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Studies on relationship between length and weight of fish, *Paracheirodon innesi* from water tank of Science College, Nanded, Maharashtra

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ABSTRACT

The length weight relationship is the most important aspect in biological studies of fishes. Length of a fish has certain mathematical relationship with its weight. This relationship changes at different life phases of fish and useful to find out length when the weight is known and vice-versa. For this study 50 specimens of *Paracheirodon innesi* were measured out of them 30 males and 20 were females. By using cube law method for determination of relationship between length and weight of fish was employed.

Key words: Length weight relationship, *Paracheirodon innesi*.

INTRODUCTION

Paracheirodon innesi is an extremely popular fresh water aquarium fish. Commonly known as 'Neon tetra'. The Neon tetra is a pelagic freshwater fish native to tropical parts of northern South America. The Neon tetra originates from western Brazil, south-eastern Colombia and eastern Peru and wild Neon tetras can be found in the headwaters of the River Amazon, Tiger, Napo and Yarapa. The study of length-weight relationship is the most important aspect in biological studies of fish.

Such studies were carried out in different fishes previously by Lacrane (1951), Brown (1957), Goswami (1996), Jhajhria (2003), Gogte (2005). During studies present investigation were conducted to determine length-weight relationship in the fish Paracheirodon innesi.

MATERIAL AND METHODS

The present study was carried out for the period of three months during June to August 2010 to determine the length weight relationship of Paracheirodon innesi. Total length of fish was measured in mm. weighted in mg. firstly and after that they were weighted individually after removing surface moisture with a blotting paper.

The mean length and mean weight was calculated by arranging them in 07 groups of 01 mm class intervals.

The length weight relationship was determined by using general parabolic form of equation.

$W=aL^b$

$W = \log a + b \log L$

Where 'W' is the weight in mgs.
'L' is the length in mms.
'a' is a constant and 'b' is an exponent.

RESULTS AND DISCUSSION

Out of 50 samples of fish, length of the male ranges from 28.09 to 34.92 mm, while weight from 230 to 358 mg. In case of female fish the value ranges from 31.06 to 33.54 mm and 330 to 658 mg in weight. These values were then converted to logarithmic values and obtained statistical data and illustrated as an arithmetic plot.

The average length (L) and the average weight (W) in each size group were calculated and the relationship was determined, on the size group average with the help of the formula by Lacrane (1951).

$W = aL^b$

W = Average weight of fish in mg.

L = Average length of fish in mm.

The formula may also be expressed as follows.

$$Y = a + B x$$

Where

Y = log W

X = log L and

a & B constant.

The length weight relationship in Paracheirodon innesi fishes have found to be

$$W = 0.04697L^{3.5405}$$

Procedure of calculations for length and weight relationship in Paracheirodon innesi fishes.

Now the general equation $W = aL^b$ has to be fitted in for above data converting this in to logarithms and after substituting y for Log W, x for Log L and a for Log A the y = a + Bx where the constant a and B to be determined.

$$B = \frac{\Sigma xy - N\bar{x}\,\bar{y}}{\Sigma x^2 - N\bar{x}^2}$$

$$= \frac{27.6865 - 7 \times 3.9514}{15.7385 - 7 \times 2.2473}$$

Table 1: Length weight relationship of Paracheirodon innesi

Size group (mm)	Average Length (mm) 'L'	Average weight (mg) 'W'	Log 'L' (x)	Log 'W' (Y)	X^2	XY	Calculated Y
28 – 29	28.66	290.85	1.4573	2.4636	2.1237	3.5902	2.4781
29 - 30	29.19	340.58	1.4652	2.5322	2.1469	3.7102	2.5108
30 – 31	30.86	340.86	1.4894	2.5325	2.2183	3.7720	2.6102
31 – 32	31.47	441.86	1.4979	2.6452	2.2437	3.9623	2.6452
32 – 33	32.64	486.95	1.5138	2.6874	2.2914	4.0681	2.7105
33 – 34	33.84	591.32	1.5294	2.7718	2.3392	4.2393	2.7750
34 - 35	34.77	658.64	1.5412	2.8186	2.3753	4.3441	2.8235
Total			ΣX = 10.4942	ΣY = 18.4517	ΣX^2 = 15.7385	ΣXY = 27.6865	

$\bar{x}$ = 1.4991,

$\bar{y}$ = 2.6359

Σx = 10.4942

Σy = 18.4517

Σx^2 = 15.7385

Σxy = 27.6865

N = 7

$N\bar{x}\bar{y}$ = 7× 3.9514

$N\bar{x}^2$ = 7 2.2473

$$= \frac{0.0262}{0.0074}$$

B = 3.5405

$$a = \frac{\Sigma y - B\Sigma s}{n}$$

$$= \frac{18.4517 - 3.5405\ (10.4942)}{7}$$

a = -2.6718
a antilog a = 0.04697

y = a + Bx
y = -2.6718 + 3.5405 (x)
Expressing this in terms of W and L the equation will be
$W = aL^B$
$W = 0.04697L^{3.5405}$

Substituting these values of a and B in the above equation plot a graph for fishes. Paracheirodon innesi, taking average length on x – axis and estimated values of average weight along the y – axis. The nature of graph is curvilinear; also mark the points, average length verses observed weight. The points are slightly away from the curve, which indicates that there is nearest agreements between observed and estimated values of the weight.

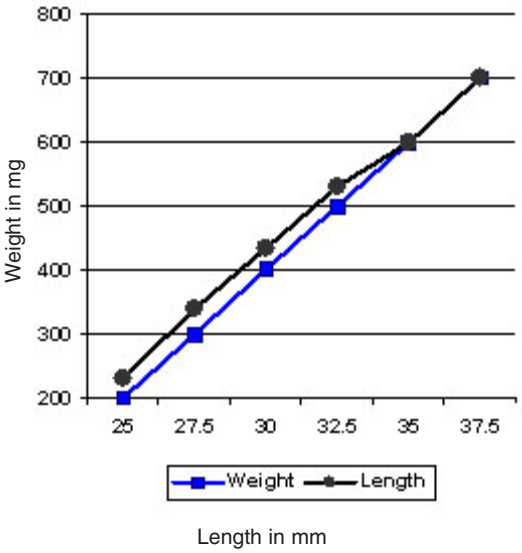

Fig.1: Length weight relationship in Paracheirodon innesi

Fig. 2: Measurement of weight during study of Paracheirodon innesi

Fig. 3: Paracheirodon innesi male

Fig. 4: Paracheirodon innesi female

The average length of fishes, estimated weight obeys the law of exponential distribution.

Length and weight relationship in Paracheirodon innesi is summarized in table 1. The length and weight relationship in Paracheirodon innesi was found to be

$W = 0.04697L^{3.5405}$

In the present study the exponent value was obtained with in this limit. It indicates that the weight of the fish is similar in relation to its length that is, isometric growth. The logarithmic values of observed length and weight are given in fig. 1.

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