

# Length–weight relationships of three fish species from the Yangtze River, China

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## Summary

Length–weight relationships (LWRs) were determined for three endemic fish species [*Gobiobotia filifer* (Garman, 1912), *Homatula potanini* (Günther, 1896) and *Xenophysogobio boulengeri* (Tchang, 1929)] from the Yangtze River in China. Samples were obtained between April 2008 and June 2012 using various types of fishing gear and electroshock fishing techniques. For each species, the sample size, length range, weight range, LWR, 95% confidence intervals of  $a$  and  $b$ , and coefficient of correlation were determined. Prior to this study, the LWRs for two species [*Gobiobotia filifer* (Garman, 1912) and *Homatula potanini* (Günther, 1896)] were unknown.

## 1 | INTRODUCTION

The length–weight relationship (LWR) is an important tool (Pan, Xie, Yang, Tang, & Qiao, 2014; Que et al., 2015; Lei, Chen, Tao, Xiong, & Chen, 2015; Wang, Tang, Ruan, Wang, & Xiong, 2015) in wide use for the comparison of species growth among sexes, seasons and regions (Froese, 2006; Froese, Tsikliras, & Stergiou, 2011). Knowledge of the LWRs can be useful to fisheries management and conservation (Cao, Yang, Cai, & Pan, 2016; Pan et al., 2015; Xiong et al., 2015).

In this study, the LWRs for *Gobiobotia filifer* (Garman, 1912), *Homatula potanini* (Günther, 1896), and *Xenophysogobio boulengeri* (Tchang, 1929) were determined from the Yangtze River, China.

## 2 | MATERIALS AND METHODS

Specimens were collected from the Jiangan reach (28°23'N; 104°57'E) of the Yangtze River between April 2008 and June 2012, using various types of fishing gear. Each specimen was identified to species level according to FishBase, measured to the nearest 0.1 cm (total length,  $L$ ) and weighed to the nearest 0.01 g (Weight,  $W$ ). For each species, the length–weight function,  $W = aL^b$ , where  $W$  is the weight (g) and  $L$  is the total length (cm), was fitted with a simple linear regression model using log-transformed data. The 95% confidence interval (CI) was determined for parameters  $a$  and  $b$  (Froese, 2006).

## 3 | RESULTS

Table 1 presents the length–weight relationships (LWRs) for each of the three species studied. For *Gobiobotia filifer* and *Xenophysogobio boulengeri*, this study includes a new maximum total length thus far not recorded in the literature.

## 4 | DISCUSSION

Length–weight relationships of the three fish species in a total of 169 individuals were calculated. The values of parameter  $b$  remained within the expected range of 2.5–3.5 (Froese, 2006). LWR for *Gobiobotia filifer* (Garman, 1912) and *Homatula potanini* (Günther, 1896) are published herein for the first time in both the scientific literature and databases such as FishBase (Froese & Pauly, 2014).

There were some differences in  $b$ -values calculated in the present study for some fish species when compared with those of other authors (e.g. Li, Xu, & Huang, 2013; Liu, Luo, & Liang, 2013; Xie, Kang, Yang, & Yang, 2015). Differences in the  $b$  value within same fish species is perhaps caused by such factors as the sex, gonad maturity, growth phase, season, stomach fullness, sampling size, and a narrow length range (Froese et al., 2011; Pan et al., 2016; Tesch, 1971).

**TABLE 1** Descriptive statistics and estimated length–weight relationship (LWR:  $W = aL^b$ ) parameters for three fish species, Yangtze River, China, sampled between April 2008 and June 2012

Family	Species	N	Total length range (cm)	Weight range (g)	a	b	95% CI of a	95% CI of b	r <sup>2</sup>
Gobioninae	<i>Gobiobotia filifer</i> (Garman, 1912)	44	4.9–15.0	1.8–26.7	0.0117	2.83	0.00655–0.0210	2.58–3.08	.953
Gobioninae	<i>Xenophysogobio boulengeri</i> (Tchang, 1929)	49	8.8–14.4	5.7–27.0	0.00507	3.22	0.00288–0.00892	2.98–3.45	.952
Nemacheilidae	<i>Homatula potanini</i> (Günther, 1896)	76	5.0–11.5	1.3–14.7	0.00615	3.17	0.00441–0.00855	3.01–3.33	.957

N, sample size; Length of species expressed as Total Length (TL) and Weight as whole body wet weight; LWR, length–weight relationship; CI, confidence interval; r<sup>2</sup>, coefficient of correlation.

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