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Short Communication

Length-weight and width-weight relationships of mud crab *Scylla tranquebarica* (Fabricius, 1798)

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Abstract

The relationships between carapace length and body weight (Log w = -0.35923+3.140792) and carapace width and body weight (Log w = -1.05521+3.271845) of males and carapace length and body weight (Log w = -0.0996+2.829127) and carapace width and body weight (Log w = -0.80516+3.020237) of females of the mud crab *Scylla tranquebarica* were estimated. Analysis of covariance of carapace length / carapace width - weight data between the regression equations of males and females showed highly significant difference ($p < 0.05$). The present results indicated that males are heavier than females at any given length / width.

Keywords: Mud crab, *Scylla* sp., length-weight relationship

Introduction

The length-weight and width-weight relationship estimates are important prerequisites for fishery biological investigations. Estimates on these relationships are useful to know the variations in expected weight from the known length groups which are, in turn, the indications of fatness, breeding and feeding states. These estimates also help to establish equations between the length and weight, width and weight, so that if one is measured the other dimension could be computed. There have been many investigations on the length-weight relationship of finfishes. However, information available on the mud crab is mostly restricted to *Scylla serrata* (Prasad *et al.,* 1989; Khan and Alam, 1991; Poovachiranon, 1991; Knuckey, 1996; Nandi *et al.,* 1996; Sukumaran and Neelakantan, 1997). For the present paper, carapace length-weight and carapace width-weight relationships of the mud crab *S. tranquebarica* were estimated.

Material and Methods

Totally 706 males and 644 females of *S. tranquebarica* collected from the landings at Parangipettai coast (Tamil Nadu) were analysed for estimating the length - weight and width - weight relationships. Crabs in the intermoult stage with all appendages intact were considered for the study since crabs in premoult and postmoult stages showed marked variations in weight. All materials were analysed in fresh condition.

The crabs were washed thoroughly to remove all mud, sand and epizoic forms. Carapace width (CW) between tips of the longest lateral spines across the middle line between the frontal notch and posterior margin was measured using a vernier caliper (0.1 mm accuracy). Individual crab weight was taken in a Docbel (BRAUN) weighing balance (accuracy: 2 g) after removing all adhering water from the body using a blotting paper.

The length - weight and width – weight relationships were determined separately for males and females of *S. tranquebarica* by the method of least squares using the logarithmic forms of the exponential equation $W = aL^b$, where W=weight (g), L=length (mm) and 'a' and 'b' are constants. For this purpose, the observed values of length /

width and weight of individual crabs were transferred into logarithmic values and regression analysis was carried out to calculate the 'a' and 'b' values. The correlation coefficient was determined to know the degree of association of the two variables. The variation between the regression coefficients (b) in male and female was calculated using ANACOVA (Analysis of covariance).

Results and Discussion

A scatter diagram each for males and females of *S. tranquebarica* was obtained by plotting the length against weight and width against weight of individual crabs (Figs. 1 to 4). From the closeness of the scatter and the parabolic nature of the plot a good relationship was found between width and weight and between length and weight as also the suitability of fitting the exponential formula $W=aL^b$ to the data.

The logarithmic equations derived are as follows:

Males (carapace length-weight) :
Log w = -0.35923+3.140792 (r = 0.9283)

Females (carapace length-weight):
Log w = -0.0996+2.829127 (r = 0.9489)

Males (carapace width-weight) :
Log w = -1.05521+3.271845 (r = 0.9215)

Females (carapace width-weight) :
Log w = -0.80516+3.020237 (r = 0.9665)

The coefficient of correlation (r) obtained for the carapace length-weight and carapace width-weight of males and females were nearly equal to 1 indicating that the values were significant. Hence, a high degree of positive correlation was evident between width-weight and length-weight. The exponential values (b) of the length-weight

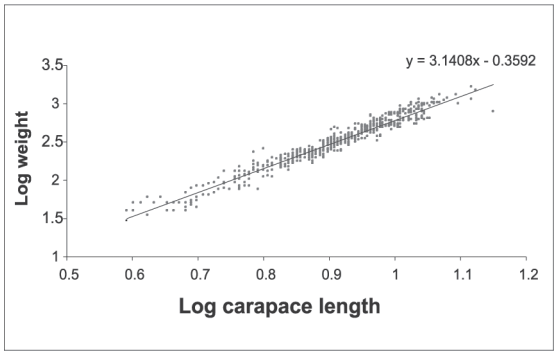

Fig. 1. Logarithmic relationship between carapace length-weight of male *S. tranquebarica*

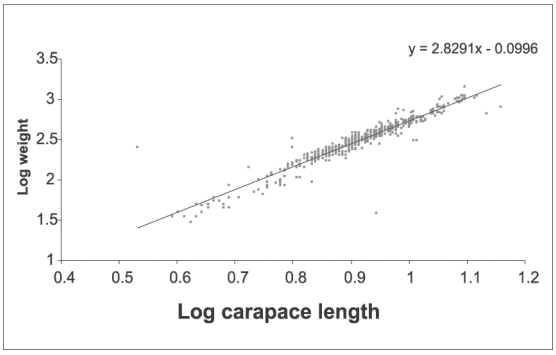

Fig. 2. Logarithmic relationship between carapace length-weight of female *S. tranquebarica*

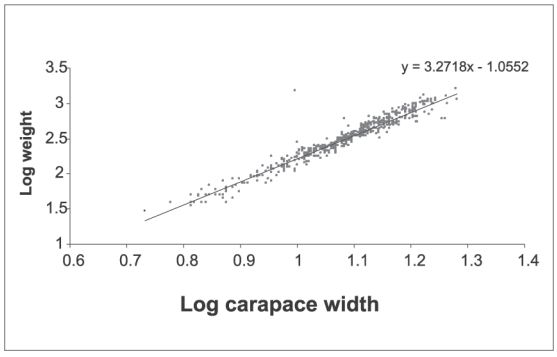

Fig. 3. Logarithmic relationship between carapace width-weight of male *S. tranquebarica*

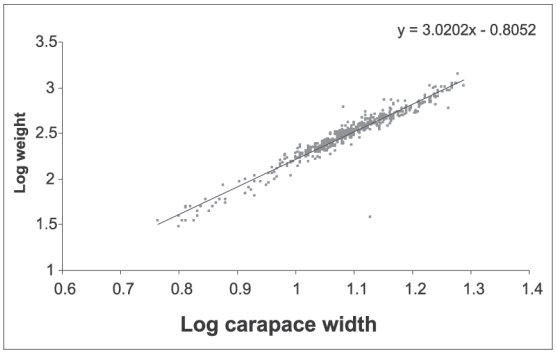

Fig. 4. Logarithmic relationship between carapace width-weight of female *S. tranquebarica*

relationship of male and female were 3.1407 and 2.8291 whereas in width-weight relationship of male and female crabs were 3.2718 and 3.0202 respectively, thereby indicating nearly an isometric pattern of growth. The differences in values between males and females were found to be highly significant ($p < 0.05$).

The value of exponent 'b' was found to be 1.3, 2.5 and 2.8 (length-weight relationship) and 1.3, 2.9 and 3.2 (width-weight relationship) in juvenile, adult male and female *S. serrata* respectively by Prasad *et al.* (1989). However for an ideal organism which maintains its shape throughout, the value of 'b' will be '3' (Allen, 1938). But in a number of organisms the value of 'b' lies between 2.5 and 4.0 (Martin, 1949). In *S. tranquebarica*, the 'b' values of length - weight & width - weight relationships were found to be 3.1408 & 2.8291 and 3.2718 & 3.0202 for male and female crabs respectively.

The 'b' values obtained in the present study indicated that the males are heavier than females at a given width and length. This tendency is in conformity with the earlier observations in *Portunus pelagicus* and *P. sanguinolentus* (Sukumaran and Neelakantan, 1997). The slight differences in exponential values may be possibly due to differential diet resulting from size difference, change in cheliped strength, foraging behaviour and metabolic rate of the crabs.

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