RESEARCH **P**APER

Length weight relationship of *Laubuka laubuca, Salmophasia phulo* and *Esomus danricus* (Hamilton,1822) from lower Brahmaputra drainage of Assam, North-East India

Chandana Kalita **and Dandadhar Sarma**

Department of Zoology, Gauhati University, Guwahati (Assam) India
Email : sarma_dandadhar@yahoo.com; ckalita30@gmail.com

Length-weight relationships (LWRs) for three cyprinids (*Laubuka laubuca*, *Salmostoma phulo* and *Esomus danricus*) collected seasonally from May 2016 to January 2017 along the lower Brahmaputra drainage in Assam (Northeast India), using fishing gears [cast nets: 2.5 m, 10–15 mm mesh size; gillnets: 30 × 0.9 m, 18–20 mm mesh size], were estimated. The '*b*' values in the LWRs were 3.46 for *L. laubuca*, 2.98 for *S. phulo* and 3.13 for *E. danricus,* respectively.

Key words : Length weight, *L. laubuca, S. phulo, E. danricus*

I**NTRODUCTION**

The lower reaches of the Brahmaputra river in Northeast India is rich in small indigenous species (SIS) of fish (Basumatary *et al.,* 2014). But, studies on LWRs for many SIS fish are scarce from this region. In the lower Brahmaputra drainage *basin Laubuka laubuca, Salmostoma phulo* and *Esomus danricus* (Hamilton, 1822) are in high demand as food and ornamental fish.). Thus, the present study on LWRs attempts to provide baseline information and important contributions for future research on said three cyprinid species.

R**ESEARCH** M**ETHODOLOGY**

Fish specimens were collected seasonally using cast nets (2.5 m, 10–15 mm mesh size) and gillnets (30 × 0.9 m, 18–20 mm mesh size) from May 2016 to January 2017 in two selected sampling sites (Nagarbera: 26° 10' 01" N, 90° 97' 97" E; Rangia: 26°43¹73" N, 92°62¹01"

E) of the lower Brahmaputra in Assam, India. Fishes were fixed in 5 per cent formaldehyde and identified following Talwar and Jhingran (1991) and Vishwanath *et al.* (2014). Total lengths (TL) and body weights (BW) were recorded after 2 to 4 days post fixation. TL was taken with the help of a digital slide calliper (Mitutoyo, CD–8" CSX) to the nearest 0.1 mm and values converted into centimetres, and BW was taken with an electronic balance (TP 303, Denver Instrument, Germany) to the nearest 0.01g. The relationship between total length and body weight were determined through linear regression equation: Log BW = Log a + b Log TL. Log-Log plots of length and weight values were made, and outliers removed by visual inspection (Froese, 2006).

R**ESEARCH** F**INDINGS** **AND** A**NALYSIS**

A total of 173 specimens (*L. laubuca* = 74; *S. phulo* = 25; *E. danricus*= 74) were examined. Statistical

analysis of length and weight parameters including sample size (N), regression parameters 'a' and 'b', their 95 per cent confidence limits and the co-efficients of determination (r^2) are presented in Table 1.

All the calculated 'b' values were within the expected range of 2.5–3.5 (Froese, 2006). Comparing the 95 per cent CL of a, all the five fish species have fusiform body shapes (Froese *et al.,* 2014). From the above discussion it is found that the 'b' value for *S. phulo* (<3) shows an negative allometric growth. The 'b' values for *L. laubuca* and *E. danricus* (>3). Correlation co-efficient for length weight is high indicating increase in weight with every increase in length with a positive correlation.

For *L. laubuca*, the 'b' value (= 3.46) was similar to the results of Kaushik *et al.* (2015) (b = 3.49 for 73 specimens) from Ranganadi river (Brahmaputra drainage, India); but, differed slightly from Hossain *et al.* (2012) (b=3.32 for 197 specimens) from Jamuna river (Brahmaputra drainage, Bangladesh). Also, the 'b' value for *S. phulo* (= 2.98) was similar to the results of Siddik *et al.* (2016) (b = 3.00 for 306 specimens) from Bangladesh, but differed from that of Islam and Mia (2015) (b = 3.22 for 55 specimens) from Atrai river in Bangladesh. The 'b' values for *E. danricus* (b = 3.13) was slightly different from the results of Deori *et al.*
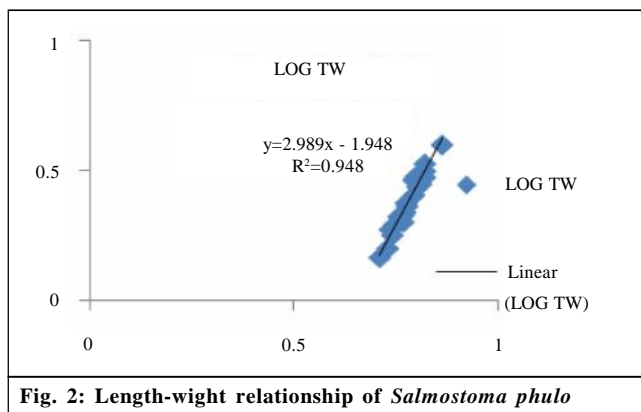

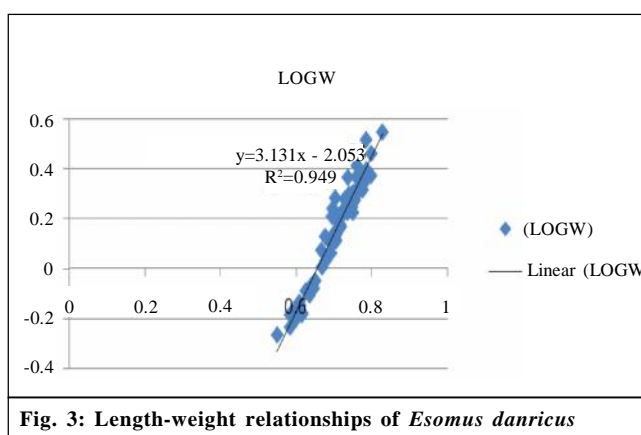**Fig. 2: Length-wight relationship of *Salmostoma phulo***

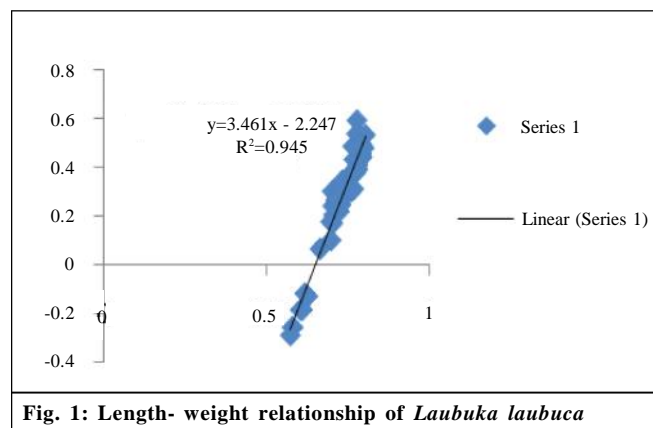**Fig. 3: Length-weight relationships of *Esomus danricus***

(2017) (b = 2.97 for 130 specimens) from Brahmaputra river of Assam. The Bayesian LWRs predictions in Fish base (Froese and Pauly, 2017) for the calculated 'a' and 'b' values were within the expected ranges for all the species, except slightly higher 'b' values for *L. laubuca* (b > 2.97–3.31). Differences in 'b' values may be due to differences in length ranges used, stomach fullness, sex, habitat, environmental conditions, gear selectivity and mesh size and also variations in fixation time of the specimens in formaldehyde (Moutopoulos and Stergiou, 2002; Froese, 2006; Li *et al.,* 2014 and Anzueto-Calvo *et al.*, 2017).

Fig. 1: Length- weight relationship of *Laubuka laubuca*

Table 1:	Descriptive statistics and parameters of LWRs (from May 2016 to January 2017) for *L. laubuca* (Hamilton, 1822), S. *phulo* (Hamilton, 1822) and *E. dendricas* (Hamilton, 1822) from the lower Brahmaputra drainage in Assam, Northeast India									
Species	N	TL (cm)		BW (g)		Regression parameters		95% CL of a	95% CL of b	r^2
		min	max	min	max	a	b			
Laubuka laubuca	74	3.74	6.35	0.52	3.91	0.0057	3.46	0.0040–0.0791	3.26–3.66	0.95
Salmostoma phulo	25	5.13	7.28	1.47	3.97	0.0114	2.98	0.0065–0.0193	2.59–3.12	0.95
Esomus danricuss	74	3.54	6.71	0.54	3.51	0.0089	3.13	0.0067-0.0117	2.96-3.30	0.95

N: Sample size; TL: Total length; BW: Body weight; CL: Confidence limits

Literature Cited

Anzueto-Calvo, M. J., Velázquez-Velazquez, E., Matamoros, W. A., Cruz Maza, B. G. A. and Nettel-Hernanz, A. (2017). Effect of conservation of fish in formalin and ethanol on length-weight relationships and condition factor in *Tlaloc labialis* (Gunther, 1866). *J. Appl. Ichthyol.*, **33** : 1184–1186.

Basumatary, S., Baishya, R. A., Talukdar, B., Kalita, H. K., Dutta, A., Goswami, U. C., Srivastava, S. K. and Sarma, D. (2014). Diversity of small indigenous species (SIS) of fish in the lower reaches of river Brahmaputra, Assam. *Ecol., Environ.& Conserv.,* **20** : 1817–1824.

Deori, D., Abujam, S., Dakua, S. and Laishram, S. (2017). Investigation on feeding, growth and condition factor of certain ornamental fish from Brahmaputra river at Dibrugarh, Assam, India **11**(3): 043-047.

Froese, R . (2006). Cube law, condition factor and weight-length relationship: History, meta- analysis and recommendations. *J. Appl. Ichthyol.*, **22** : 241–253.

Froese, R., Thorson, J. T. and Reyes Jr., R. B. (2014) A bayesian approach for estimating length-weight relationship in fishes. *J. Appl. Ichthyol.*, **30** : 78–85.

Hossain, M. Y., Md Rahman, M., Fulanda, B., Jewel, M. A. S., Ahamed, F. and Ohotomi, J. (2012). Length-weight and length-length relationships of five threatened fish species from the Jamuna (Brahmaputra river tributary) River, Northern Bangladesh. *J. Appl. Ichthyol.,* **28** : 275 – 277.

Islam, M. R. and Mia, M.J. (2015). Length-weight and length-length relationship of five fish species in the Atrai River, Dinajpur, Bangladesh. *J. Appl.Ichthyol.,* **32**: 1371–1373.

Kaushik, G., Das, M. K., Hussain, J. F. and Bordoloi, S. (2015). Length-weight relationships of five fish species collected from Ranganadi river (Brahmaputra river tributary) in Assam, India. *J. Appl. Ichthyol.,* **31** : 433–434.

Li, Q., Xu, L. X., Huang, J. R. (2014). Length-weight relationships of16 fish species from the Liuxihe national aquatic germplasmresources conservation area, Guangdong, China. *J. Appl. Ich-thyol.,* **30** : 434–435.

Moutopoulos, D. K., Stergiou, K. I. (2002). Length-weight andlength-length relationships of ?sh species from the Aegean Sea (Greece). *J. Appl. Ichthyol.,* **18** : 200–203.

Sarkar, U. K., Negi, R. S. and Deepak, P. K. (2008). Length-weight relationship of clown knifefish *Chitala chitala* (Hamilton, 1822) from the Ganga Basin, India. *J. Appl. Ichthyol.,* **25** : 232–233.

Siddik, M. A. B., Chaklader, M. R., Hanif, M. A., Islam, M. A. and Fotedar, R. (2016). Length-weight relationship of four fish species from a coastal artisanal fishery, southern Bangladesh. *J. Appl. Ichthyol.,* **32** : 1300–1302.

Talwar, P. K. and Jhingran, A. G. (1991). *Inland fishes of India and adjacent countries*. New Delhi,, India: Oxford and IBH Publishing Co.

Vishwanath, W., Nebeshwar, K., Lokeshwor, Y., Shangningam, B. D. and Rameshori, Y. (2014). *Freshwater fish taxonomy and a manual for identification of fishes of Northeast, India*. Lucknow, India: Manipur University and National Bureau of Fish Genetic Resources.

Webliography

Froese, R. and Pauly, D. (2017). *Fishbase.* World Wide Web Electronic Publication. Available at *www. fishbase.org. Ver.* (06/2017) .

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