

## GROWTH PATTERN IN THE SLENDER RIVER PRAWN, *MACROBRACHIUM IDELLA* (HILGENDORF)

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### ABSTRACT

The growth of a few important taxonomic characters such as length of carapace, telson and rostrum and width of carapace of river prawn *Macrobrachium idella*, were studied. Significant difference in the pattern of growth was observed in males and females with regard to all the characters. The growth was faster in males as regard to the lengths of carapace and telson and carapace width in females. Average size was however greater in females with respect to all the characters studied. The species clearly exhibited sexual dimorphism.

Key-words: Allometry, *Macrobrachium idella*, Palaemonidae

Though taxonomic characters of decapod crustaceans are based on morphometric attributes, literature dealing with statistical treatment of such characters is scarce (Tazelaar, 1930; Yaldwin, 1957; Koshy, 1969; Rajalakshmi, 1980; Jayachandran and Joseph, 1985). Therefore, an attempt has been made here to study the growth pattern of some body parts of taxonomic importance in one of the commercial species of Kerala, *Macrobrachium idella* (Hilgendorf).

A total of 338 specimens of *M. idella* (220 males ranging in total length from 32 to 110 mm and 118 females from 34 to 92 mm) were collected from Vellayani Lake, Trivandrum. Total length (tip of rostrum to the tip of telson), carapace length (tip of rostrum to posterior dorsal limit of carapace), length of rostrum (tip of rostrum to the orbital angle) and length of telson (tip of telson to the posterior limit adjoining abdomen) were measured based on the method of Koshy (1969). Width of carapace was taken as the maximum horizontal width of the carapace.

In the present study of morphometry two methods have been employed - the analysis of covariance method (Snedecor and Cochran, 1975) and the body proportion index, using 't' test (Pillai, 1951). The carapace length and length of telson are related to the total length and the length of rostrum and width of carapace to the carapace length.

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## I. ANALYSIS OF COVARIANCE

A. *Characters related to total length* : It can be seen from the Table I that the carapace length and length of telson significantly differ at slope itself which indicates the different pattern of growth in both the sexes. The growth of the lengths of both carapace and telson was faster in males than in females though the average size was greater in females (Table II). Since the analysis of covariance showed significant differences in the growth pattern, regression equation have been calculated separately for the two sexes and are graphically presented in Fig.1.

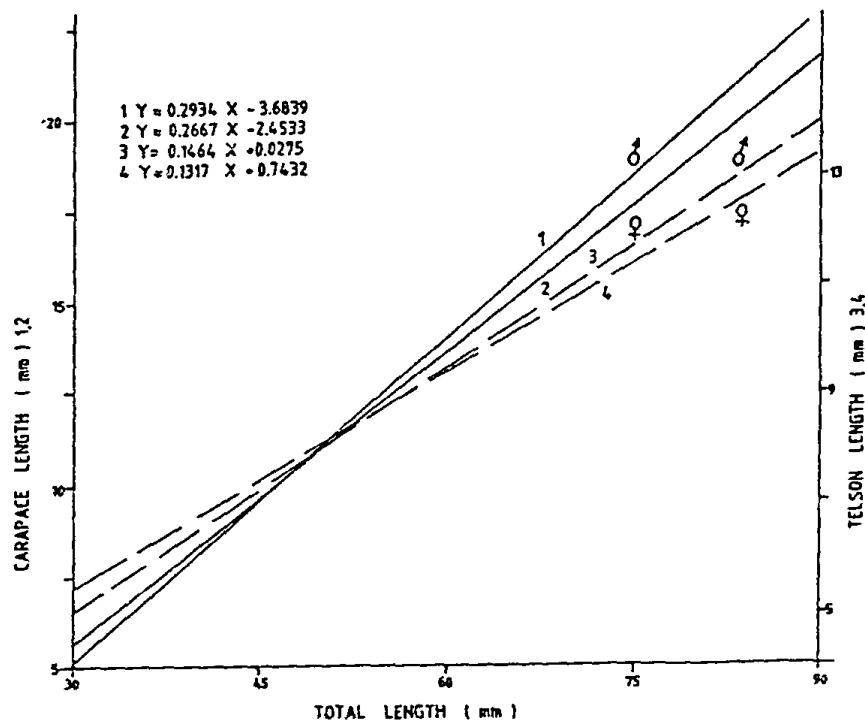


Fig.1. Relationships of carapace length, length of telson and the total length

B. *Characters related to carapace length* : It can be seen from Table II that slopes differ significantly between the sexes as regard to the width of carapace while the difference was significant only at elevations as regard to the length of rostrum. The growth was faster in females than in males with respect to the width of carapace. Regarding the width of carapace and length of rostrum the average size was greater in females (Table II). Regression equations have been calculated separately for both the sexes for both the characters and are graphically presented in Fig.2.

Table I— Analysis of covariance (for testing regression lines)

Source	df	Carapace		Length		Length of telson		Width of carapace		Length of rostrum	
		SS	MSS	SS	MSS	SS	MSS	SS	MSS	SS	MSS
(within)											
Males	218	165.34	0.76	66.75	0.31	98.46	0.45	334.44	1.53		
Females	116	90.91	0.78	26.95	0.23	69.94	0.60	132.80	1.14		
Pooled within	334	256.24	0.77	93.69	0.28	168.39	0.50	467.25	1.39		
	335	266.61	0.79	96.86	0.29	171.76	0.51	467.25	1.39		
Difference between slopes	1	10.37	10.37	3.17	3.17	3.37	3.37	0.01	0.01		
Between and within	336	--	--	--	--	--	--	481.35	1.43		
Between adjusted means	1	--	--	--	--	--	--	14.09	14.09		
For comparison of slopes F's values	--	13.51*			11.29*	6.68*		0.01**			
For comparison of elevation F'e values	--	--			--	--		10.10*			

\* P &lt; 0.01

\*\* Not significant

Table II— Regression coefficients (growth rates) and average size of body measurements of *M. idella* (Rate of growth and average size compared to total length and carapace length)

Characters	Regression coefficient		Mean values	
	Male	Female	Male	Female
Carapace length	0.2934	0.2667	15.3364	15.6144
Length of telson	0.1464	0.1317	09.5182	09.6653
Width of carapace	0.6392	0.6936	10.2182	10.6314
Length of rostrum	0.5168	0.5193	13.6447	14.2203

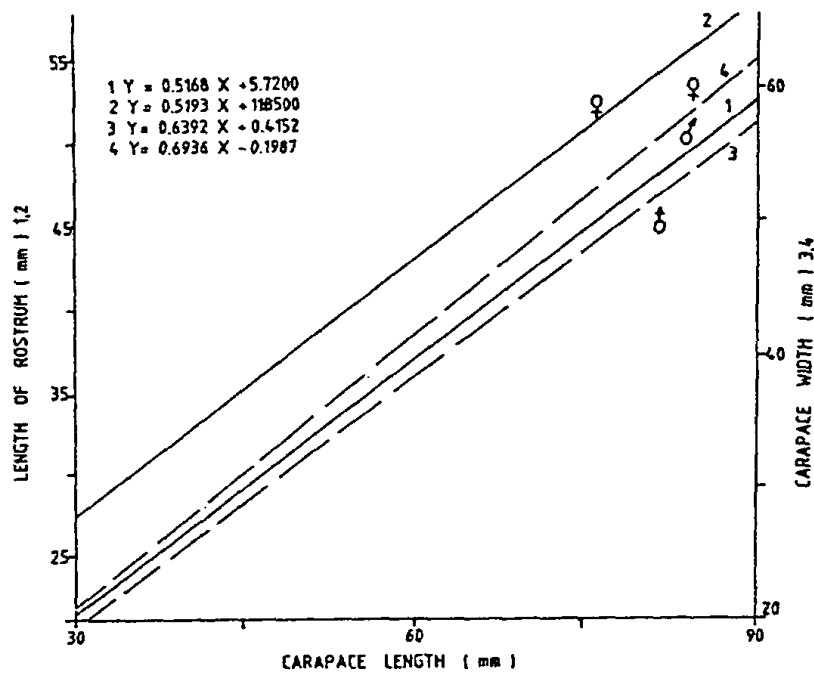


Fig.2. Relationships of carapace width, length of rostrum and carapace length

## II. BODY PROPORTION INDEX METHOD

A. *Characters related to total length* : Of the characters studied, the proportion of telson alone showed significant difference between the sexes (proportion was greater in males), whereas the proportions of the two sexes were almost the same with regard to carapace length (Table III).

Table III—Comparison of body proportion indices in relation to total length and carapace length between the sexes of *M. idella*

Characters	Mean values of morphometric characters as percentage to the total length and carapace length		't' value
	Male	Female	
Carapace length	23.00 ± 0.18	22.93 ± 0.13	0.27 **
Length of telson	14.70 ± 0.07	14.31 ± 0.08	3.71 *
Width of carapace	67.52 ± 0.53	68.04 ± 0.49	0.65 **
Length of rostrum	97.23 ± 2.21	92.94 ± 1.05	1.37 **

\* P < 0.01; \*\* Not significant

From the analysis of covariance method it can be seen that the two sexes of *M. idella* significantly differ in growth patterns of various morphometric characters. When body proportion of the same species were compared, only length of telson in relation to total length showed significant difference between sexes. It can be seen from Fig.1 that the growth rate of carapace length to total length is steeper for males. It can also be seen that the slope value of the length of rostrum to carapace length is not significant between sexes (Table I). This suggests that the growth of the carapace excluding rostrum is highly significant between sexes. Therefore, if we compare the growth rate of rostrum in relation to carapace length in the two sexes, naturally the rostrum length will be higher in females than in males and hence the higher value noticed at the intercept (Fig.2). If we consider the proportion of the length of rostrum to carapace length, supported by the facts from Figs. 1&2, we can infer that the proportion will be higher for males.

Cole (1958) noticed a change in the relation between carapace length and total length in *Palaemon serratus*. The ratio of total length and carapace length obtained was 5.46 and 5.22 in males and females respectively. Rajyalekshmi (1980) too found the difference in the growth pattern of males and females of *Macrobrachium malcolmsonii*. However, Brusher (1972) while studying relationship between total length and tail length of the prawn, *Penaeus indicus* - an abundant species of the Western Indian Ocean, noted a slightly higher growth in females. Koshy (1969) worked out the rate of growth of the rostrum in relation to carapace length in *Macrobrachium lamarreii* and found that growth rate was higher in females than males. According to him, greater range of the measurements of females compared to that in males was due to the fact that the females grow to much larger size than the males. On the other hand, in many species like *Macrobrachium rosenbergii* and *M. malcolmsonii*, it is the male which grows to larger size than females. A study of the range and mean of the various biometric data collected on the population of *M. dayanus* has shown that the males grow

to larger size than females (Koshy, 1971). In *M. lamarreii* it was found that the rostral length of females was 40% longer than the males. In *M. idella* males are larger than females and growth rate is the same both in male and female in the case of the length of rostrum in relation to carapace length. Koshy (1971) reported that in *M. dayanus* the regression coefficients differ significantly in carapace length, length of rostrum and the length of the first cheliped in relation to the length of the cephalothorax between the sexes, thereby establishing the sexual dimorphism. Jayachandran and Joseph (1985) established sexual dimorphism in *M. scabriculum* and found that carapace length and length of telson in relation to total length and length of rostrum in relation to carapace length showed significant difference at elevations.

The average size of females was higher than the males with regard to all the characters studied. The above results establish clear sexual dimorphism of this species. It also gives an overall picture of the relative growth of different body parts of taxonomic importance. A lot of interspecific and intraspecific variations have been recorded in this group (Holthuis, 1950). Therefore the present results can well form a basis of comparison for racial studies. Further it can also be utilized for interspecific taxonomic studies.

Of the two methods employed in the present study, the analysis of covariance method may be regarded as the better one as it brings out number of differences between sexes.

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