LENGTH-WEIGHT RELATIONSHIP OF A CYPRINID FISH *PUNTIUS FILAMENTOSUS* FROM CHALAKUDY RIVER, KERALA

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Puntius filamentosus (Valenciennes) is a medium-sized cyprinid that forms an important food and ornamental fish and is easily recognized by the elongated, filament-like extensions of the branched dorsal fin-rays in adult males. The length-weight relationship is an important tool in fish biology, physiology, and ecology and fisheries assessment. This relationship serves three purposes *viz.* i) to determine the type of the mathematical relationship between two variables so that if one variable is known the other could be computed; ii) the relative condition can be estimated to assess the general well being of the fish and type of growth, i.e. whether isometric or allometric and iii) it helps to estimate the potential yield per recruit in the study of fish population dynamics.

In fishes, generally the growth pattern follows the cube law (Brody, 1945; Lagler, 1952). Such relationship for the fishes will be valid when the fish grows isometrically. In such cases the exponential value must be exactly 3. But in reality, the actual relationship between length and weight may depart from the ideal value due to environmental conditions or condition of fish (Le Cren, 1951). This relationship is expressed by the equation $W = aL^b$. This equation was used by several workers for different species from different habitats. Some of the recent works in this aspect are those by Mercy *et al.* (2002), Oscoz *et al.* (2005), Serajuddin (2005), and Harish Kumar *et al.* (2006).

Methodology: A total of 60 specimens (24 males, 18 females and 18 indeterminate) of different size groups (5.4 to 12.0cm) were collected from the fish market close to the downstream stretch of Chalakudy river during January to December 2005. Lengths of fishes were measured with a mm scale and weighed with a top loading electronic balance in fresh condition to the nearest 1mm and 0.1g respectively. The length-weight relationship was estimated separately for males, females, indeterminate and pooled data using the linear form of formula $W= aL^b$ (Le Cren, 1951) as log W= log *a* + *b* log L, where, W = weight of the fish, L = length of the fish and *'a'* and *'b'* are constants. The constants '*a*' and '*b*' values in the equation were estimated using the methods of least squares. The '*t*' test was employed to test the level of significance of weight on length. The regression equation was fitted separately for each group and the slopes ('*b*' values) were tested to find out significant variation among them, if any, with ANCOVA. Statistical analysis was carried out with the help of the statistical software SPSS.

Results: The estimated coefficients of the length-weight relationship and other details of statistical analysis are given in Table 1 and the results of the ANCOVA analysis are given in Table 2. The r values and t test indicates a high degree of correlation between length and weight. The ANCOVA results showed that there is no significant difference between the *'b'* values of males and females.

The length-weight relationships (logarithmic) for the different groups of *Puntius filamentosus* from the Chalakudy River are as follows:

Males - Log W= -1.835+2.891 Log L or W= $0.014622L^{2.891}$
Females - Log W= -2.117+3.197 Log L or W= $0.007638L^{3.197}$
Indeterminate - Log W= -1.652+2.647 Log L or W= $0.022284L^{2.647}$
Pooled - Log W= -1.933+2.992 Log L or W= $0.011668L^{2.992}$

Discussion: The exponential value of the length-weight relationship *'b'* in *P. filamentosus* followed the cube law especially the pooled data (*'b'* = 2.992) Table 1, indicating thereby an isometric pattern of growth in the fish. According to Hile (1936) and Martin (1949) the value of *'b'* usually remains constant at 3.0 for an ideal fish. However, Beverton & Holt (1957) suggested the departure of the *'b'* value from 3 is rare in adult fishes. In the present study the males and females showed deviations from the ideal value and in the case of females the value is, little more than that of 3. Pathak (1975) reported a *'b'* value of less than 3 for *Labeo calbasu* from Soni River and Harish Kumar *et al.* (2006) reported values less than 3 for the males and females of *Rasbora daniconius* from Karnataka. Sunilkumar *et al.* (1999) opined that the exponential values for the endemic catfish, *Horabagrus brachysoma* do not significantly differ from 3 and Mercy *et al.* (2002) reported a *'b'* value of 3.04 for *P. denisonii* from Kerala and values above 3 are possible in some conditions such as in farming and other stress free environments. Generally, weight of fish will be proportional to the cube of their length, based on its dimensional equality (Harish Kumar *et al.*, 2006). The present results, the juveniles and males exhibited allometric pattern of growth but the females exhibited isometric growth pattern and the combined data showed that the deviation from the ideal condition is not significant. The change in the exponent is due to changes in specific gravity and shape of the body contour and in such cases the cube law need not always hold good (Rounsfell & Everhart, 1953). Morphological changes due to age also cause substantial changes in the exponent of length on weight. The overall results indicates that *P. filamentosus* showed an almost isometric pattern of growth in the studied habitat and the present conditions exists in the collection site is conducible for the feeding and optimum growth of the fish.

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***Table1. Coefficients of length–weight relationship and statistical analysis of* Puntius filamentosus**

	Number	'*b*'	log *a*	S.E.(*b*)	r	*t*	Sig.
Male	24	2.891	-1.835	0.121	0.981	23.894	0.00*
Female	18	3.197	-2.117	0.149	0.983	21.513	0.00*
Indeterminate	18	2.647	-1.652	0.233	0.943	11.362	0.00*
Combined	60	2.992	-1.933	0.084	0.978	35.830	0.00*

* = Significant at 5 %level

Table 2. Results of ANCOVA of* Puntius filamentosus *for different groups. Tests between subjects effects dependent variable: weight

Source	Sum of squares	df	Mean square	F	Significance
Corrected mode	2.349	3	0.783	443.208	0.000
Intercept	0.797	1	0.797	451.440	0.000
Length	1.608	1	1.608	910.317	0.000
Sex	0.006878	2	0.003439		
Error	0.09892	56	0.001766		
Total	380611	60			
Corrected Total	2.447	59			

a. R Squared = 0.960 (Adjusted R Squared = 0.957)

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