

Detailed Morphometric Studies in *Penaeus indicus* Milne Edw. from Veli Lake, Trivandrum

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The results of a detailed morphometric study of 36 characters of one of the commercially important penaeid prawn, *Penaeus indicus* Milne Edw. have been presented in this paper. Reports are already available suggesting that the females of this species grow to a larger size than the males. The present study showed that irrespective of the size difference, the rate of growth of almost all the characters remain the same except the propodus of 1st pereopod. Comparison of F values of both slopes and elevations and also regression equations for all the characters of the two sexes have been presented. The present data forms the basic information of the growth pattern in this species, which can be utilized for establishing the taxonomic status of this species.

Key Words : Morphometrics, *P. indicus*, Regression, Analysis of covariance, Trivandrum coast

Introduction

A lot of studies on the age and growth in penaeid prawns are available (Sriraman et al. 1987 for review). Similar studies in palaemonid prawns have been made by Koshy (1969, 1971), Jayachandran and Joseph (1985, 1988) and Sebastian (1993). Eventhough the taxonomic studies in crustaceans are largely based on the morphological and also on the proportions of different body parts, allometric studies of

these characters are seldom being made. Such studies of these characters will also help in establishing sexual dimorphism.

Penaeus indicus is a commercially important species which spent its larval and early part of life cycle in estuaries. This species is very closely related to *P. penicillatus* and *P. merguensis* and the taxonomic status of the three sometimes been much confused (Fischer & Bianchi 1984). In order to solve this problem, accutnulation of basic

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data is necessary for each species. The present study is a detailed allometric study of *P. indicus* collected from Veli Lake, Trivandrum coast.

Material and Methods

A total of 65 male specimens (ranging in total length from 55 to 121 mm) and 59 females specimens (ranging in total length from 52 to 129 mm) of *P. indicus* had been collected from Veli Lake, Trivandrum coast during April 1985. Sex of each specimen was identified on the basis of the presence of the thelycum or petasma. The following 36 measurements of each specimen were accurately made. Total lengths, carapace length, length of rostrum, length of cephalothorax, maximum width of carapace, length of telson, total length of 1st to 5th pereopods and also lengths of ischium, merus, carpus, propodus and dactylus of each pereopod. The regression of characters, such as, carapace length, length of rostrum, length of cephalothorax, width of carapace, length of telson and total length of 1st to 5th pereopods on total length of prawn; such as, length of rostrum, width of carapace and length of cephalothorax on carapace length and such as, the lengths of ischium, merus, carpus, propodus and dactylus of each pereopod on total length of each respective appendage have been calculated. The method of analysis of covariance was applied for comparison of regressions (Snedecor & Cochran 1975).

Results and Discussion

The results of the analysis of covariance showed that there is no significant difference in the growth pattern between sexes with

regard to almost all the characters studied, except the case of 1st pereopod in relation to the total length of that appendage. A comparison of F values of both slopes and elevations are given in table 1. The regression equations have been calculated separately for the two sexes for all the characters.

Though many taxonomic studies of decapod crustaceans are based on meristic and morphometric attributes, studies dealing with such aspects are very much limited. Koshy (1969, 1971) established the sexual dimorphism in two palaemonid prawns, *M. lamarrei* and *M. dayanum*. Jayachandran & Joseph (1985, 1988) worked out the allometric growth studies of *M. idella* and *M. scabriculum*. Farmer (1986) and Mathews (1992) brought to light the morphometric relationship of various body parameters of commercially important penaeid prawns of the Gulf region. Recently Sebastian (1993) made a comparative allometric study of two closely related species of *M. equidens equidens* and *M. equidens pillai* and established its taxonomic status.

P. indicus is a commercially important prawn in which females grow to a larger size than males (maximum size recorded for males and females are 184 mm and 228 mm respectively) (Holthuis 1980). The present study is a detailed morphometric study of the various characters which showed that eventhough the females grow to a larger size than the males, the rate of growth of almost all the body parts remains the same for both the sexes except for the propodus of 1st pereopod. At present a lot of confusion exists in the taxonomic status of this species with *P. penicillatus* to a greater extent and with *P. merguensis* to a lesser extent (Fischer & Bianchi 1984). Therefore

Table 1 Comparison of regression equations (males and females) of *P. indicus*

Sl. No.	Characters (Y)	Regression equation		Comparison of	
		Male	Female	Slope (F) value	Elevation (F) value
(1)	(2)	(3)	(4)	(5)	(6)
a. Growth in relation to total length (X) and					
1.	Carapace length	$Y = 2.01 + 0.41 X$	$Y = 1.51 + 0.41 X$	0.149	0.323
2.	Length of rostrum	$Y = 1.26 + 0.21 X$	$Y = 1.05 + 0.22 X$	0.388	1.235
3.	Length of cephalothorax	$Y = - 0.81 + 0.21 X$	$Y = - 0.77 + 0.21 X$	0.003	0.004
4.	Width of carapace	$Y = - 0.76 + 0.12 X$	$Y = - 0.69 + 0.12 X$	0.107	0.111
5.	Length of telon	$Y = - 0.71 + 0.13 X$	$Y = - 0.49 + 0.12 X$	0.620	0.096
6.	Total length of 1st pereopod	$Y = 1.50 + 0.17 X$	$Y = 1.76 + 0.16 X$	0.084	0.002
7.	Total length of 2nd pereopod	$Y = 1.30 + 0.23 X$	$Y = 2.13 + 0.23 X$	0.392	0.984
8.	Total length of 3rd pereopod	$Y = 2.04 + 0.33 X$	$Y = 1.81 + 0.33 X$	0.095	0.225
9.	Total length of 4th pereopod	$Y = 1.20 + 0.25 X$	$Y = 2.06 + 0.24 X$	0.366	1.377
10.	Total length of 5th pereopod	$Y = 1.73 + 0.27 X$	$Y = 2.14 + 0.26 X$	0.470	0.796
b. Growth in relation to carapace length (X) and					
11.	Length of rostrum	$Y = 0.31 + 0.53 X$	$Y = 0.22 + 0.54 X$	0.443	3.474
12.	Length of cephalothorax	$Y = - 1.53 + 0.50 X$	$Y = - 1.27 + 0.50 X$	0.058	0.069
13.	Width of carapace	$Y = - 1.10 + 0.29 X$	$Y = - 0.86 + 0.28 X$	0.235	0.002
c. Growth in relation to total length of 1st pereopod (X) and					
14.	Length of ischium	$Y = 0.28 + 0.15 X$	$Y = 0.15 + 0.16 X$	0.489	0.266
15.	Length of merus	$Y = - 0.29 + 0.30 X$	$Y = - 0.19 + 0.29 X$	0.255	0.144
16.	Length of carpus	$Y = - 0.22 + 0.30 X$	$Y = - 0.64 + 0.33 X$	2.558	0.683

(Table 1 Contd.)

(1)	(2)	(3)	(4)	(5)	(6)
17.	Length of propodus	$Y = 0.35 + 0.24 X$	$Y = 0.86 + 0.20 X$	0.070	2.791
18.	Length of dactylus	$Y = 0.29 + 0.13 X$	$Y = 0.35 + 0.12 X$	0.086	0.029
d. Growth in relation to total length of 2nd pereopod (X) and					
19.	Length of ischium	$Y = 0.44 + 0.11 X$	$Y = 0.65 + 0.10 X$	1.795	1.867
20.	Length of merus	$Y = - 0.16 + 0.28 X$	$Y = - 0.54 + 0.30 X$	1.832	0.866
21.	Length of carpus	$Y = - 0.60 + 0.41 X$	$Y = - 0.97 + 0.43 X$	1.118	0.005
22.	Length of propodus	$Y = 0.68 + 0.18 X$	$Y = 1.01 + 0.16 X$	2.019	0.021
23.	Length of dactylus	$Y = 0.77 + 0.08 X$	$Y = 0.77 + 0.08 X$	0.109	1.340
e. Growth in relation to total length of 3rd pereopod (X) and					
24.	Length of ischium	$Y = 0.85 + 0.07 X$	$Y = 0.84 + 0.07 X$	0.028	0.596
25.	Length of merus	$Y = - 0.06 + 0.26 X$	$Y = - 0.71 + 0.28 X$	3.453	2.153
26.	Length of carpus	$Y = - 1.27 + 0.50 X$	$Y = - 0.57 + 0.48 X$	2.495	4.361*
27.	Length of propodus	$Y = 0.49 + 0.16 X$	$Y = 0.42 + 0.17 X$	0.012	0.336
28.	Length of dactylus	$Y = 1.00 + 0.06 X$	$Y = 0.87 + 0.06 X$	0.429	0.143
f. Growth in relation to total length of 4th pereopod (X) and					
29.	Length of ischium	$Y = 0.92 + 0.08 X$	$Y = 0.50 + 0.10 X$	2.387	1.092
30.	Length of merus	$Y = - 1.07 + 0.34 X$	$Y = - 1.35 + 0.36 X$	0.793	0.090
31.	Length of carpus	$Y = - 0.34 + 0.28 X$	$Y = - 0.48 + 0.28 X$	0.013	3.760
32.	Length of propodus	$Y = 0.08 + 0.20 X$	$Y = 0.26 + 0.20 X$	0.296	0.041
33.	Length of dactylus	$Y = 0.74 + 0.09 X$	$Y = 0.99 + 0.08 X$	0.521	1.264
g. Growth in relation to total length of 5th pereopod (X) and					
34.	Length of ischium	$Y = 0.70 + 0.08 X$	$Y = 0.71 + 0.08 X$	0.001	0.081
35.	Length of merus	$Y = - 0.81 + 0.32 X$	$Y = - 1.17 + 0.34 X$	1.208	0.057
36.	length of carpus	$Y = - 0.46 + 0.30 X$	$Y = - 0.73 + 0.30 X$	0.006	7.504**
37.	Length of propodus	$Y = 0.17 + 0.20 X$	$Y = 0.27 + 0.20 X$	0.182	0.007
38.	Length of dactylus	$Y = 0.75 + 0.08 X$	$Y = 0.94 + 0.07 X$	0.186	1.600

Significant at - 1% level (**); 5% level (*).

the present data will form a basic information of various characters of this species which can be utilized for comparison and establishment of the taxonomic status of the confused species.

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