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Age, Growth & Length-Weight Relationship in Estuarine Periwinkle *Littorina scabra* (Linne)

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Age and growth in *L. scabra* was determined by length frequency distribution, probability plot, Von Bertalanffy's equation and Ford-Walford graph. Female attained 9.05, 13.60 and 15.35 mm size at the end of 1st, 2nd and 3rd y respectively whereas male attained 9.05, 12.34 and 14.14 mm size during 1st, 2nd, 3rd y respectively; indicating that the female grows faster than the male. The life span of *L. scabra* was 3 to 4 y. The logarithmic values of observed lengths and corresponding logarithmic weights showed a linear relationship (for females $r=0.8812$, for males $r=0.8100$).

Periwinkle occurs in appreciable quantities at different places in the Indo-Pacific region[1]. Scant information is available on the rate of growth and age in *Littorina scabra*[2]. The present study on age and growth in *L. scabra* has been made to gain an insight into age class structure of the stock, changes in abundance of population and their relation to longivity and rate of growth. Length-weight relationship which can provide computation of weight from a known length has also been studied.

Materials and Methods

Monthly random samples of *L. scabra* were collected between Dec. 1982 to and Nov. 1983 from the Jetty piles of Vellar Estuary (lat.11°30'N; long.79°46'E).

Growth rate was determined by length frequency distribution[3], probability plot[4,5], Von Bertalanffy's equation[6-10] and Ford-Walford graph[11].

Shell height was measured to the nearest 0.1 mm using a Vernier calliper. The data were arranged in size groups of 0.5 mm intervals. As the number of total observations varied in different months, size frequencies were converted into percentages. For length-weight relationship, the logarithmic equation was employed[12].

Results and Discussion

Length-frequency distribution—In female (Fig.1), size groups below 4.8 mm height were present during Feb. and March 1983 while size groups between 8.4 - 9.7 mm and 10.5-11.1 mm were present in all months. The size groups between 9.8 and 10.4 mm were absent during May and Sept. 1983. Maximum height of female *L. scabra* (16.1-16.7 mm) was observed in Dec. 1982. During April 1983, size groups 7.0-7.6 mm showed peak abundance.

In male (Fig.1), size groups 4.9-5.5 mm were present only during Feb. and March 1983 while size groups between 7.7-11.1 mm were present in all months. Maximum height of male *L. scabra* (14.7-15.3 mm) was in May 1983. During April 1983, size groups 9.1-9.7 mm showed peak abundance. The size groups below 4.9 mm and size ranges between 15.4 and 16.7 mm were absent throughout year.

Probability plot—The cumulative percentage of occurrence of different size groups was plotted on arithmatic probability paper to note the point of inflection. Growth of female *L. scabra* was 4.85 mm in 0 y and was 9.05, 13.60, 15.35 mm during 1st, 2nd and 3rd y respectively. The male *L. scabra* attained 5.55 mm in 0 y and reached 9.05, 12.34 and 14.14 mm during 1st, 2nd and 3rd y respectively. The life span appears to be from 3 to 4 y.

This method is used for species which have prolonged spawning periods. Secondly some year classes may not be represented in the catches, and overlapping the distribution of older size group is likely to yield erroneous results by Petersen method[3]. The probability method of seperating the polymodel length frequency distribution has been used to find out model lengths of different year classes. This method is found to be very useful in getting a higher degree of accuracy in sorting out the different size groups contributed from different broods.

Von Bertalanffy's growth equation—Length calculated for different years using this equation plotted along with the observed length for same period showed a general agreement in the growth pattern. This also showed high degree of agreement with probability plot method[4,5] employed.

Ford-Walford graph—This was constructed by plotting $Lt+1$ against Lt where Lt is the height of the animal at a particular age. The straight line obtained

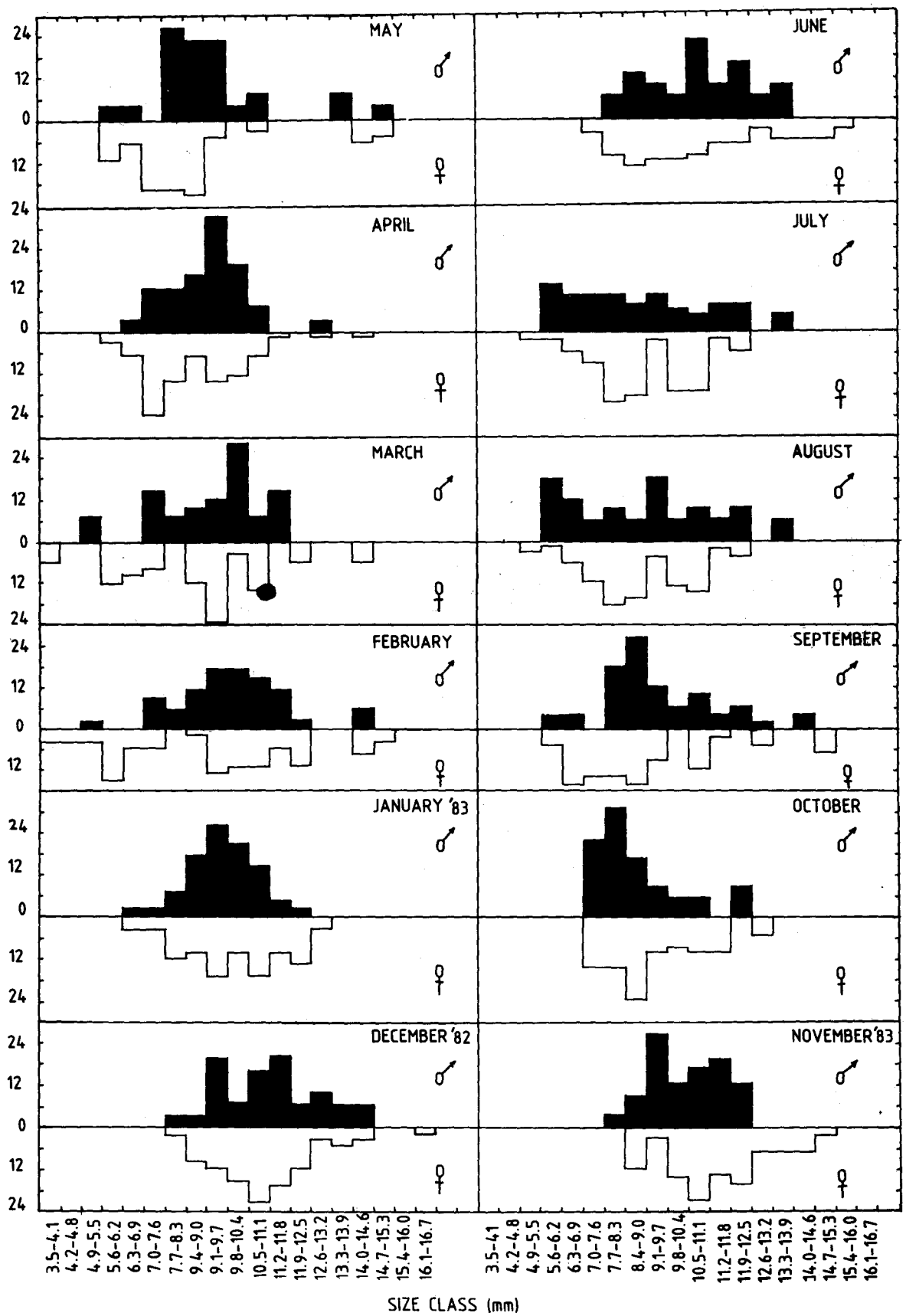

Fig. 1—Length-frequency distribution for the period December 1982 to November 1983 (Male:Female)

when intersected by a 45° diagonal from the origin, L ∞ (length at infinity) was obtained and it was 21.4 mm for female and 20.5 mm for male.

Length-weight relationship—The regression equation for males (n=459) and females (n=662) of *L. scabra* are

for females : log W = −0.1225 + 2.2393 Log L
for males : log W = −1.3659 + 3.4829 Log L

Analysis of variance revealed significant differences between regression equations of males and females. The correlation coefficients for males and females were highly significant at 0.05% level. Logarithmic values of observed height and corresponding logarithmic weights were plotted and the regression line fitted to the data showed a linear relationship between these 2 variables (r=0.8812 for female; r=0.8100 for male).

Growth rate of *L. scabra* of Porto Novo was less when compared to that from Nankuri Harbour of Nicobar island[2]. In 0 and 1st y the male and female growth pattern was more or less similar, but in 2nd and 3rd y the female growth rate was higher than male. *L. scabra* was observed to have longivity of 3 to 4 y. Growth rate at 1st and 2nd y was high when compared to 3rd and 4th y which is similar to that observed earlier[2,14,15].

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