NOTES

LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF *PERNA VIRIDIS* (LINNAEUS, 1758) AND *MERETRIX MERETRIX* (LINNAEUS, 1758) FROM MUMBAI WATERS

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ABSTRACT

Length weight relationship of the two commercially important molluscs *P. viridis* and *M. meretrix* was found to be $W = -0.40263L^{2.044719}$ & $W = -0.04359L^{2.315498}$ respectively. Condition factor was recorded to be less than 1.0 for most part of the year in *P. viridis* and for *M. meretrix* it ranged from 0.39 to 4.61. The present study reveals that there was allometric growth in both the species and the growth was not satisfactory since it showed lower K-value during most part of the year.

Keywords: Length-weight, Condition factor, *Perna viridis, Meretrix meretrix*

Length and weight are the two factors which are related to each other. Length–weight relationship is an important and significant tool for prediction of the recruitment, estimation of stock and also for solving taxonomical problems (Spiers, 1952). If a mathematical relationship between the length and weight is established then one parameter can be computed from the other. The condition factor or K-value is useful in explaining the well being of an organism and to find out any difference arising from seasonal changes in relation to the age and sex of the organism. This K-value provides a useful comparison of the weight of the organism relative to length.

Length–weight relationship and condition factor of fishes have been studied extensively but comparatively very limited works are available on length-weight relationship of molluscs. Benny and Ayyakkanu (1992) worked on length–weight relationship in *Chicoreus ramosus* collected from Gulf of Mannar. Mohan (1980) reported on allometric relationship between length, height and depth and also on length-weight relationship of the green mussel, *Perna viridis*. Pota and Patel (1987) worked on oyster on these aspects. Other notable works are by Rao (1987), Brey and Hain (1992), Paninee and Pitiwang (1991), Sockendarsi *et al.*, (1998), Vandepeer *et al.*, (1999) and Rabi and Maravi (1997).

The green mussel, *Perna viridis* and

clam, *Meretrix meretrix* constitute an important fishery along the Maharashtra coast. As there is little information on the length weight relationship of these species, the same was worked out.

A total of 550 specimens of *P. viridis* and 650 specimens of *M. meretrix* were collected from Mumbai waters during the period between January 2000 and January 2001 except September and October 2000 when *P. viridis* samples were not available in the landing centre. The length of *P. viridis* ranged from 5.0 – 10.2 cm and weight from 10 – 55 g while the *M. meretrix* were ranging from 3.8 – 5.7 cm in length and the of 16 – 62 g. in weight. The specimens were cleaned and extraneous water was wiped. Then the length (cm) and the weight (g) of the mussels and clams were measured. The length is the widest part across the shell at 90 degrees to the height.

The length-weight relationship was estimated by using the general formula $W = aL^b$ (Le Cren, 1951).

The equation $W = aL^b$ can be expressed in linear form using natural logarithm as

$$\text{Log } W = \log a + b \log L$$

The constants 'a' and 'b' are estimated using the method of least square.

Condition factor has been calculated by using the following formula as used by Devaraj (1973), Acharya and Dwivedi (1985);

$$K = \frac{W}{L^b}$$

The results of length-weight relationship and condition factor of *P. viridis* and *M. meretrix* are presented in Table 1 and also plotted in Figs. 1 and 2 respectively. In case of mussel, the samples collected in November 2000 showed maximum value of condition factor i.e. 3.904533, whereas during the rest of the months, it was below 1.0. On the other hand clams had maximum growth in the month of February 2000 by showing K value as 4.613454 while the lowest growth was in July with K value as 0.39.

The 'a' and 'b' values were found to be -0.40263 and 2.044719 respectively for *P. viridis* whereas for *M. meretrix* the values were -0.04359 and 2.315498 respectively. Accordingly the equation $W = aL^b$ was rewritten as $W = -0.40263\ L^{2.044719}$ for *P. viridis* and $W = -0.04359\ L^{2.315498}$ for *M. meretrix*. The same in the logarithmic form can be written as $Y = 0.3951 + 2.044719X$ and $Y = 1.36061 + 2.315498X$ for *P. viridis* and *M. meretrix* respectively. The condition factor of *P. viridis* has been found to range from 0.13 to 3.9 and that of *M. meretrix* from 0.39 to 4.61. In case of *P. viridis* the minimum K value was recorded in the month of January and the maximum was in November, while in *M. meretrix* the minimum value was in July and the maximum was in February.

Present results indicate allometric

Table 1: Length-weight relationship and condition factor of *Perna viridis* and *Meretrix meretrix*.

S. No.	Month	Length weight relationship $W = aL^b$		Condition Factor	
		Perna viridis	*Meretrix meretrix*	*Perna viridis*	*Meretrix meretrix*
1	Jan 2000	$W=-0.882363\ L^{2.559256}$	$W=-0.035I77\ L^{2.273279}$	0.13	0.93
2	Feb	$W=-0.683346\ L^{2.262458}$	$W=0.662509\ L^{1.181252}$	0.20	4.61
3	Mar	$W=-0.62487\ L^{2.27125}$	$W=0.03219\ L^{2.148927}$	0.24	1.08
4	Apr	$W=-0.496051\ L^{2.124854}$	$W=-0.266689\ L^{2.640613}$	0.32	0.54
5	May	$W=-0.066309\ L^{1.650396}$	$W=0.362199\ L^{1.67414}$	0.87	2.31
6	June	$W=-0.303623\ L^{1.87784}$	$W=-0.02574\ L^{2.323303}$	0.51	0.94
7	July	$W=-0.352244\ L^{1.999414}$	$W=-0.414356\ L^{2.861426}$	0.45	0.39
8	Aug	$W=-0.799345\ L^{2.54123}$	$W=0.285425\ L^{1.825578}$	0.16	1.93
9	Sep	No sample	$W=-0.240778\ L^{2.659828}$	---	0.58
10	Oct	No sample	$W=0.346444\ L^{1.717092}$	---	2.23
11	Nov	$W=0.582042\ L^{1.05468}$	$W=0.037453\ L^{2.204396}$	3.90	1.09
12	Dec	$W=-0.679055\ L^{2.350123}$	$W=-0.00022\ L^{2.229469}$	0.21	1.00
13	Jan 2001	$W=-0.874824\ L^{2.566617}$	$W=-0.316751\ L^{2.734452}$	0.13	0.48

growth in both the bivalves studied. Nayar (1955), Wilton and Owen (1964), Alagarswami (1966) and Talikhedkar *et al.*, (1976) have reported allometric growth for various species of molluscs. But the present result is at a variance from Mohan (1980) who reported isometric growth in case of *P viridis*. That might be related to non linear growth of the shell in length reflected in length-weight relationship which gave a curve in his case. In the present study 'b' value for both the species was found to be less than '3' which clearly indicates that the weight of both the bivalves do not remain isometric as the length changes. According to Hile (1936), 'b' value usually remains between 2.5 and 4.0 to exhibit isometric growth. Therefore, it can be concluded from our study that length-weight relationship of *P. viridis* and *M. meretrix* do not follow cube law.

The condition factor calculated for

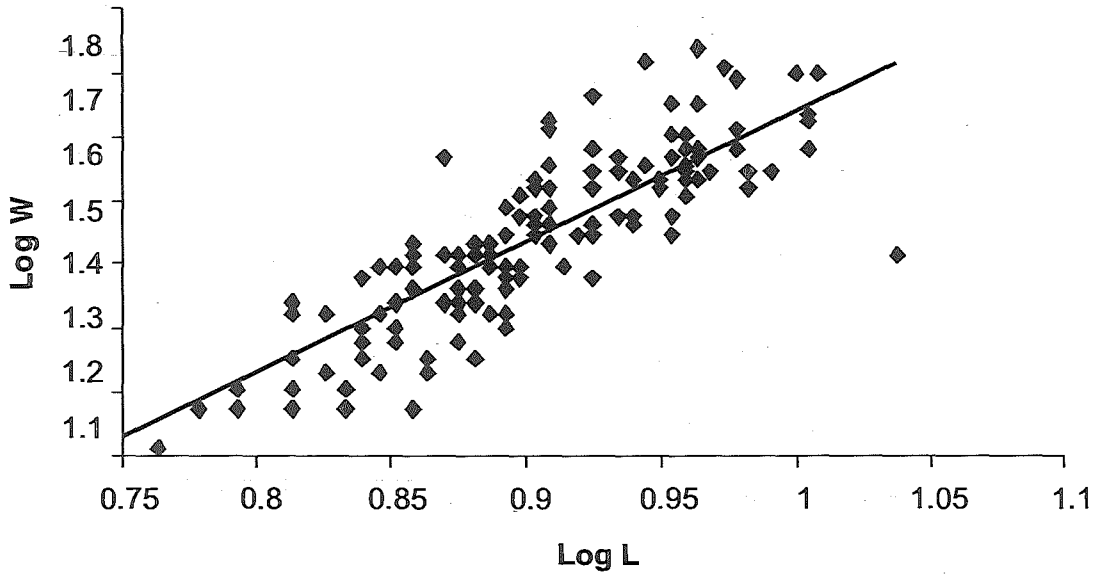

Fig. 1: Length-weight relationship of P. viridis

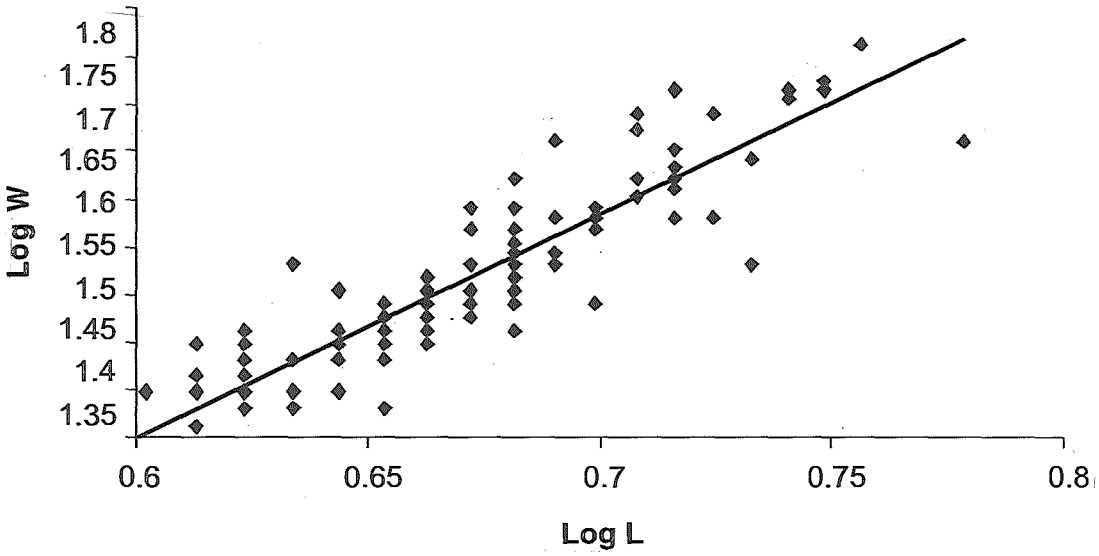

Fig. 2: Length-weight relationship of M. meretrix

each month may be used to detect seasonal variations in the condition of the organism, which may vary with food abundance and the average reproductive stages of the stock (King, 1995). Though the condition factor shows seasonal changes and related to reproductive cycle, the present study do not reveal such fact as *P. viridis* recorded a lower value of K through out the year. The condition factor is an indication of the overall well-being of the animals (King, 1995); values of 1.0 and above indicate for better growth of the species,

whereas values less than 1.0 indicate a stress condition or spent condition of the species (Narejo *et al.*, 2002). But since this condition prevailed throughout the year, the relationship between reproductive cycle and lower K value of *P. viridis* is ruled out. Hence it can be inferred that there must be certain stress factors present or scarcity of food throughout the year (except November). *M. meretrix* exhibited alternating patterns with K values by exhibiting as low as less than 1.0 and as high as 4.0. The condition factor was found to be more than 1.0 for the months of February-March and August-December, and in rest of the study periods, it was less than 1.0. Along the Mumbai coast the spawning period of *M. meretrix* is from March to June (MPEDA, 1997), and during this period the K value should show a higher value since there is a positive correlation between the maturity of gonad and the condition factor (Narejo *et al.*, 2002). But the present results do not confirm this fact rather it reveals that the condition factor shows a seasonal variation which was also reported by King (1995). Since the variation in environmental factor makes variation in 'b' value which in turn varies K- value as reported by Narejo *et al.* (2002), so the seasonal variations in abundance of the phytoplankton in the water body upon which these two organisms feed on, may be the possible reason for such poor growth. Present study concludes that both *P. viridis* and *M. meretrix* do not exhibit isometric growth and the growth of both the species is not satisfactory since a lower value of 'K' was found during most part of the year.

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