Original article

Morphological Characters of *Pseudapocryptes elongatus* in the Payra River, Southern Bangladesh

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ABSTRACT

The present study expresses the morphological characters including length weight relationships (LWRs) (13 equations), length length relationships (LLRs) (12 equations), recorded maximum length of *Pseudapocryptes elongatus* from the Payra River, Southern Bangladesh. A total 220 specimens of *P. elongatus* having a wide range of length were carried out occasionally using different fishing gears during July 2014 to June 2015. Total of 13 lengths were taken to nearest 0.01 cm using digital slide calipers, while total body weight (BW) was recorded using an electronic balance with 0.01 g accuracy, for each individual. The LWRs was calculated by the equation: $W = a \times L^b$, where W is the body weight (g) and L is the length (cm), a and b are LWRs parameter. Total length (TL) was ranged from 3.50-28.10 cm and BW was varied from 0.15 to 37.39 g. These results will convey important information for the Fish Base, will provide an important baseline for future studies as well.

Introduction

The *Pseudapocryptes elongatus* (Cuvier 1816) is a ray finned fish of the family Gobiidae and inhabits coastal to freshwater. It is distributed in Indo-Pacific region including Bangladesh, China, India, Japan, Malaysia, Myanmar, and Thailand (Froese and Pauly 2021). This species is commonly known as Chewa in Bangladesh (Rahman 1989), Ikan njanjan in Indonesia (Weber and Beaufort 1953) and Belacak in Malaysia (Mohsin et al. 1993). The *P. elongatus* is a commercially important species in different countries *i. e.*, Japan, Taiwan and Vietnam (Ip et al. 1990). This species is categorized as list concern globally (IUCN 2015).

Very few studies have been conducted on this species like ecology, food and feeding habit (Cees et al. 1995), biology and population dynamics (Hora and Law 1936; Dinh et al. 2007). Morphometric characters are very supportive for identification and classifying of any fish species in laboratory or in wild habitats (Begenal 1978; Jayaram 1999) and useful for comparing life story and morphological themes of populations of different water-bodies (Hossain 2013; Hossain et al. 2012; Hossen et al. 2016). Therefore, the aim of this study is to describe the morphological characters of *P. elongates* with various body sizes from in the Payra River of southern Bangladesh.

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Materials and methods

This study was conducted in the Payra River (22° 27' N, 90° 20' E), southern Bangladesh near the Bay of Bengal. A total 220 specimens of *P. elongatus* were carried out using different fishing gears, including cast net, square lift net, seine net, conical trap and monofilament fixed gill net during July 2014 to June 2015. The fresh samples were instantaneously chilled on site and after arrival in the laboratory fixed with 10% formalin for further study. Species identifications were done based on morphological characteristics according to Froese and Pauly (2021). For each individual, total body weight was recorded using an electronic balance (0.01 g accuracy) and different lengths (Figure 1 and Table 1) were taken using digital slide calipers to the nearest 0.01 cm. The LWRs were calculated using the equation: $W = a \times L^b$, where W was the body weight (g) and L was the length (cm). The parameters a and b were estimated by linear regression analyses based on natural logarithms: $ln (W) = ln(a) + b\, ln(L)$. Moreover, 95% confidence limits of a, b and the co-efficient of determination (r^2) were estimated. Extremes outliers were erased from the regression analyses according to Froese (2006). To confirm whether b values obtained in the linear regressions were significantly different from the isometric value ($b = 3$), a t-test was applied (Sokal and Rohlf 1987). The LLRs (12 relationships) were estimated by linear regression analysis (Hossain et al. 2006).

For statistical analysis, GraphPad Prism 6.5 Software was used. All statistical analyses were considered significant at level 5% ($p < 0.05$).
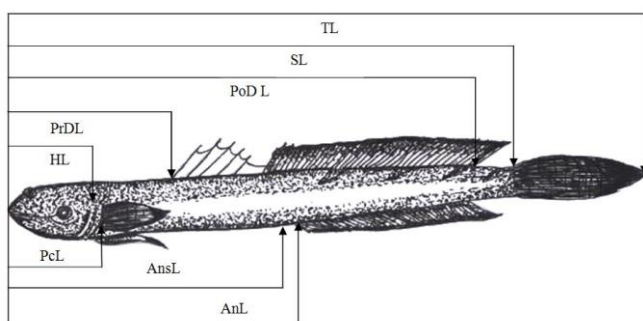

Fig. 1. Showing the morphometric measurements of *Pseudapocryptes elongatus* from the Payra River, Bangladesh

Result

Altogether 220 specimen of *P. elongates* was sampled from the Payra River. Table 1 presents the descriptive statistics for length and weight measurements of *P. elongatus*. Total sample (n), regression parameters and 95% confidence intervals for a and b of the LWRs, coefficients of determination (r^2) of *P. elongatus* were given in Table 2. The calculated allometric coefficient (b) showed negative allometric growth ($b < 3.00$, $p < 0.001$) to positive allometric growth ($b > 3.00$). The LWRs were highly significant ($p < 0.01$), with all r^2 values ≥ 0.980. Moreover, the LLRs (12 relationships) along with the estimated parameters and the coefficient of determination (r^2) were presented in Table 3. Also, the calculated LLRs were highly significant ($p < 0.001$) with $r^2 \geq 0.977$.

Discussion

This study describes the first complete information on morphological (LWRs and LLRs) characteristics of *P. elongatus* from the Payra River, Southern Bangladesh, however previously, some studies were done about biological observation (Bucholtz et al. 2009), biology and population dynamics (Dinh et al. 2007) in Vietnam and length-weight relationship in Malyasia (Khaironizam and Norma-Rashid 2002). This study recorded the maximum length of *P. elongates* (28.10 cm TL). Information of maximum length helps to estimate asymptotic length and growth coefficient of fishes that have importance in fisheries management (Hossain et al. 2016a; b). The regression parameter b of LWRs were ranged from 2.37–3.43 indicating negative allometric to positive allometric growth pattern of this species in the Payra River, Southern Bangladesh. The b values, however, may differ in the same fish species as a result of the permutation of various factors including habitat, level of stomach fullness, seasonal effect, gonadal maturation, sex, physiology, preservation techniques and dissimilarities in the observed length ranges of the specimens collected, which were excluded in the present study (Tesch 1971; Hossain et al. 2012). This is the first study on these aspects and there was no previous study on this issue that restrains to compare with our findings.

In conclusion, this study was provided the morphometric characters including length-weight relationships, length-length relationships and

Table 1. Morphometric measurements of the *Pseudapocryptes elongatus* (Cuvier 1816) captured from the coastal Payra River, Southern Bangladesh

Measurements	Min (cm)	Max (cm)	Mean ± SD	95% CL	%TL
Total length (TL)	3.50	28.10	17.56 ± 6.76	16.22 – 18.90	
Standard length (SL)	2.21	23.00	13.92 ± 5.48	12.83 – 15.00	79.57
Head length (HL)	0.58	3.11	2.06 ± 0.72	1.92 – 2.21	11.78
Oparcular length (OprL)	0.33	2.25	1.39 ± 0.52	1.29 – 1.50	7.94
Body depth (BD)	0.18	2.05	1.19 ± 0.49	1.09 – 1.28	6.76
Pre dorsal length (PrDL)	0.98	4.62	3.12 ± 1.03	2.91 – 3.32	17.76
Post dorsal length (PoDL)	2.23	22.5	13.71 ± 5.53	12.61 – 14.81	78.07
Pectoral length (PcL)	0.58	3.15	2.08 ± 0.73	1.94 – 2.23	11.87
Pelvic length (PvL)	0.62	3.12	2.08 ± 0.71	1.94 – 2.22	11.86
Anal length (AnL)	1.45	8.8	5.51 ± 1.97	5.12 – 5.90	31.36
Anus length (AnsL)	1.25	8.5	5.21 ± 1.92	4.83 – 5.59	29.69
Pectoral fin base length (PcFBL)	1.17	7.8	0.51 ± 0.16	0.48 –0.54	2.89
Pelvic fin base length (PvFBL)	.09	0.70	0.45 ± 0.17	0.41 – 0.48	2.54
Body weight (BW)	0.15	37.39	13.44±10.82	11.30 – 15.59	

n, sample size; Min, minimum; Max, maximum; SD, standard deviation; CL, confidence limit for mean values

Table 2. Descriptive statistics and estimated parameters of the length-weight relationships of *Pseudapocryptes elongatus* (Cuvier 1816) captured from the Payra River, Southern Bangladesh

Equation	Regression parameters		95% CL of *a*	95% CL of *b*	r^2
	a	*b*			
BW= $a \times TL^b$	0.0057	2.61	0.0049 – 0.0067	2.55 – 2.67	0.988
BW= $a \times SL^b$	0.0152	2.50	0.0130 – 0.0178	2.41– 2.53	0.985
BW= $a \times HL^b$	1.0463	3.09	1.0018 – 1.0928	3.04 – 3.15	0.992
BW= $a \times OprL^b$	3.8774	2.85	3.7521 – 4.0070	2.78 – 2.91	0.988
BW= $a \times BD^b$	6.8667	2.37	6.6405 – 7.1006	2.31 – 2.43	0.984
BW= $a \times PrDL^b$	0.2316	3.28	0.2077 – 0.2582	3.19 – 3.38	0.979
BW= $a \times PoDL^b$	0.0169	2.45	0.0149 – 0.0192	2.40 – 2.50	0.990
BW= $a \times PcL^b$	1.0004	3.109	0.9403 – 1.0644	3.03 – 3.19	0.984
BW= $a \times PvL^b$	0.9333	3.20	0.8715 – 0.9995	3.11 – 3.29	0.981
BW= $a \times AnL^b$	0.0594	3.00	0.0533 – 0.0661	2.93 – 3.06	0.989
BW= $a \times AnsL^b$	0.0859	2.88	0.0779 – 0.0947	2.82 – 2.94	0.989
BW= $a \times PcFBL^b$	98.659	3.43	90.8314-107.1620	3.33-3.53	0.980
BW= $a \times PvFBL^b$	86.4234	2.66	81.4951-91.6499	2.60-2.71	0.989

n, sample size; *a* and *b* are length-weight relationship parameters; CL, confidence limit for mean values; r^2, co-efficient of determination

Table 3. The estimated parameters of the length-length relationships ($Y = a + b \times X$) of *Pseudapocryptes elongatus* (Cuvier 1816) captured from the Payra River, Southern Bangladesh

Equation	Regression parameters		95% CL of *a*	95% CL of *b*	r^2
	a	*b*			
TL = a + b × SL	0.4428	1.23	0.1807 to 0.7049	1.21 – 1.25	0.995
TL = a + b × HL	-1.7845	9.38	-2.2038 to -1.3652	9.18 – 9.57	0.990
TL = a + b × OprL	-0.4411	12.91	-1.0195 to 0.1373	12.52 – 13.30	0.978
TL = a + b × BD	1.4076	13.61	0.8663 to 1.9489	13.19 – 14.04	0.977
TL = a + b × PrDL	-2.6083	6.47	-3.2127 to -2.0039	6.28 – 6.65	0.980
TL = a + b × PoDL	0.8729	1.22	0.5945 to 1.1513	1.20 – 1.24	0.994
TL = a + b × PcL	-1.6131	9.20	-2.1446 to -1.0816	8.96 – 9.44	0.983
TL = a + b × PvL	-2.0439	9.42	-2.6279 to -1.4600	9.15 – 9.68	0.981
TL = a + b × AnL	-1.2294	3.41	-1.6964 to -0.7623	3.33 – 3.49	0.987
TL = a + b × AnsL	-0.6897	3.50	-1.1325 to -0.2469	3.42 – 3.58	0.987
TL = a + b × PcFBL	-3.1532	40.79	-3.7755 to -2.5309	39.63 – 41.96	0.980
TL = a + b × PvFBL	0.2577	38.81	-0.1966 to 0.7119	37.86 – 39.76	0.985

a, intercept; *b*, slope, CL, confidence limit for mean values, r^2, co-efficient of determination

recorded total length which will be used in the Fish Base and as an important baseline for future studies.

Conflict Of Interest
There is no competing interest that might influence the research work.

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