

Length-Weight and Width-Weight Relationships of Mud Crab *Scylla tranquebarica* (Fabricius, 1798)

¹N. Thirunavukkarasu and ²A. Shanmugam

¹Department of Marine Studies and Coastal Resource Management,
Madras Christian College (Autonomous), Tambaram, Chennai, Tamilnadu, India

²Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai, Tamilnadu, India

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

Key words: Mud crab • *Scylla* sp • Length-weight

INTRODUCTION

The length-weight and width-weight relationships study assumes an important prerequisite in fishery biological investigations. It is mainly dealt with to know the variations in expected weight from the known length groups, which are, in turn, the indications of fatness, breeding and feeding state and their suitability to the environment. The study is also perceived to establish precise mathematical 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 length-weight relationship of finfishes. However, information available on such a study in portunid species *S. serrata* is very much fragmentary [1-6]. Regarding others, the length-weight relationship of hermit crabs *Diogenes brevisrostris*, *Parapagurus bouvieri* and *P. dimorphus* [7] and horse shoe crab *Tachypleus gigas* [8] have been reported earlier. In the present study, the length-weight and width-weight relationships in the mud crab *S. tranquebarica* were studied.

MATERIALS AND METHODS

Totally crabs comprising 706 males and 644 females of *S. tranquebarica* collected from the landings at Parangipettai coast during the study were analyzed for recording the length-weight and width-weight relationship. Crabs in the intermoult stage with all appendages intact were only 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. Individual carapace width (CW) between tips of the longest lateral spines across the middle line between the frontal notch and posterior margin were measured using a vernier caliper (0.1mm accuracy) and individual weight was taken in Docbel (BRAUN) weighing balance (Accuracy of 2g) 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 in *S. tranquebarica* by the method of least squares using the logarithmic forms of the exponential equation $W = aL^b$, where W =weight, L =length and 'a' and 'b' are constants.

Corresponding Author: N. Thirunavukkarasu, Department of Marine Studies and Coastal Resource Management,
Madras Christian College (Autonomous), Tambaram, Chennai, Tamilnadu, India.
E-mail: thirush2k3@yahoo.co.in

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 involved. The variation between the regression coefficients (b) in male and female *S. tranquebarica* was calculated using ANOVA (Analysis of covariance).

RESULTS

A scatter diagram each for males and females in respect to *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 from the parabolic nature of the plot, it is clear that there exist a good relationship 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,

Males (carapace length-weight) : $\text{Log } w = -0.35923+3.140792$
 Females (carapace length-weight) : $\text{Log } w = -0.0996+2.829127$
 Males (carapace width-weight) : $\text{Log } w = -1.05521+3.271845$
 Females (carapace width-weight) : $\text{Log } w = -0.80516+3.020237$

The coefficient of correlation (r) obtained for the carapace length -weight and carapace width -weight of

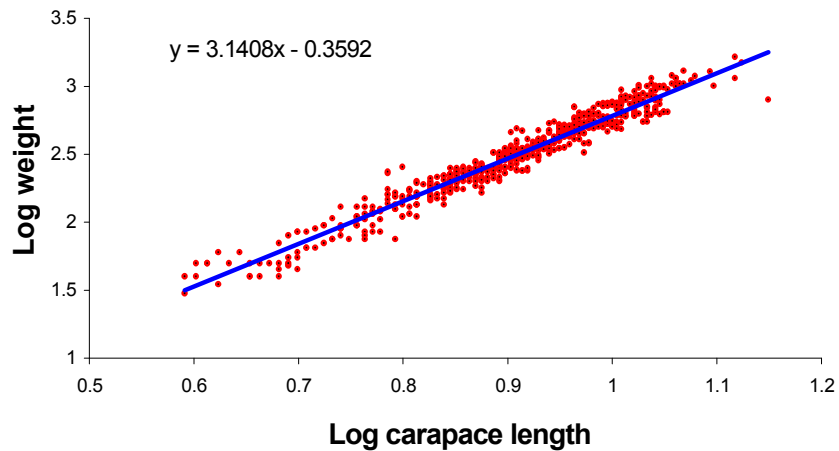


Fig. 1: Logarithmic relationship between carapace length–weight of male *S. tranquebarica*

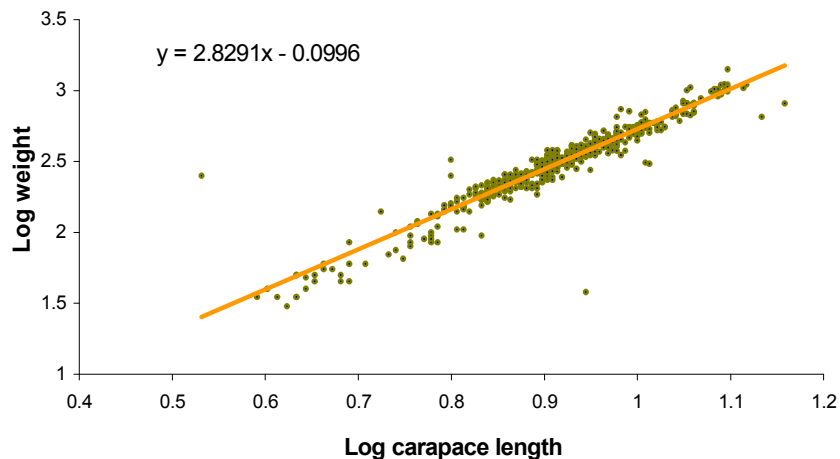


Fig. 2: Logarithmic relationship between carapace length–weight of female *S. tranquebarica*

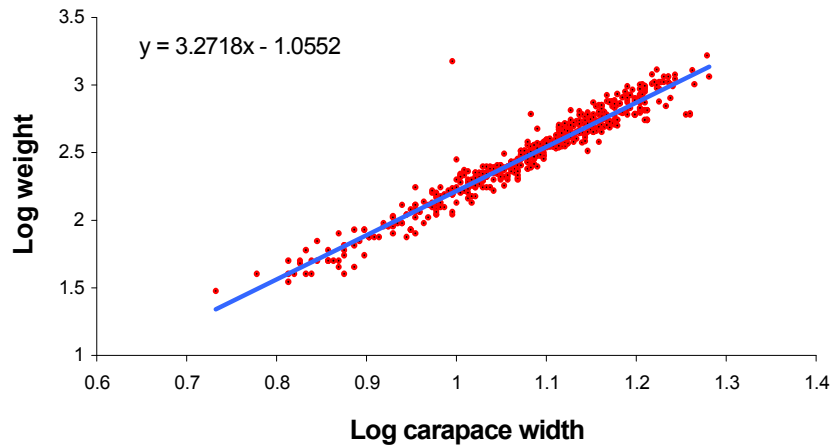


Fig. 3: Logarithmic relationship between carapace width–weight of male *S. tranquebarica*

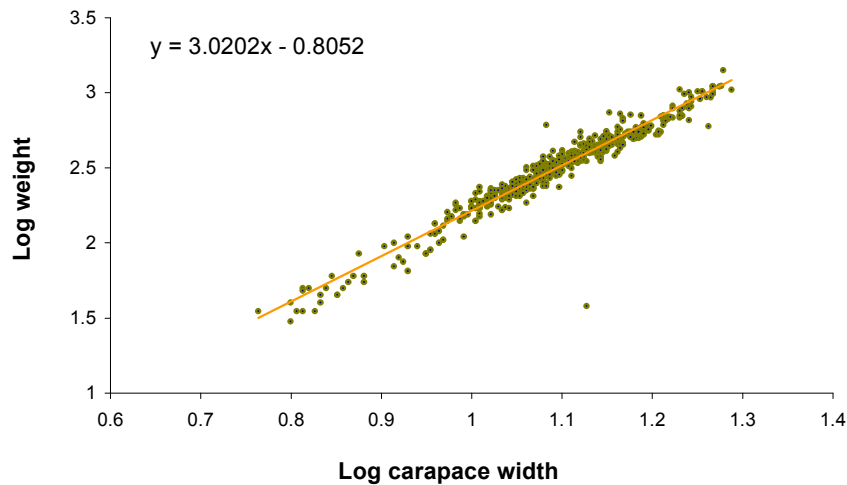


Fig. 4: Logarithmic relationship between carapace width–weight of female *S. tranquebarica*

males and females were nearly equal to 1 (0.928313 and 0.948974 and 0.921516 and 0.966518 respectively) indicating that the values were significant and hence, a high degree of positive correlation existed between width-weight and length-weight in these crabs.

The exponential values (b) of the length-weight 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, indicating thereby nearly an isometric pattern of growth. The data were treated for ANOVA and the results were found to be highly significant ($p < 0.05$).

DISCUSSION

The value of exponent 'b' was found to be 1.3, 2.5 and 2.8 (length-weight relationship) and in 1.3, 2.9 and 3.2

(width-weight relationship) in juvenile, adult male and adult female *S. serrata* respectively [5]. However for an ideal organism which maintains its shape throughout, without any change the value of 'b' will be '3' [9]. But in a number of organisms the value of 'b' lies between 2.5 and 4.0 [10] as also the values of *S. tranquebarica* in which the 'b' values of length-weight and width-weight relationships were found to be 3.1408 and 2.8291 and 3.2718 and 3.0202 for male and female crabs respectively.

Further the 'b' values indicated that the males are heavier than females at a given width and length against weight in *S. tranquebarica*. The linear plot based on the calculated values suggested that there is a direct relationship in width-weight and length-weight relationships in males and females of the study animals.

This tendency of *S. tranquebarica* males being heavier than females in the present study is

also in conformity with the earlier observation in *P. pelagicus* and *P. sanguinolentus*. The present results indicate that the tendency of males being heavier than females in portunid crabs which is in conformity of earlier observations. The slight differences in exponential values may possibly due to differential diet presumably resulting from size difference, change in cheliped strength, foraging behaviour and metabolic rate of animal.

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