SOME ASPECTS OF BIOLOGY OF A LESS KNOWN PENAEID PRAWN *PARAPENAEUS LONGIPES* ALCOCK AT MANGALORE

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ABSTRACT

A marked difference in growth rate was observed between males and females of *Parapenaeus longipes* at Mangalore. The relationships both between length and weight and between total length and carapace length were different in the sexes. Though smallest prawn that was found with fully mature ovary was 55 mm, it was at 68 mm and above that majority of the prawns were mature. Females generally outnumbered males in the catches. Percentage of maturity among females was highest in May.

INTRODUCTION

Although there are a few distributional records of *P. longipes* (Alcock 1905, George 1966, 1979), the species is not known to occur as a fishery in any area and, therefore, virtually nothing is known about its biology. But, recently this species had appeared, though briefly, in considerable numbers in the catches of trawlers operated off Mangalore coast at the depth of 10-20 mm. Interestingly, it was around the month of May each year, from 1980 to 1982, that they occurred in the catches. This availability, however, made it possible to study a few aspects of the biology of the species as permitted by the limited period of occurrence.

Altogether 11 samples, consisting of 1493 prawns, were collected during the months May 1980, April-May 1981 and May-June 1982. These were examined for total length, weight, sex and maturity conditions.

OBSERVATIONS

Fishery: There was no fishery exclusively for *P. longipes*. The species was occurring as a by catch along with other species at Mangalore. The estimated catch amounted to 1.5 t in May 1980 and 2.7 t in April-May 1981. Most of the catches were obtained during the fourth week of May. The c.p.u.e. varied from 0.5 to 3.5 kg per boat per day.

Size distribution: The length ranged from 48 to 69 mm in males and 48 to 81 mm in females in May 1980. During April-May 1981, the respective ranges

were 51 to 78 mm and 48 to 81 mm. During May-June 1982 the size ranged from 48 to 69 mm in males and 51 to 78 mm in females. The length-frequency data for different days of observation were plotted separately, with the length measurements grouped into 5 mm class intervals. In order to eliminate minor modes and also to remove possible bias in sampling, three point moving averages have been adopted so as to project only prominent modes (Fig. 1). It could be seen that in females, the brood 'a' at 63 mm on 2-5-80 has progressively

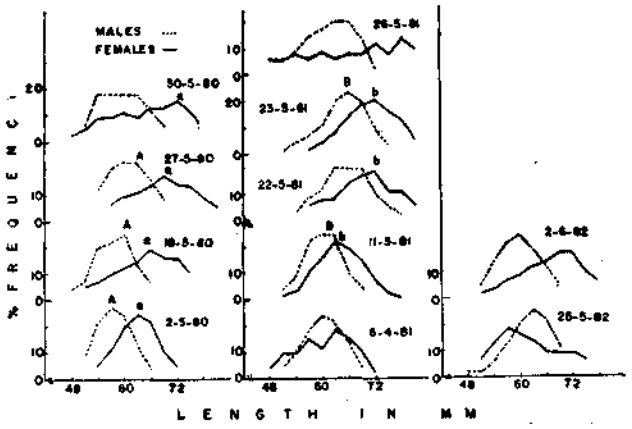

FIG. 1. Length frequency distribution of *P. longipes* at Mangalore.

shifted to 72 mm by 30-5-80 thereby registering a growth increment of 9 mm in 28 days. In the case of males, the dominent mode 'A' at 57 mm on 2-5-80 appears to have shifted to 63 mm by 27-5-80 showing a growth of 6 mm in 25 days. However, the data for May 81 indicated a faster rate of 6 mm in 12 days in males and 15 mm in 15 days in females. From all these, the average growth works out to 9.7 mm in males and 16.7 mm in females per month. This marked difference in growth rates, however, seems to be too great to be relied upon, and hence cannot be taken as conclusive unless confirmed, if possible, by a more detailed study covering a longer period.

Length-weight relationship: 97 males and 99 females were studied for the length-weight relationship. The length-weight relationship was derived separately for each sex using the formula, $W = aL^n$, where W is the weight of the prawn in g; L is the length of the prawn in mm and 'a' and 'n' are constants. The relationship among males and females are given by the following regression equations (Figs. 2 and 3).

$$\text{Males : } \log W = 3.6005 + 2.1270 \log L, \quad r = 0.7514$$
$$\text{Females : } \log W = 4.0472 + 2.4056 \log L, \quad r = 0.7833$$

The identicality of these regression lines when tested was found that these lines were significantly different (Table 1). Similarly, the slopes were also tested, which suggested that they were not significantly different (Table 2).

Total length-carapace length relationship: Altogether 77 males and 75 females were measured to determine the total length-carapace length relationship. The relationship was derived separately for males and females as follows (Figs. 4 & 5):

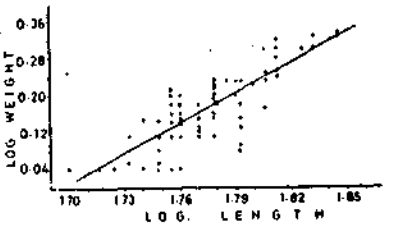

FIG. 2. Regression of weight on total length in the males of *P. longipes*.

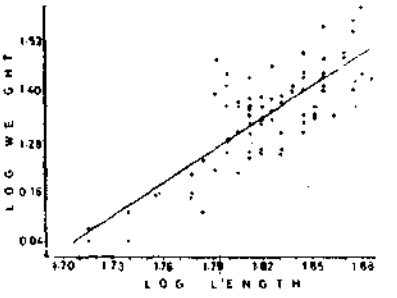

FIG. 3. Regression of weight on total length in the females of *P. longipes*.

TABLE 1. *Anova table for testing identicality of regression lines in the length-weight relationship among males and females of* P. longipes.

Deviation due to	d.f.	S.S.	M.S.	F observed	F 5%
Sex	2	0.0831	0.04155	9.40*	3.04
Error	192	0.8486	0.00442		
Total	194	0.9317			

* Significant at 5% level

d.f. - degrees of freedom; S.S. - Sum of Squares; M.S. - Mean Squares

TABLE 2. *Anova table for testing equality of slopes in the length weight relationship among males and females of* P. longipes.

Deviation due to	d.f.	S.S.	M.S.	F observed	F 5%
Sex	1	0.0043	0.0043	0.97*	3.89
Error	192	0.8486	0.00442		
Total	193	0.8529			

* Significant at 5% level

d.f. - degrees of freedom; S.S. - Sum of Squares; M.S. - Mean Squares

Males: C = 0.5932 + 0.2261 L, r = 0.9061

Females : C = −1.7878 + 0.2684, r = 0.9598

The regression line when tested for their identicality were found to be significantly different at 5% level (Table 3). Similarly, the slopes were also significantly different when tested for their equality (Table 4).

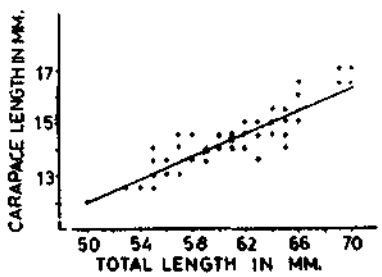

FIG. 4. Regression of carapace length on total length in the males of *P. longipes.*

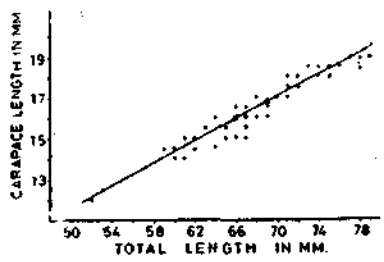

FIG. 5. Regression of carapace length on total length in females of *P. longipes.*

Breeding: In the development of the ovary of *P. longipes,* four maturity stages, i.e., immature, early maturing, late maturing and mature, have been recognised as in other species. The percentage distribution of various maturity stages during different months indicates that 19.6%, 3.4%, 11.9% and 4.8% females were mature, respectively during May 80, April and May 81 and June 82. All these facts suggest that this prawn spawns during April-June.

Size at maturity: The majority of females of *P. longipes* were found to mature at 68 mm in length and above, though the smallest female with fully matured ovary measured 55 mm in length.

TABLE 3. *Anova table for testing identicality of regression lines in the total length carapace length relationship among males and females of* P. longipes.

Deviation due to	d.f.	S.S.	M.S.	F observed	F 5%
Sex	2	3.66	1.83	8.86*	3.06
Error	148	30.57	0.2066		
Total	150	34.23			

* Significant at 5% level

d.f. - degrees of freedom; S.S. - Sum of Squares; M.S. - Mean Squares

TABLE 4. *Anova table for testing equality of slopes in the total length carapace length relationship among males and females of* P. longipes.

Deviation due to	d.f.	S.S.	M.S.	F observed	F 5% F
Sex	1	1.45	1.45	7.02*	3.91
Error	148	30.57	0.2066		
Total	149	32.02			

* Significant at 5% level

d.f. - degrees of freedom; S.S. - Sum of Squares; M.S. - Mean Squares

Sex ratio: The percentage distribution of females during different days of observation show that the preponderance of females was fairly high on all days except 27-5-80, 22-5-81 and 25-5-82, when the percentage of males was found to be more.

Sizewise distribution of sexes indicated that the proportion of males was generally high up to 56-60 mm length and that females dominated the population beyond that size (Table 5).

TABLE 5. *Sizewise distribution of sexes of* P. longipes *at Mangalore. (Figures denote percentages)*

Size group mid-point (mm)	May 80		April 81		May 81		May 82		June 82	
	M	F	M	F	M	F	M	F	M	F
38	—	—	—	—	100.0	—	—	—	—	—
43	—	—	—	—	50.0	50.0	100.0	—	—	—
48	88.9	11.1	11.1	88.9	21.0	79.0	25.0	75.0	50.0	50.0
53	62.0	38.0	43.8	56.2	57.8	42.2	11.1	88.9	66.7	33.3
58	67.1	32.9	57.4	42.6	59.6	40.4	52.0	48.0	68.0	32.0
63	36.4	63.6	40.4	59.6	50.0	50.0	72.5	27.5	41.5	58.5
68	23.0	77.0	22.2	77.8	43.0	57.0	56.2	43.8	23.0	77.0
73	—	100.0	—	100.0	28.8	71.2	—	100.0	—	100.0
78	—	100.0	—	—	2.6	97.4	—	—	—	100.0
83	—	100.0	—	—	14.3	85.7	—	—	—	—

M - males; F - females

The sudden appearance of *P. longipes* in April-May in the trawl fishery and then complete absence during the rest of the season is quite puzzling. It is possible that the species is an inhabitant of deeper waters. Earlier accounts also indicated that it is distributed up to a depth of 88 m (Holthuis 1980).

Acknowledgement

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References

Alcock, A. 1905. A revision of the genus *Penaeus* with diagnoses of some new species and varieties. *Ann. Mag. nat. Hist.*, (7)16: 508-532.

George, M. J. 1966. On a collection of penaeid prawns from the offshore waters of the south-west coast of India. *Sym. ser. Mar. bio. Ass. India,* (2) Pt. 1 337--346.

George, M. J. 1979. Taxonomy of Indian Prawns (Penaeidae, Crustacea, Decapoda). *Contributions to Marine Sciences Dedicated to Dr. C. V. Kurian,* 1979: 21-59.

Holthuis, L. B. 1980. FAO species Catalogue. Vol. 1. Shrimps and prawns of the world. An annotated catalogue of species of interest to fisheries. *FAO Fish. Synop.,* (125) Vol. 1: 261 p.

Kubo, I. 1951. Some Macrurous Decapod Crustacea found in Japanese waters with discriptions of four new species. *J. Tokyo Univ. Fish.,* 38(2): 259-289.