

**LENGTH–WEIGHT RELATIONS OF ANATOLIAN KHRAMULYA, *CAPOETA TINCA*
(ACTINOPTERYGII: CYPRINIFORMES: CYPRINIDAE), FROM SAMSUN PROVINCE,
NORTHERN TURKEY**

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Abstract. The parameters of length–weight relations for Anatolian khramulya, *Capoeta tinca* (Heckel, 1843) from 10 inland bodies of water of the Samsun Province, Northern Turkey were presented. The *b* values of the length–weight relations ranged from 2.5444 to 3.3517. For nine freshwater resources in Samsun, this study is the first reference on length–weight relation of *Capoeta tinca*.

Keywords: fish, length–weight relation, Anatolian khramulya, *Capoeta tinca*, Samsun province, Turkey

Length–weight relations are useful in determining weight and biomass when only length measurements are available, and allow comparisons of species growth between different habitats and/or regions (Koutrakis and Tsikliras 2003, Oscoz et al. 2005).

Anatolian khramulya, *Capoeta tinca* (Heckel, 1843) is a species of the family Cyprinidae and has a wide distribution in western Asia (Yıldırım and Aras 2000). Its original distribution areas in Turkey are the rivers and streams of the northern- and northwest Black Sea regions (Geldiay and Balık 1999). *Capoeta tinca* can adapt very easily to changes in aquatic environment, and occurs both in lotic and lentic habitats. Furthermore, the species has economic value as a commercial fish in natural and man-made lakes. It is a herbivorous fish, but its nutrition value is lower than that of other species like *Esox lucius*, *Sander lucioperca*, or *Silurus glanis*. Despite that, it is consumed by people owing to its wide distribution, its tolerance to different habitats and its size (Ekmekçi and Özeren 2003).

In Turkey, length–weight relations of *Capoeta tinca* were investigated in the Kızılırmak (Akgül 1987, Yılmaz and Gül 1999, Gül and Yılmaz 2002) and Sakarya (Yılmaz et al. 1996) river basins, and Almus Dam Lake (Cengizler and Erdem 1994). No study has previously been carried out, however, on length–weight relations of *Capoeta tinca* inhabiting many inland bodies of water in the Samsun Province, northern Turkey. The aim of this study was to determine the length–weight relations of

Capoeta tinca captured from 10 freshwater sites of the above-mentioned province.

Capoeta tinca specimens were collected from 10 freshwater sites in the Samsun Province. Three of these bodies of water (Çakmak and Derbent dam lakes, and Divanbaşı Pond) are lentic habitats while seven others (Gamalık, İstavloz, Küplüağzı, Tersakan, Yakakent, Mertırmacı streams and Kızılırmak river) are lotic. Fish were caught with nets and electrofishing device in different periods, from July 2003 to February 2005. Captured specimens were measured to the nearest 0.1 cm fork length (FL) and weighted to the nearest 0.1 g total weight (*W*).

Length–weight relations were calculated using the equation $W = aL^b$, where *W* is the total weight of the fish [g], *L* is the fork length [cm], *a* and *b* are the parameters of the equation (Bagenal and Tesch 1978). The parameters *a* and *b* were estimated by linear regression of the transformed equation: $\log W = \log a + b \log FL$. The determination coefficient (r^2) was used as an indicator of the quality of the linear regression.

Length and weight descriptive statistics (number of specimens (*n*), minimum and maximum fork lengths, mean fork length, standard deviation of the mean fork length, minimum and maximum total weights, mean total weight, standard deviation of the mean total weight) as well as the parameters of the length–weight relation (*a*, *b*, 95% confidence intervals of *b*, r^2) of *Capoeta tinca* for each freshwater resource are given in Table 1. Sample size ranged from 7 for Gamalık and Tersakan streams,

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Table 1
Descriptive statistics and estimated parameters of the length–weight relation (LWR) for *Capoeta tinca* captured from 10 freshwater sites in Samsun Province, Northern Turkey

Body of water	Month	<i>n</i>	Length characteristics			Weight characteristics			Parameters of the LWR					
			min	max	mean	SD	min	max	mean	SD	<i>a</i>	<i>b</i>	95% CI of <i>b</i>	<i>r</i> ²
Çakmak Dam Lake	Nov; Mar	21	17.9	31.7	22.88	3.75	84	435	172.8	97.2	0.0091	3.1188	3.1088–3.1288	0.98
Derbent Dam Lake	Nov	12	21.0	31.0	26.15	2.89	115	455	253.8	96.4	0.0043	3.3517	3.3385–3.3648	0.97
Divanbaşı Pond	Feb	130	16.2	33.5	24.43	4.37	59	523	227.1	117.3	0.0106	3.0895	3.0857–3.0934	0.99
Gamlık Stream	Jul	7	7.4	15.5	10.49	3.17	6	49	19.9	17.2	0.0213	2.8281	2.7958–2.8604	0.99
Istavloz Stream	Aug	25	7.6	17.0	11.34	2.31	6	75	23.8	15.3	0.0212	2.8488	2.8377–2.8599	0.99
Kızılırmak River	Jul	12	10.5	21.7	16.35	3.34	14	138	66.3	40.6	0.0075	3.2065	3.1943–3.2188	0.99
Küplütağzı Stream	Sep	68	7.0	22.8	19.99	3.32	5	120	38.1	27.7	0.0173	2.8601	2.8512–2.8691	0.98
Mertirmacı Stream	Jul	70	8.5	21.0	14.16	2.39	8	115	40.1	19.3	0.0212	2.8186	2.8106–2.8266	0.97
Tersakan Stream	Jul	7	8.0	21.3	12.84	5.02	6	130	40.6	46.7	0.0092	3.1358	3.1175–3.1541	0.99
Yakakent Stream	Sep	75	7.2	15.2	10.97	1.77	6	50	20.3	8.8	0.0434	2.5444	2.5366–2.5522	0.97

n, sample size; Min, minimum; Max, maximum; SD, standard deviation, *a* and *b*, parameters of the LWR; CI, confidence interval; *r*², coefficient of determination.

to 130 for Divanbaşı Pond. Fork length ranged from 7.2 cm to 33.5 cm. Total weight varied from 5 g to 523 g. Specimens inhabiting lentic environments were bigger than those from lotic systems. Length–weight relations were highly significant ($P < 0.001$), with $r^2 > 0.96$.

The calculated values of the b parameter ranged from 2.5444 for Yakakent stream to 3.3517 for Derbent Dam Lake (Table 1). According to Ricker (1975), b values outside the range of 2.5–3.5 are generally considered to be erroneous. In this study, length–weight relations of *Capoeta tinca* inhabiting several freshwaters environments except Kızılırmak river in the Samsun Province of northern Turkey were reported for the first time. The referred b value of the length–weight relations for this species from different habitats in Turkey were estimated as 2.89 in Almus Dam Lake (Cengizler and Erdem 1994), 2.81 in Kirmir branch of the Sakarya River (Yılmaz et al. 1996), 3.22 in Devres branch of the Kızılırmak River (Yılmaz and Gül 1999) and 2.81 in Delice branch of the Kızılırmak River (Gül and Yılmaz 2002). Our results are in accordance with the previous ones.

Length–weight relations are not constant over the entire year and vary according to factors such as food availability, feeding rate, gonad development and spawning period (Bagenal and Tesch 1978). Consequently, the parameters estimated in the present study should be considered only for sampling time, since samples of *Capoeta tinca* were collected in different months and years.

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