

ON THE OCCURRENCE OF *Plesionika ensis* (A. MILNE EDWARDS) (PANDALIDAE, CRUSTACEA) IN THE ARABIAN SEA WITH NOTES ON ITS BIOLOGY AND FISHERY POTENTIALITIES*

By C. SUSEELAN AND K. H. MOHAMED**
Central Marine Fisheries Research Institute

THE genus *Plesionika* Bate, which comprises mostly of deep-water prawns, is represented in Indian waters by six species and none of them is known to occur in such quantities as to form a sizable portion of any commercial catch. *Plesionika ensis* (A. M. Edwards) was present in fair quantities in the exploratory trawler landings of the Indo-Norwegian Project vessels from south-west coast of India. The only previous record of the species from the Indian Ocean region is that of Alcock (1901), who collected two specimens from the Andaman Sea. The exploratory trawling operations in the deeper waters (at depths ranging from 200 to 395 metres) were carried out from October 1967 to February 1968 with suitably designed shrimp-trawls in the offshore areas lying between Quilon and Ponnani (Lat. 08°40' N. to 10° 55' N. and Long. 75° 35' E. to 75° 55' E.) (Fig. 4). *P. ensis* was obtained from almost all these areas in varying quantities and as this species is so far known to science from only limited number of specimens a brief description is given here together with notes on its biology and fishery possibilities.

Family : PANDALIDAE

Plesionika ensis (A. Milne-Edwards) (Fig. 1A)

AcanthePHYRA ensis A. Milne-Edwards, 1881, p. 14.

Pandalus ensis A. Milne-Edwards, 1883, pl. 18.

Plesionika uniproducta Spence Bate, 1888, p. 641, pl. 113, fig. 1.

Pandalus (Plesionika) ensis Alcock, 1901, p. 96.

Pandalus ensis Rathbun, 1906, p. 914.

Plesionika ensis De Man, 1920, p. 113 (in key).

Plesionika ensis Holthuis, 1951, pp. 55-59.

In most of the characters the specimens on hand agree with the descriptions of the species by Alcock (1901) and Holthuis (1951). Body smooth but covered with characteristic scales. These scales (0.272 to 0.368 mm. in length and 0.096 mm.

* Published with the permission of the Director, Central Marine Fisheries Research Institute, Mandapam Camp.

** Present Address : Central Marine Fisheries Research Sub-station, Cochin-16, India.

in breadth) are lanceolate and are provided with ventrally curved short peduncle (fig. 1B). They are highly deciduous and the small pits in which they are planted give a squamose appearance to the integument under low magnification.

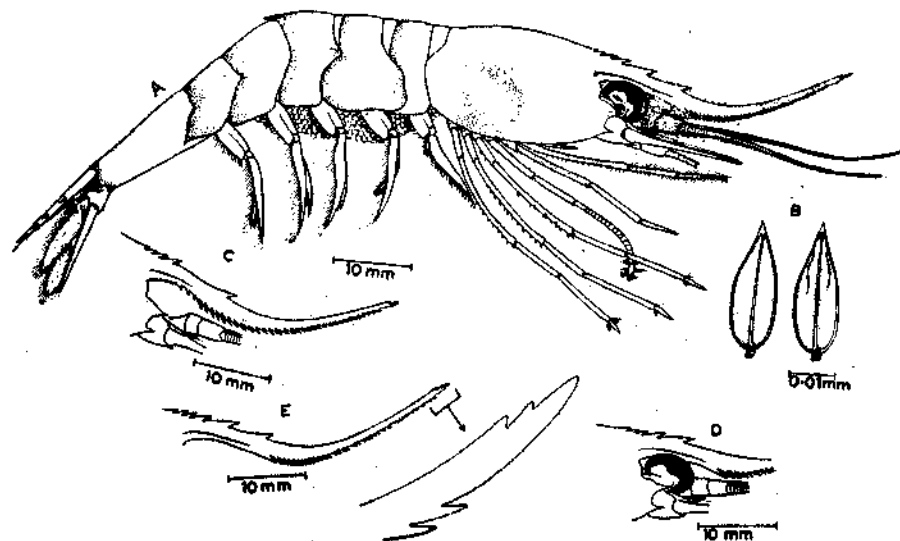


FIG. 1. *Plesionika ensis* (A. Milne-Edwards) : A. Berried female (95 mm), stippled portions of the body indicate deep red colouration ; B. Scales ; C. Rostrum with fifth dorsal tooth absent and the ventral denticulation commencing from far behind the normal position ; D. Rostrum with the sixth dorsal tooth absent ; E. Rostrum with two sub-apical teeth.

Rostrum long, moderately slender, having a double curve with the apex pointing upwards and reaching a good deal above the level of the dorsal surface of the carapace. It surpasses the scaphocerite by half or more its length in young specimens and less than half in adults. The rostrum of Alcock's egg-laden female, even though broken at its tip, was more than double the length of carapace. While describing the specimens obtained from Rio Muni, Holthuis (*op. cit.*) observed that the rostrum is 'very long and slender'. Bate (1888) recorded its length to be as long as carapace. In the large number of specimens examined by us the length of rostrum varied between 1.5 and 1.75 times the length of carapace, the younger specimens generally having relatively longer rostrum than the adults. In both sexes there are 5 to 6 (usually 6) proximally placed teeth on its upper margin ; the first 4 of which are placed close together above the orbit while the succeeding ones are isolated. The first tooth is movable and very small, hardly visible to naked eye. The sizes of the succeeding teeth show gradual increase until the fifth which is the largest of all. The fifth or the sixth tooth may be occasionally wanting (fig. 1C, D). The sixth tooth is placed at the level of the last segment of the antennular peduncle and the margin of the rostrum beyond this tooth (which is about 2/3 entire length of the rostrum) is smooth except for the single sub-apical tooth. In one male specimen (95 mm.), however, an additional sub-apical tooth was also observed (fig. 1E). The ventral margin of the rostrum carries a row of 34-46 fixed teeth which are relatively smaller and sharp. These denticulations usually commence from the level slightly in advance of the last dorsal tooth, but in one specimen (fig. 1C) among our

collections it commenced from far behind. The width of the ventral denticulations was often found to be variable as was observed by Holthuis (*op. cit.*).

The carapace smooth, $1/3$ in length of abdomen including telson. The characteristic mid-dorsal spine on the posterior border of the 3rd abdominal tergum quite distinct in both the sexes. The 6th somite is 2.5 times as long as high and 2.5 to 2.7 times as long as the 5th. The telson $9/11$ length of 6th somite and is armed with 3 pairs of terminal spines and an equal number of small movable spines dorso-laterally. The outermost pair of the terminal spines is very short and movable, while the inner pairs are long, slender and fixed. In the relative lengths of the 6th somite and telson the present specimens agree with the descriptions of Bate (*op. cit.*) and Alcock (*op. cit.*) who observed the telson to be shorter than the 6th somite, although these measurements were observed to be equal by Holthuis (*op. cit.*).

All pereopods except the last pair carry well developed epipods. The 1st and 2nd pereopods are almost equal in length reaching the end of scaphocerite. The number of carpal joints in the 2nd pereopods varied between 15 and 17 in both the sexes as against 20 reported by Holthuis. The last three pairs of pereopods are longer than the first two. The third, which is the longest of all, is a little more than 1.25 times the first and surpasses the end of scaphocerite.

Colouration: In fresh condition the body is pinkish throughout. The abdominal somites appear well defined due to the concentrations of deep red chromatophores forming stripes on the posterior borders of the terga and pleura. The mid-dorsal spine on the 3rd abdominal tergum reddish. A pair of deep red crescentic blotch apposed against each other on the branchio-cardiac region of the carapace (fig. 1A) appears to be characteristic of the species. Appendages generally pinkish; tip of rostrum, distal portion of the antennular flagella, exopod of 3rd maxilliped and uropods dark red. Antennal and pterygostomial spines as well as the setae on the borders of the pleopods white. Spines on telson dark red. In mature females the deep blue colour of the eggs can be seen through the carapace. The egg-mass of the berried female is deep blue but this colour fades gradually as the embryos develop. In advanced stages of development the berry appears whitish and the dark eye spots of the embryo are visible.

Distribution: Although considered rare, the species enjoys a world-wide distribution similar to *P. martia*—a very closely related species recently recorded from these waters by George and Rao (1966)—and has been reported to occur in Pacific, Atlantic and Indian Ocean. It is recorded from Barbados, Martinique and Grenada of West Indies; Barra Grande in Brazilian coast; Rio Muni in Gulf of Guinea; Hawaiian Islands and Andaman Sea. The present record extends its distribution to the Arabian Sea.

Biology and Fishery: The occurrence of the species in such large numbers has made it possible to make general observations on some aspects of the biology of the species. The size range* of the species in the catches varied from 58 to 118 mm. and their count was 300 to 330 numbers per kg. The largest individual prawn observed was 118 mm. female and it weighed 4.5 gms. The size frequency distribution (fig. 2) of the species in the catches showed that the size variation bet-

* The total length and the carapace length of the specimens examined for this purpose were measured from the tip of rostrum to the tip of telson and from the orbital margin to the posterior dorsal edge of the carapace respectively.

ween the two sexes is not significant at any stage indicating that the growth rate in both the sexes is more or less equal. It would also appear that the species do not

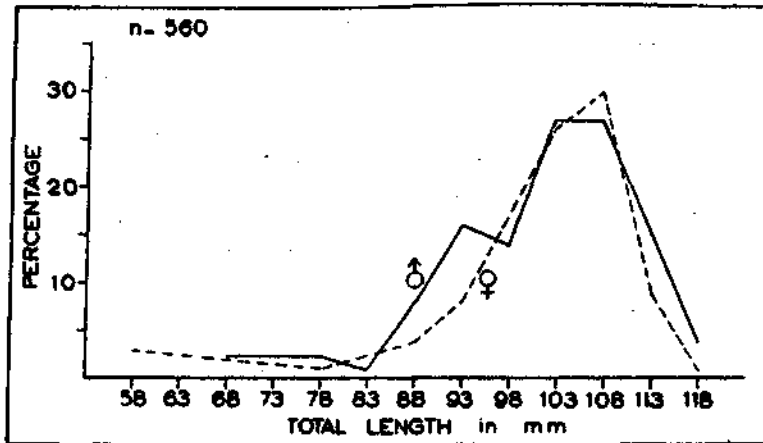


FIG. 2. Size distribution of *P. ensis* in the exploratory trawl catches.

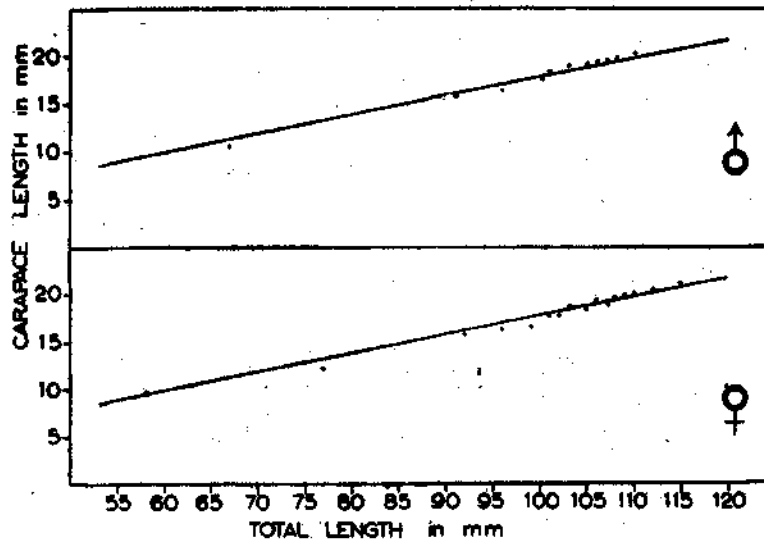


FIG. 3. *Plesionika ensis*: Relationship between carapace and total length.

show protandric hermaphroditism as is the case in some other Pandalids. In female the modal size was at 106-110 mm. while in male, in addition to this principal mode, there was a subsidiary mode at 91-95 mm. The linear relationship of carapace length to total length in prawns ranging from 58 to 118 mm. was estimated as

$$C = -1.98417 + 0.19883 L \text{ in males and}$$

$$C = -1.55502 + 0.19306 L \text{ in females}$$

where C is the carapace length and L the total length in mm. (Fig. 3).

Females were generally predominant in the catches and the overall sex ratio was observed to be 2 : 3. Berried females and those with head-roes were encountered in the catches in all the months of observation indicating that the species breeds throughout the year. The smallest of the berried female collected was 89 mm. in total length and 16 mm. in carapace length. The eggs on the pleopods are oval in shape and they measure 0.640 to 0.896 mm. in length and 0.560 to 0.704 mm. in width. The size of these eggs was found to be larger than what was observed by Holthuis (*op. cit.*). The fecundity of the species was estimated by total count of fertilised eggs attached to the pleopods of 5 berried females; the details of which are given below :

Carapace length of <i>P. ensis</i> in mm.	Total number of eggs on pleopods
17.0	1553
17.3	1888
18.5	2950
18.8	3890
21.0	3927

The exploratory deep-water trawling operations were conducted with a view to locate possible new shrimp resources off the south-west coast of India. Fishing was carried out with a 45 m. head rope shrimp trawl on the continental slope at depths ranging from 200 to 395m. Of the 190 hauls made during the season 153 contained prawns and *P. ensis* occurred in 117 of these hauls. Particulars of the catch are as follows :

1. Total number of hauls made	..	190
2. Total fishing effort (duration of actual trawling)	..	183.28 hrs.
3. Total weight of catch	..	45271.00 kg.
4. Total weight of prawns	..	23054.00 kg.
5. Total weight of <i>P. ensis</i>	..	432.17 kg.
6. Catch of <i>P. ensis</i> per hour of trawling	..	2.36 kg.
7. Percentage of <i>P. ensis</i> in prawns catch	..	1.90

In individual hauls the catch of the species varied from 0.2 to 11.6 kg. per haul of approximately one hour duration and it was always obtained as part of large quantities of the deep sea catches which included fishes, prawns and other crustaceans. The common species which are associated with the occurrence of *P. ensis* are :

FISHES—*Chlorophthalmus agassizi*, *C. bicornis*, *Cubiceps natalensis*, *Epinnula orientalis*, *Neoscopeleus macrolepidotus*, *Neobythites steaticus*.

PRAWNS—*Aristeus semidentatus*, *Solenocera hextii*, *Penaeopsis reducta*, *Metapenaeopsis andamanensis*, *Plesionika martia*, *Parapandalus spinipes*, *Heterocarpus wood-masoni*, *H. gibbosus*.

OTHER CRUSTACEANS—*Thelxiope megalops*, *Pleistacantha moseleyi*, *Nephropsis carpenteri*, *Eumunida funambulus*, *Puerulus sewelli*.

The areawise analysis of the catches showed that relatively larger quantities of *P. ensis* were caught from the southern areas than from the north (fig. 4). The

species formed as much as 3% of the prawns landed from off Quilon. Along with other prawns this species was also processed for export by the Indo-Norwegian Project. For freezing the recovery of headless 'tail' was 50% by weight and the

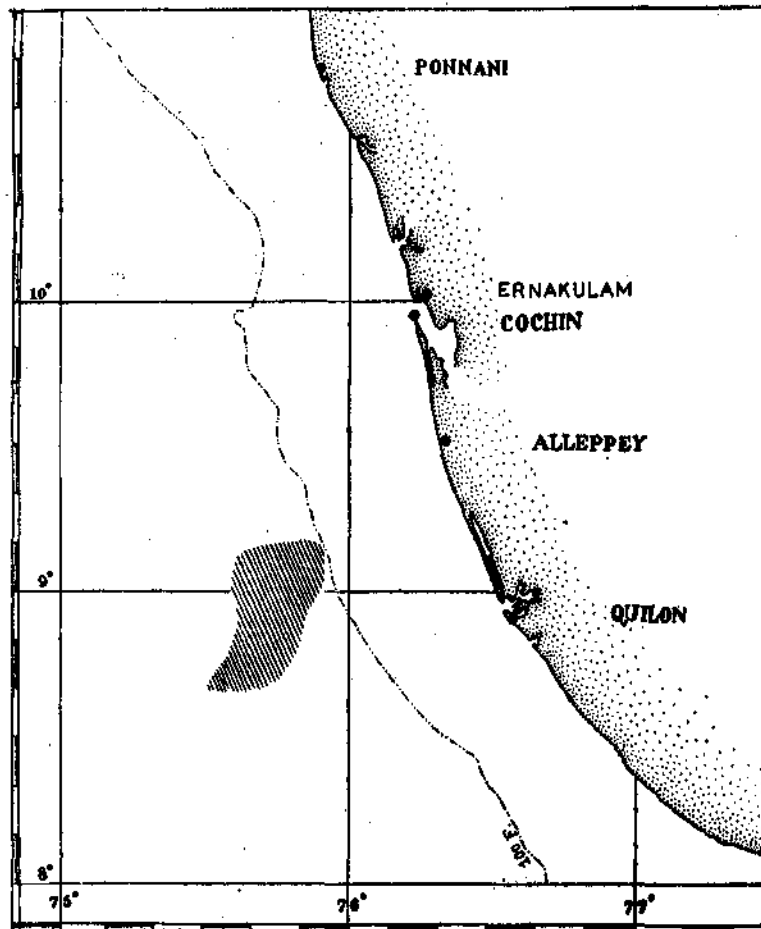


FIG. 4. Chart showing area of exploratory fishing. Hatched portion indicates area from where better yield of *P. ensis* was recorded.

meat alone accounted for 36% of the total weight. Although not a species growing to a very large size its resemblance in general appearance, body colour and colour of meat with that of other pandalid prawns of Europe is likely to attract commercial interest. The exploratory trawling conducted so far is by no means exhaustive, but the information collected indicate the existence of a new resource of possible commercial value.

The authors are thankful to their colleague Mr. M. J. George for going through the typescript and suggesting improvements.

REFERENCES

- ALCOCK, A. 1901. *A Descriptive Catalogue of the Indian Deep-sea Crustacea Decapoda, Macrura and Anomala in the Indian Museum, Calcutta, India* : 94-97.
- BATE, C. S. 1888. Report on the Crustacea Macrura collected by H.M.S. 'Challenger' during the years 1873-76. *Rep. Sci. Res. Voy. H.M.S. 'Challenger'*, 24 : 641-644.
- DE MAN, J. G. 1920. Decapoda Part IV. *Siboga Exped. Monogr.*, 39a : 106-113.
- GEORGE, M. J. AND VEDAVYASA RAO, P. 1966. On some decapod crustaceans from the south-west coast of India. *Proc. Symposium on Crustacea I* : 330.
- HOLTHUIS, L. B. 1951. The caridean Crustacea of the Tropical West Africa. *Atlantide-Report*, 2 : 55-59.
- MILNE-Edwards, A. 1881. Description de quelques Crustacés Macroures provenant des grandes profondeurs de la mer des Antilles—*Ann. Sci. Nat. Zool., Ser. 6*, 11 (4) : p. 14.
- . 1883. *Recueil de Figures de Crustacés nouveaux ou peu connus*.
- RATHBUN, M. J. 1906. The Brachyura and Macrura of the Hawaiian Islands. *Bull. U.S. Fish. Comm.*, 23 : 914.