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Short Communication

SHELL-SIZE VARIABILITY OF THE SEA MUSSEL, *MODIOLUS STRIATULUS* (HANLEY)

INTRODUCTION

Modiolus striatulus Hanley, a bivalve mollusc belonging to the family Mytilidae, is a highly variable species (Subba Rao *et al.*, 1992). It occurs in the maritime States of West Bengal, Orissa, Tamil Nadu, Kerala, Maharahtra and Andaman in India and outside India from Sri Lanka, Singapore, Myanmar, Gulf of Thailand, China and Japan. Shells are usually attached to rocks, stones, wooden jetties in submerged waters and also on algal growths on stone. It was reported as a major nuisance causing mollusca in Palta Water Works, Calcutta (Krishnamurti and Rajagopalan, 1968).

Annandale and Kemp (1916) Studied the variation of this species and clarified its identity. However, its shell-size variability, if any, is ascertained herein using standard statistical tests and analysing morphometric relationship between shell length and shell width of different size groups.

Materials and Methods : A total of 200 specimens of *Modiolus striatulus* were collected at random from Matla river bed, Canning occurring as thick mussel mat of honey-comb-like appearance. The collected samples were measured for morphometric study to find out the shell length (SL) and shell width (SW) relationship. Furthermore, 35 examples of higher size groups from the same locality were also measured from the National Zoological Collection present in the Mollusca Section of this Department to complete this study. The strength of this length-width relationship is reflected following coefficient of correlation, regression equation, scatter diagram as well as log curve.

Result : In all 235 specimens of *Modiolus striatulus* have been measured for various statistical analysis based on shell length, a standard and widely used parameter. Frequency distribution of various size groups, average length, average width and length-width ratio of respective size groups are calculated and presented in Table - 1. The mean value is calculated as 13.34. From the Table - 1 it is clear that the length-width ratio bears more or less uniform relationship which decreases slightly (0.57 to 0.40) with the increase in size. The modal class represents 12-15 mm size group showing maximum frequency of 66.38%. Raw data also reveal that maximum individual frequency of *M. striatulus* corresponds to the shell length of 14 mm. The standard error, which represents the standard deviation of means, is calculated as 0.462. So, $\bar{X} \pm SE = 13.34 \pm 0.462$ [$\bar{X}$ = Mean, SE = Standard Error].

The correlation coefficient value (r) is calculated between the shell length and shell width as follows :

$$r = cov(x,y) / \delta x \quad \delta y$$

Where, x = Shell length; y = Shell width; cov (x,y) = covariance of x and y; δx = Standard deviation of x; δy = Standard deviation of y.

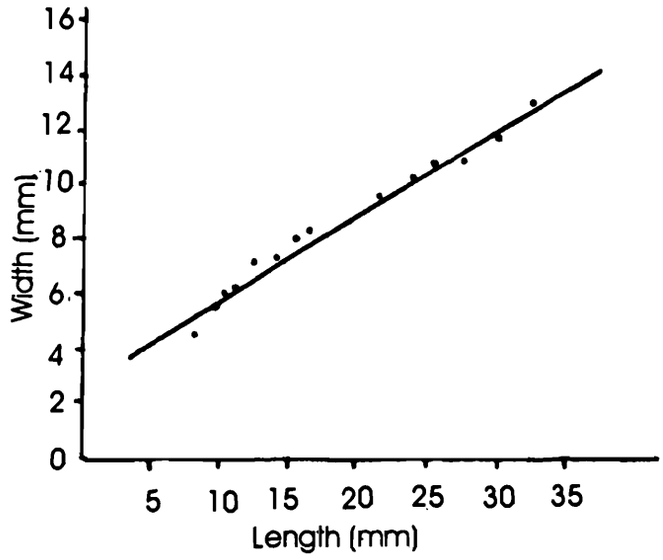

Fig. 1. Regression line with scatter diagram of shell width against shell length of *Modiolus striatulus*

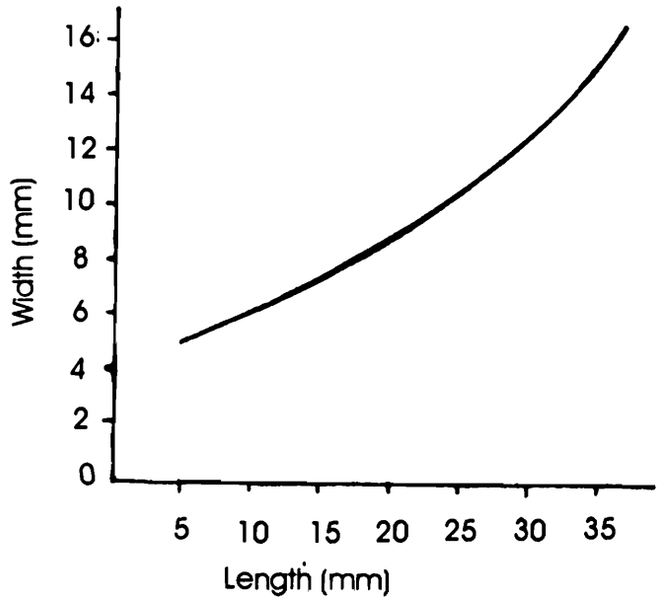

Fig. 2. Log-curve between shell width and shell length of *Modiolus striatulus*

The r value is calculated as 0.98 which clearly indicates a strong relationship between the two variables. The regression equation between SL and SW is calculated as

$y = 0.313\ x + 2.783$ [where x = shell length in mm and y = shell width in mm].

To check out the scattering of the value of SW against SL, the scatter diagram is drawn along with regression line equation and shown in Fig. 1. Both regression line and scatter diagram indicate a high degree of association between the variables as the regression line forms an angle approximately 45^0 and the scattering of the values are more or less very close to the regression line. Further, for final confirmation, the values of SW are plotted against the SL in log-curve (Fig. 2). The log equation yields the result as follows :

$\log y = 0.618 + 0.016\ x$ [where, x = shell length in mm and y = shell width in mm].

So, the log equation for the fitted curve gives the value, $y = 4.154\ (1.038)^x$ [Where, x = shell length in mm and y = shell width in mm].

Log-curve shows the tendency of increasing in shell width with shell length, more or less uniformly, indicating insignificant variation with respect to length-width relationship.

Table 1. Frequency distribution and length-width ratio of various size-groups in *Modiolus striatulus*.

SIZE GROUP (length in mm)	Frequency	Frequency %	Average length of the group (in mm)	Average width of the group (in mm)	Length-width ratio
8-11	38	16.17	10.80	6.17	0.57
12-15	156	66.38	13.65	7.06	0.52
16-19	13	5.53	16.52	8.19	0.48
20-23	5	2.13	22.50	10.18	0.45
24-27	10	4.26	25.31	10.67	0.42
28-31	8	3.40	29.25	11.72	0.40
32-35	5	2.13	32.40	12.96	0.40

DISCUSSION

Shell dimensions and their inter-relations in bivalve molluscs have been reported by several workers in India. (Rao, 1951; Nair & Nair, 1985, 1986; George *et al.*, 1986). The present study indicates strong inter-relation in the length-width ratio as well as in the correlation co-efficient between the shell length and shell width of *Modiolus striatulus* (r = 0.98) as also observed in

case of marine mussel, *Perna viridis* (r = 0.94) by George *et al* (1986). As such, morphometrically the variability between the two variables viz., shell length and shell width bears a highly proportional statistical inter-relationship charaterising the specific identity of the species.

SUMMARY

Increase in shell length and shell width of *Modiolus striatulus* is strongly correlated.

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Zoological Survey of India,
M-Block, New Alipore,
Calcutta - 700 053

N. C. NANDI
M. K. DEV ROY
SUJIT PAL