M. moyebi* selecting warm brackishwater environments of medium salinity for spawning.

Most of the males above a size range 51–60 mm were fully matured. Although only 35% of all males caught were recorded as matured, the actual percentage of sexually matured males would be much higher since a good percentage of the males might have either deposited the spermatophore in females near to their capture or would have lost them while moulting.

Another interesting aspect of the distribution of this species is its negligible contribution to the coastal penaeid prawn fishery of the Goa coast. Results of some exploratory trawlings conducted off the Goa coast revealed that very few females of this species had mature ovaries and the male population was almost negligible. This fact also favours the view that this species, unlike other penaeid prawns of this area, may be attaining sexual maturity and spawning in estuaries.

#### ACKNOWLEDGEMENTS

The help rendered by Miss. Anna Dias and Miss. Nutan Pangam in the field are gratefully acknowledged.

#### REFERENCES

- Fischer, W. and G. Bianchi, 1984. FAO species identification sheets for fishery purposes. Western Indian Ocean area. 51, FAO, Rome.
- George, M. J. 1969. Systematics-taxonomic considerations and general distribution. *Bull. Cent. Mar. Fish. Res. Inst.*, 14: 5–48.
- George, M. J. 1980. Systematics of the commercially important prawns (Crustacea, Decapoda. Subfamily Penaeinae) from Goa. *J. Bombay Nat. Hist. Soc.*, 76 (3): 297–304.
- Holthuis, L. B. 1980. FAO Species Catalogue. Vol. 1 Shrimps and prawns of the world. *FAO Fish. Synop.* 125, 271 pp.
- Kurian, C. V. and V. O. Sebastian. 1976. Prawn and prawn fisheries of India, Hindustan Publishing Co, New Delhi, 280 pp.
- Muthu, M. S. and P. E. S. Manickam. 1973. On the occurrence of mature specimens of *Metapenaeus burkenroadi* Kubo in the Pulicat Lake. *Indian J. Fish.*, 20 (1) : 61–69.
- Nair, P. V. R., G. Luther and C. Adolph. 1967. An ecological study of some pools near Mandapam (South India) formed as a result of the cyclone and tidal wave of 1964. *J. Mar. Biol. Ass. India*, 7 : 420–439.
- Rao, P. V. 1968. Maturation and spawning of penaeid prawns of the south-west coast of India. *FAO Fish. Rep.*, 2 (57) : 285–302.
- Strickland, J. D. and T. R. Parsons. 1962. A practical handbook of seawater analysis. *Fish. Res. Bd. Canada Bull.*, 167, 311 pp.
- Wickins, J. F. 1976. Prawn biology and culture. *Oceanogr. Mar. Biol. Rev.* 14 : 435–507.