



Technical contribution

Length–weight relationships of four freshwater ornamental fish species from the Brazilian Negro River basin

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Summary

The present work reports the length–weight relationships (LWR) for four ornamental fish species from the middle Negro River basin, Amazonas, Brazil. The r^2 value ranged from 0.810 to 0.941 and values of b varied from 2.346 to 3.442. These results represent the first reference on LWR for all four species, based on FishBase.

Introduction

Located in the central Amazonas, the Negro River is one of the largest rivers in water volume in the world, draining a basin of over 600 000 km² (Chao, 2001; Latrubesse and Franzinelli, 2005). It is characterized by black water and an anabranching floodplain system of fluvial archipelagos, flooded forests and small streams, which host more than 1000 fish species in the region (Chao, 2001).

Despite the high fish diversity in the Negro River, few studies describe the length–weight relationships (LWR) of the ichthyofauna (Lemos et al., 2006; Teixeira-de Mello et al., 2009, 2011). These relationships can be extremely important in field studies having limited resources and time, allowing determination of fish weight from knowledge of the length, or the weight when knowing the length (Sinovcic et al., 2004). The present work determined the LWR relationship for *Ancistrus hoplogenyis* (Günther, 1864) (Loricariidae), *Apistogramma pertensis* (Haseman, 1911) (Cichlidae), *Carnegiella marthae* (Myers, 1927) (Gasteropelecidae) and *Nannostomus unifasciatus* (Steindachner, 1876) (Lebasiinidae), in order to improve the biological knowledge of these important ornamental fish species from the Brazilian Amazonas.

Material and methods

At low water season in the middle Negro River basin (January, 2010), *A. hoplogenyis*, *A. pertensis*, *C. marthae* and *N. unifasciatus* were captured in streams of the Mariuá Archipelago, near the community of Daracua (0°30'44,1"S; 63°12'37,2"W), Amazonas, Brazil (Fig. 1).

Fish were found close to stream margins and submersed tree trunks and captured with hand nets. Collected animals were separated by species and identified by consulting standard fish books and taxonomic keys (Géry, 1977; Axelrod et al., 1997; Weitzman and Palmer, 2003). Each fish was weighed on an

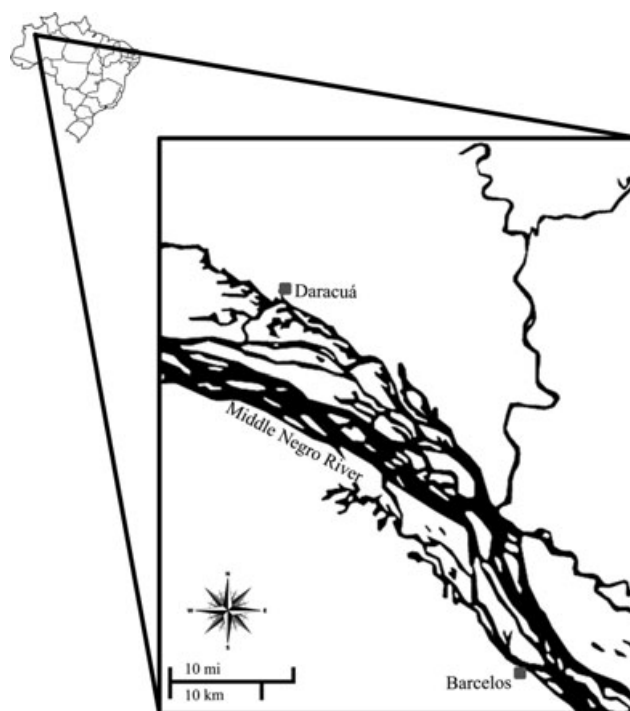


Fig. 1. Map of Mariuá Archipelago, showing a section of the middle Negro River basin between the communities of Daracua and Barcelos, Amazonas State, Brazil

analytical balance with 0.001g precision; length was measured using a digital paquimeter with 0.01 cm precision. The LWR was estimated using the expression $W = a \cdot L^b$, where W = total weight (g) and L = total length (cm). The parameters a and b were estimated by linear regression after logarithmic transformation of weight and length data ($\log W = \log a + b \log L$). Additionally, 95% confidence limits (CL) of a and b were estimated. Log–log plots of total length and weight were performed from the regression for identification and exclusion of outliers (Froese, 2006).

Results and discussion

All regressions were highly significant ($P < 0.001$), with the coefficient of determination (r^2) ranging from 0.810 to 0.941. Results are presented in Table 1. Generally, the values of the exponent b remain within the range of 2.5–3.5 (Carlander, 1969). However, the estimated b for *C. marthae* was 2.346,

Table 1

Regression coefficients (a), slopes (b), 95% confidence limits (95% CL) and coefficients of determination (r^2) for relationships between total length and weight logarithm of four ornamental fish species, middle Negro River basin, Amazonas State, Brazil

Species	N	Total length (cm)	Weight (g)	Relationship parameters				
				a	95% CL of a	b	95% CL of b	r^2
<i>Ancistrus hoplogenyis</i> ^a	102	4.301–10.203	1.308–12.501	0.0188	0.0144–0.0244	2.790	2.652–2.930	0.941
<i>Apistogramma pertensis</i> ^a	185	2.061–3.961	0.057–0.542	0.0054	0.0046–0.0063	3.442	3.291–3.592	0.918
<i>Carnegiella marthae</i> ^a	117	2.321–3.278	0.165–0.449	0.0249	0.0202–0.0307	2.346	2.136–2.557	0.810
<i>Nannostomus unifasciatus</i> ^a	125	3.211–4.207	0.146–0.408	0.0030	0.0024–0.0039	3.387	3.202–3.573	0.914

^aNew species estimates (Froese and Pauly, 2011).

which represents a strongly negative allometric growth. This lower b value is probably related to the narrow length range recorded (TL: 2.32–3.27 cm; Table 1), which is among the known factors to largely affect the LWR (Froese, 2006). Another explanation is related to the body shape of this species, characterized by a slim body and expanded pectoral girdle, forming a well-developed keel, which allows *C. marthae* to leap out of the water as a strategy to escape predators and to search for food (Géry, 1977; Weitzman and Palmer, 2003). *A. hoplogenyis* also showed negative allometric growth, implying allocation of more energy to axial growth rather than to biomass (Teixeira-de Mello et al., 2009), while *Ap. pertensis* and *N. unifasciatus* presented positive allometric growth.

This study represents the first reference on LWR for all four species, based on the data in FishBase (Froese and Pauly, 2011). The results obtained here may be used for comparison in future studies regarding these species in the middle Negro River basin, as well as other basins of the Amazonas.

Acknowledgements

The authors wish to thank Raphael Mariano Macieira (UFES) and Francisco Manoel de Souza Braga (UNESP) for their relevant contribution to the manuscript, and FAPEAM (grant 126/08; 2459/08), CAPES and CNPq (grant 408795/2006-9) for financial support. M. Tavares-Dias (grant 300472/2008-0) and J. L. Marcon (grant 309522/2009-9) received research fellowships from the CNPq.

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