

SHORT COMMUNICATION

Length-weight relationships of three Blenniid fish (Actinopterygii: Blenniiformes) from the Persian Gulf, Iran

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Abstract

In the present study, the length-weight relationships (LWRs) of 117 specimens representing three species, including 13 specimens of *Antennablennius bifilum*, 84 specimens of *Istiblennius pox* and 20 specimens of *Antennablennius variopunctatus* collected from the Persian Gulf were estimated. The LWRs equations were found as $W: 0.00000020L^{3.89}$ for *A. bifilum*, $W: 0.0054L^{3.12}$ for *I. Pox* and $W: 0.023L^{2.31}$ for *A. variopunctatus*. The values of b ranged from 2.31 (*A. variopunctatus*) to 3.89 (*A. bifilum*), with the coefficient of determination (r^2) greater than 0.95. This study presents the LWRs parameters for three species of the family Blenniidae from the Persian Gulf, Iran for the first time and provides useful information for marine ecologists, fishery managers, marine conservationists, and for the online databases.

Keywords: Length-weight relationship, b parameter, Blenniidae, Persian Gulf

INTRODUCTION

Length-weight relationship (LWRs) parameters of fishes are important for estimation of the weight of a specimen from its length and estimating length through weight, to use in stock assessment, in the estimation of biomass from length observations, ontogenetic changes, growth studies (Kumolu-Johnson & Ndimele 2010; Keivany et al. 2017b; Jafari-Patcan et al. 2018; Zamani-Faradonbe et al. 2018; Eagderi et al. 2020; Barmooz et al. 2021;), and to estimate the condition factor (Wootton 1990; Pauly 1993; Petrakis & Stergiou 1995; Gonçalves et al. 1997; Yedier et al. 2019; Türker et al. 2020). The Persian Gulf lies within the extensive arid zone of southwestern Asia and is generally classified as a subtropical marine ecosystem (Sheppard, 1993). Environmental conditions in this region are characterized by pronounced seasonal temperature fluctuations, with seawater temperatures rising above 34°C during summer and dropping below 15°C in winter (Rezai et al. 2004). According to the most recent ichthyofaunal checklist, the Persian Gulf supports a rich fish diversity, comprising 744 recorded species distributed among 445 genera, 131 families, and 27 orders (Eagderi et al. 2019). This contribution

presents the parameters of LWRs for three species of Blenniidae (Actinopterygii: Blenniiformes) viz. *Antennablennius bifilum*, *Istiblennius pox* and *Antennablennius variopunctatus* from the Persian Gulf for the first time.

MATERIALS AND METHODS

The sampling was carried out on a seasonally basis. A total of 117 specimens of three species, including 13 *Antennablennius bifilum*, 84 *Istiblennius pox* and 20 *Antennablennius variopunctatus* were collected in the depths of 40-130cm by hand net and diving, from the Persian Gulf, during September 2022 to August 2023. The collected fishes were anesthetized in 1% clove oil and preserved in buffered 10% formalin at the field and transported to the Ichthyology Museum, Department of Natural Resources, Isfahan University of Technology. The total length (TL) and total weight of each individual were measured using dial calipers and digital scale to the nearest 0.01mm and 0.01g, respectively. The length-weight relationship was estimated by $W=aL^b$, and the logarithmic length-weight equation as: $\text{Log}(w)=\text{Log}(a)+b\text{log}(L)$, (Froese 2006). So that W is the whole-body weight (g); L is the total length (mm), a is the intercept and b is the slope

Table 1. Descriptive statistics and estimated parameters of length-weight relationships for three species of blennies from the Persian Gulf, Iran.

species	Total length (mm)			Total weight (g)		Regression parameters			
	n	max	min	max	min	a (CIa)	b (CIb)	r ²	Gp
<i>A. befilum</i>	13	61.84	51.80	2.13	1.06	0.0000002 (0.0000006-0.000001)	3.89 (3.38-3.96)	0.98	A ⁺
<i>I. pox</i>	84	89.97	19.00	3.98	0.03	0.0054 (0.004-0.006)	3.12 (3.04-3.26)	0.92	A ⁺
<i>A. variopunctatus</i>	20	63.04	36.67	1.67	0.48	0.023 (0.018-0.031)	2.31 (2.15-2.48)	0.95	A ⁻

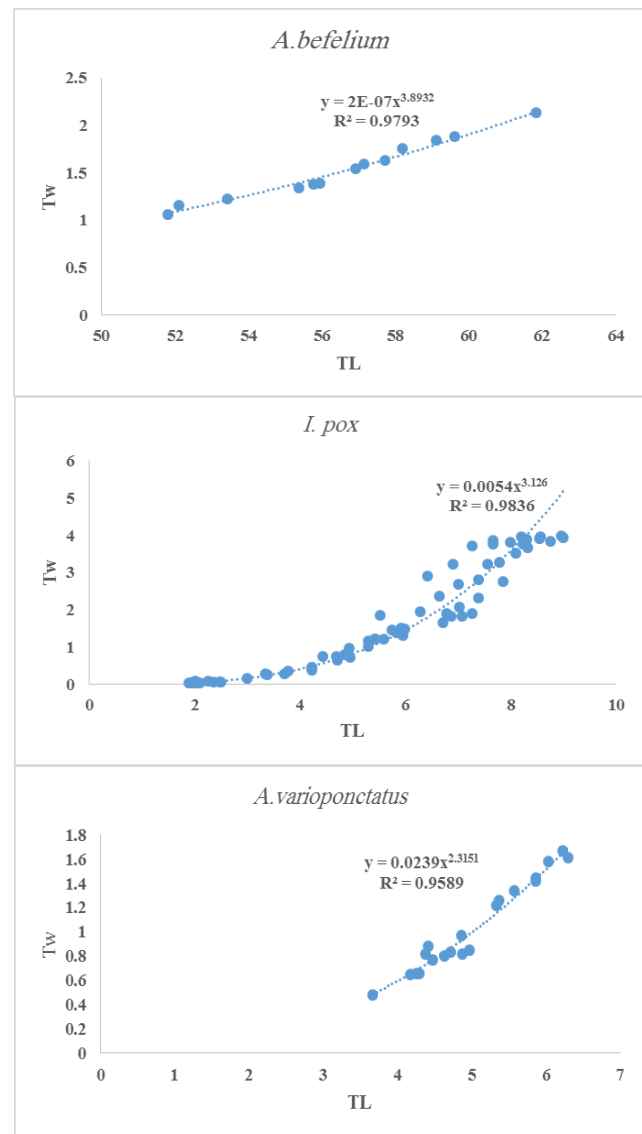
n: number of individuals; a: intercept; b: slope; CI: confidence limits; r²: coefficient of determination; Gp: Growth pattern

(Froese et al. 2011). Outliers perceived in the log-log plots of all species were removed from the regression. Student's t-test was performed to determine whether the estimated b-value differed significantly from the theoretical value of 3 ($b=3$; $P<0.05$). All statistical analyses were performed in Excel 2019 and PAST 2.17b (Hammer et al. 2001) software.

RESULTS AND DISCUSSION

The specimens were ranged from 19-89.97mm in total length and 0.03-3.98g in total weight. The number of samples, minimum and maximum of total length (mm), minimum and maximum of weight (g), length-weight relationships parameters (a , b) and the coefficient of determination (r^2) of three studied species, *A. bifilum*, *I. Pox* and *A. variopunctatus* are presented in Table 1 and Fig. 1. LWR ranged from 2.31 for *A. variopunctatus* to 3.89 for *A. bifilum*. The values of the b in LWRs falls between 2.5 and 3.5 (Froese 2006) or 2-4 (Tesch 1971). All relationships were highly significant ($P<0.05$) with r^2 values greater than 0.92 in three species ($r^2=0.92$ -0.98). This is while the growth pattern in *A. befilum* is and *I. pox* is positive allometric, in *A. variopunctatus* is negative allometric.

The value of b for three species is in the expected range (2-4) (Tesch 1971; Froese 2006; Zamani-Faradonbe et al. 2015). The b coefficient in the length-weight relationship may be influenced by a variety of biological and environmental factors, including habitat characteristics, feeding habits, sex, reproductive maturity, stomach fullness, and the

**Fig.1.** Length-weight relationship graph of three Blenniidae species from the Persian Gulf.

overall health condition of individuals (Tesch 1971; Bagenal & Tesch 1978; Kamal et al. 2009). In

addition, both the length–weight relationship and its associated parameters are not constant and may exhibit daily as well as seasonal fluctuations (De Giosa et al. 2014). This study provided some basic information that will be useful for their fishery management and fish population dynamic studies.

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مقاله کوتاه

روابط طول-وزن سه گونه ماهی از خانواده بلونی‌ماهیان (Actinopterygii: Blenniiformes) در خلیج فارس، ایران

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گروه شیلات، دانشکده منابع طبیعی، دانشگاه صنعتی اصفهان، اصفهان ۸۴۱۵۶۸۳۱۱۱، ایران.

چکیده: در مطالعه حاضر، رابطه طول-وزن برای ۱۱۷ نمونه متعلق به سه گونه از خانواده بلونی‌ماهیان شامل ۱۳ نمونه از *Antennablennius bifilum*، تعداد ۸۴ نمونه از *Istiblennius pox* و ۲۰ نمونه از *Antennablennius variopunctatus* که از خلیج فارس جمع‌آوری شده بودند، برآورد شد. معادلات رابطه طول-وزن به ترتیب برای *A. bifilum* برابر با $W=0.0000020 L^{3/89}$ ، برای *I. pox* $W=0.0054 L^{2/12}$ ، و برای *A. variopunctatus* $W=0.023 L^{2/31}$ به دست آمد. مقدار ضریب b در بین گونه‌های مورد بررسی از ۲/۳۱ در *A. variopunctatus* تا ۳/۸۹ در *A. bifilum* متغیر بود و ضریب تعیین (r^2) در تمامی موارد بیش از ۰/۹۵ محاسبه شد. این پژوهش برای نخستین بار پارامترهای رابطه طول-وزن این سه گونه از خانواده بلونی‌ماهیان را در خلیج فارس (ایران) گزارش می‌کند و اطلاعات ارزشمندی را برای بوم‌شناسان دریایی، مدیران شیلاتی، متخصصان حفاظت از اکوسیستم‌های دریایی و همچنین پایگاه داده FishBase فراهم می‌آورد.

کلمات کلیدی: رابطه طول-وزن، پارامتر b ، بلنی‌ماهیان، خلیج فارس