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Length-Weight Relationship and Condition Factor of an Endemic Ornamental Cat Fish, *Gagata dolichonema* He, 1996 Manipur

KEYWORDS

Konsam Nishikanta
Department of Life Sciences Manipur University, Canchipur, Imphal, Manipur, India

***Yurembam Motilan**
Department of Life Sciences Manipur University, Canchipur, Imphal, Manipur, India. *Corresponding Author

ABSTRACT *The Length Weight Relatioship (LWR) and Condition Factors of Gagata dolichonema He was studied. During the study, the obsreved values are: a= 0.0487 and n= 2.3550 respectively. The relationship was established as follows: W= 0.0487L2.3550. The value of K was almost constant in all specimens, ranging from 0.7520–0.9113, except for one specimen in which the value of K was 1.2636 (in 90.5 mm TL). Since the value is lesser than 3, it can be concluded that the relationship deviates from the cube law.*

INTRODUCTION

Study of LWR has a significant role in fishery biology and fish population dynamics where many stock assessment models require the use of LWR parameters, since various important biological aspects viz., general well-being, onset of maturity and spawning, fecundity etc., can be assessed with the help of condition factor from this relationship. And also, it is one of the important morphometric characters in taxonomy (Le Cren, 1951; Goel et al., 2011). Determination of the proper size of the fish to harvest for maximum sustained yield is directly related to its weight. Length-weight relationship of fish varies depending upon the conditions of its life in the environment. This relationship serves three purposes viz., to elucidate the mathematical relationship between the two variables so that if one variable is known, the other could be computed to determine the relative condition that can be used to assess the general well-being and type of growth, i.e., whether isometric or allometric growth and to estimate the potential yield per recruit in the study of fish population dynamics (Prasad and Anvar, 2007).

Generally, in fishes the growth pattern follows the cube law (Brody, 1945; Lagler, 1952). The 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, due to environmental conditions or conditions of fish, the actual relationship between length and weight may depart from the ideal value (Le Cren, 1951). In the present paper, biology of *Gagata dolichonema* (Fig. 1) was studied. *Gagata dolichonema* which is confined only to Chindwin drainage possesses high ornamental value. Thus, the propagation in their number at the earliest is very necessary for the biology study.

MATERIALS AND METHODS

Identification of fishes

Counts and measurements were made following Kottelat (2001). Measurements were taken point-to-point with a digital caliper to the nearest 0.01mm on the left side of the specimens whenever possible. Fin rays, scales and lateral line pore counts were made on the left side of the specimens using LicaS8APO stereo zoom microscope under transmitted and reflected light.

Length-weight relationship

Total length was measured from the tip of mouth to the tip of longest caudal fin lobe for each specimen in millimeter and body weight was recorded in gram. To study the length-weight relationship, sexes were treated separately and the relationship was then calculated by the method of least squares using the equation:

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

Where, W = weight in gram, L= Total length in mm and 'a' and 'b' are constant forms of the formula, $W = aL^b$ (Le Cren, 1951). The level of significance was tested by covariance method (Snedceor and Cochran, 1967).

Condition factor (K)

Condition factor or Ponderal index was determined, using the formula:

$$K = W \times 10^5 / L^3,$$

Where, K = Condition factor; W = weight of the fish and L = length of the fish; the value, 10^5 is a factor to bring the Ponderal index (K) near to unity (Carlander, 1970).

RESULT AND DISCUSSION

The Length Weight Relationship and Condition Factors of *Gagata dolichonema* were studied. The sexes were combined since it was difficult to segregate male and females in the collection sites. The statistical data of length and weight relationship are shown in (Table.1) and (Fig. 2) represents the relation between logL and logW. (Fig. 3) shows regression line of total length and body weight. Weight of the fishes was taken against the corrresponding length of the fishes. The relationship confirmed the general formula $W=aL^n$. The value of 'a' and 'n' were determined by least squares after converting the data to logarithm.

Their values are: a=0.0487; n=2.3550

The relationship was setablished as follows:

$$W=0.0487L^{2.3550}$$

The same is represented in logarthmic form of length-weight relationship as:

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Ln W=-1.3124+2.3550LnL.

Student's t-test was performed to test the significance of regression co-efficient whether the length weight relationship follows isometric pattern. The calculated 'b' value was found to be insignificant at 1% level indicating isometric growth.

The co-efficient of condition factor or the Ponderal index (K) of the species was calculated. The value of K was almost constant in all specimens, ranging from 0.7520–0.9113, except for one which has a value of 1.2636 (in 90.5 mm TL).

The relationship of length and weight confirmed the applicability of the general formula, $W= aL^n$ to the fish. The value of n was found to be 2.5525 which fall within the ranges as given by Hile (1936) and Martin (1949). Similar value was also obtained by Natarajan and Jhingran (1963), Reddy and Rao (1992). Since the value is lesser than 3, it can be concluded that the relationship deviates from the cube law. Hence, it can be further accepted that the fish changes its shape as it grows. The value of coefficient of condition (K) was almost constant which indicates the maturation cycle among the fish with various lengths.

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Fig 1. *Gagata dolichonema*

Table.1 Relation between total length, observed weight and Condition factor.

SL. No.	L	logL	$(logL)^2$	W	logW	$(logW)^2$	logL. logW	K
1	90.55	1.9594	3.8392	9.32	0.9694	0.9397	3.6844	1.2636
2	70.78	1.8499	3.4221	7.95	0.9003	0.8105	2.7736	0.8751
3	102.4	2.0102	4.0409	9.39	0.9726	0.9527	3.8497	0.8737
4	79.00	1.8776	3.6008	4.22	0.6253	0.3910	0.1176	0.8559
5	93.74	1.9719	3.8883	6.72	0.8273	0.6844	2.611	0.8158
6	90.40	1.9561	3.8265	6.02	0.7795	0.6076	2.3249	0.8140
7	82.62	0.9170	0.8408	5.14	0.7109	0.5053	0.4248	0.9113
8	90.8	1.9580	3.8337	6.61	0.8202	0.6727	2.5789	0.8829
9	80.68	1.9067	3.6355	4.66	0.6683	0.4466	1.6236	0.8873
10	94.02	1.9732	3.9800	6.23	0.7944	0.9160	2.5113	0.7520

L=Total length; W= Weigth of fish, K= Condition factor

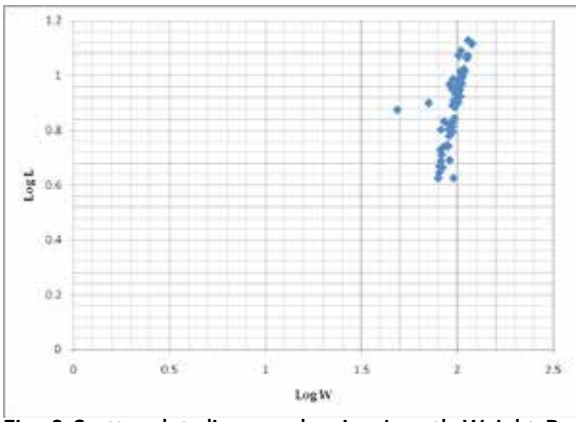

Fig. 2 Scatter dot diagram showing Length Weight Relationship of *Gagata dolichonema.*

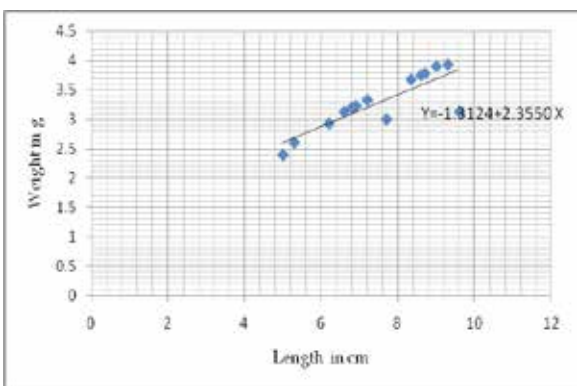

Fig.3 Regression line of Length-weight Relationship of an Endemic *Gagata dolichonema*

REFERENCE Cadwallader, P.L. (1975). A laboratory study of interactive segregation between two New Zealand streams-dwelling fish. Journal of Animal Ecology; 44: 865 –875. | Goel, C.; Barat, A.; Pande, V.; S. Ali; R. Kumar. (2011). Length-weight relationship of snow trout (Sizothorax richardsonii) based on linear and non linear models from hill stream of Uttarakhand, India. World Journal of Fish and Marine Sciences; 3(6): 485–488. | Hile, R. (1936). Age and growth of the cisco Leucichthys artedi (Le Suaur) in the Lakes of the North-Eastern highland Wisconsim. Bulletin of the United States Fish; 48: 211–217. | Kottelat, M. (2001). Fishes of Laos. WHT Publications (Pte) Limited; 1–23 pp. | Le Cren, E.D. (1951). The Length-weight relationship and seasonal cycle in gonad-weight and condition in the perch (Perca fluviatilis). Ibid; 20(2): 201–219. | Martin, W.R. (1949). The mechanics of environmental control of body form in fishes. University of Toranto studies Biological Series; 58: 1–91. | Natarajan, A.V.; Jhingaran, A.V. (1963). On the biology of Catla catla (Ham.) from the River Yamuna. Proceeding National Institude of Science India; 29 (3): 326–355. | Ready, Y.S.; Rao, M.B. 1992. Length-weight relationship and relative condition of Puntius sophore (Hamilton-Buchannan) from Lake Hussain Sagar, Hydrabad, India. Journal of Inland Fishery Society India; 24(1): 22–25. | Snedecor, G.W.; W.G. Cocchran. 1967. Statistical Methods. Oxford and IBH Publishing Cooperation. |