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A First Record (*Knipowitschia longicaudata* (Kessler, 1877)) for the Fish Fauna of Lake Manyas

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Abstract: *Knipowitschia longicaudata* is recorded for the first time from Lake Manyas. *K. caucasica* is known to live in Lake Manyas. Therefore, In order to determine whether the specimens of *Knipowitchia* collected from Lake Manyas were *K. caucasica* species or not, they were compared with *K. caucasıca* from Lake Eğirdir. The comparission of K. caucasica specimens from Lake Eğirdir with the specimens from Lake Manyas showed that those species were 2 distinct species of *Knipowitchia*. Statistical analyses revealed that our specimens were K. longicaudata. The systematic characteristics of this species were examined and then compared with the data of those reported in previous studies.

Key Words: Gobiidae, *Knipowitschia longicaudata* (Kessler, 1877), Lake Manyas (Lake Kuş), Freshwater Fish Fauna

Manyas Gölü (Kuş Gölü) Balık Faunası İçin İlk Kayıt

Özet: Bu çalışmada, *Knipowitschia longicaudata* türü Manyas Gölü'nden ilk kez tespit edilmiştir. Manyas Gölü'nde *K. caucasica*'da mevcut olduğu için toplanan örneklerin aynı tür olup olmadıkları açıklığa kavuşturulması amacıyla Eğirdir Gölü'nden toplanan *K. caucasica* örnekleri ile karşılaştırılmıştır. Yapılan ıstatistiksel analizler sonucunda Manyas Gölü'nden toplanan örneklerin *K. longicaudata* türüne ait olduğu ortaya konmuştur, Ayrıca, bu türün sistematik karakterleri daha önceki çalışmalarda bildirilen veriler ile karşılaştırarak test edilmiştir.

Anahtar Sözcükler: Gobiidae, *Knipowitschia longicaudata* (Kessler, 1877), Manyas Gölü, Tatlısu Balık Faunası

Introduction

Investigation of freshwater fish fauna began in the middle of the 19th century and have continued up to the present in Anatolia. Many studies have been carried out on this subject. Among these, Sözer (1941) and Erazi (1942) were pioneers in documenting the distribution of gobies in the waters (both inland and seas) of Turkey. Furthermore, Berg (1949), Slastenenko (1956), Balık (1975), Kuru (1975, 1980), Meriç (1986), Akşiray (1987), Geldiay and Balık (1999), Eryılmaz (2002) and Bilecenoğlu et al. (2002) have made valuable contributions to the taxonomy of goby species in Turkey.

So far, the well-known *Knipowitchia* members are *Knipowitschia caucasica*, *K. ephesi* and *K. mermere* in Turkey (Meriç, 1986; Ahnelt et al., 1995; Ahnelt, 1995; Neer et al., 1999). In this study, beside *K. caucasica,* another *Knipowitschia* species was recorded in Lake Manyas and some of its systematic characteristics are given. Therefore, the objective of this study is to report the species *K. longicaudata* in Lake Manyas and to give some systematic characteristics of the species and to compare them with those of *K. caucasica* collected from Lake Eğirdir.

Materials and Methods

Twenty-five individuals from different sampling stations were caught by seine during 2002 and 2003 (Figure 1). Fish samples were fixed in 4% formalin and transferred to the laboratory for processing. The taxonomic key given by Whitehead et al. (1984) was used to identify the species.

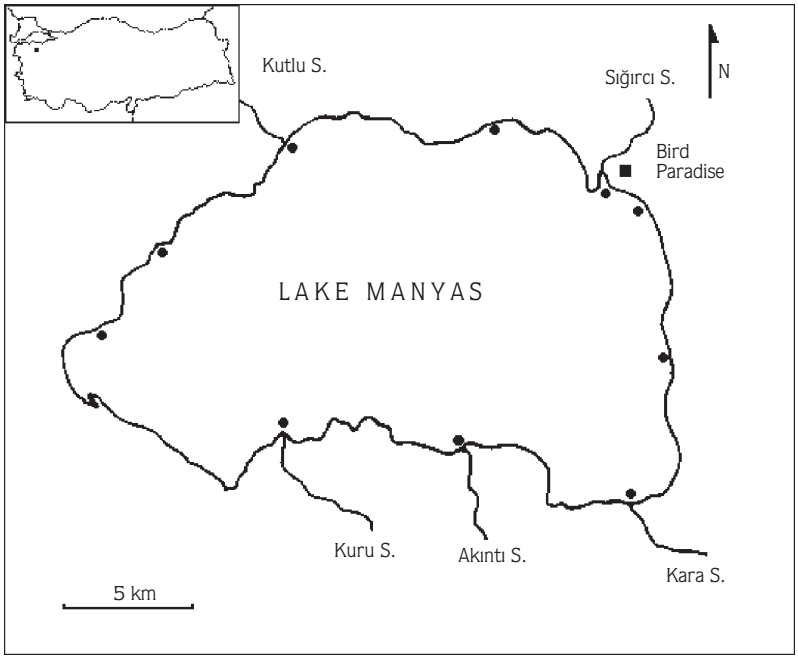

Figure 1. Sampling stations in Lake Manyas.

The meristic characters of the *K. longicaudata* specimens were determined using a loop and a stereo binocular microscope with 4x magnification. The metric characters of the goby specimens were measured using a milimetric fish ruler and digital compasses. *K. longicaudata* was compared with *K. caucasica* using the Syntax program. Cluster and principal component analyses were used. The color patterns of the specimens were also determined when they were alive. *K. caucasica* specimens collected from Lake Eğirdir were obtained from Güler Ekmekçi.

Results

Taxonomic section

Ordo: Perciformes

Familia: Gobiidae

Knipowitschia longicaudata (Kessler, 1877)

($D_{1.}$ V-VII, $D_{2.}$ I 7-9, P.16-18, A. I 7-8, Sq. 37-41)

Synonyms: *Pomatoschistus longicaudata* (Kessler, 1877), *Pomatoschistus longicaudata*

Beling, 1927, *Knipowitschia georghievi* Pinchuk, 1978 (Kottellat, 1997).

Material examined: Turkey: Lake Manyas 16.03.2004, leg. Berber, 15 specimens.

Knipowitschia longicaudata Berg, 1916

Synonyms: *Gobius lencoranicus* Kessler, 1877; *Gobius caucasicus* Kavraiskii, 1899;

Pomatoschistus caucasicus Berg, 1916; *Bubyr caucasicus kosswigii* Sözer, 1941

Material examined: Turkey: Lake Eğirdir, 16.03.2004, leg. Ekmekçi, 15 specimens.

Description

General body shape is shown in Figure 2. Genipores are shown Figures 3a and 3b. The meristic and metric characters of this species are given in Tables 1 and 2.

The body was elongate, interiorly cylindrical, laterally compressed in the posterior section. The lateral line system was without a posterior oculoscapular canal. Genipores were vertical and in 5 rows. Back naked to origin of second dorsal fin. Upper lip was thin and uniform. Interorbital distance was 1.61 of eye diameter. Body was greyish to fawn. Large black spot found on caudal fin. Several vertical dark bars were observed across the sides in adult male. Some 9-10 black chin spots were observed in female but only slight vertical elongation of lateral midline spots. Caudal fin was long and asymmetric. Sdantard length (SL) was as 3.25 cm for female and 3.75 cm for male.

Figure 2. General body shape of *Knipowitschia longicaudata*.

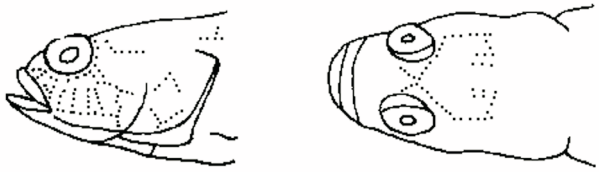

Figure 3. The genipores under eyes (a) and on the dorsal of head (b) of *Knipowitschia longicaudata*.

Table 1. Some statistical values related to meristic characters of *K. longicaudata* (N: 15) and *K. caucasica* (N: 15).

Parameters	D1		D2		A		P		Sq	
	K. l	K.c	K. l	K.c	K. l	K.c	K. l	K.c	K. l	K.c
Min	5	6	I 8	I 7	I 8	I7	16	16	36	33
Max	7	7	I10	I 8	I 9	I 8	18	18	39	35
Mean	5.9	6.2	I 9	I 7.3	I 8.4	I 7.3	16.5	17.1	37.4	34.3
Mod	6	6	I 9	I 7	I 8	I 7	16	17	37	34
SD	0.46	0.37	0.65	0.48	0.51	0.48	0.64	0.71	1.03	0.75
V	0.21	0.14	0.43	0.24	0.26	0.23	0.41	0.50	1.06	0.56

(*K. l: K. longicaudata* , *K..c*: *K. caucasica*, D1: The number of basic rays in the first dorsal fin, D2: The number of branched rays in the second dorsal fin, P: The number of branched rays in the pectoral fin, A: The number of branched rays in the anal fin, Sq: The number of scales along the lateral line, Min: Minimum value, X: Mean, Mod: most repeated value, SD: Standard Deviation, V: Variance)

Table 2. Some statistical values related to the ratios of body parts of *K. longicaudata* (N: 15) and *K. caucasica* (N: 15).

Ratios	SL/HL		SL/MBD		HL/NL		HL/HW		ED/IOD		CPL/CPD	
	K. l	K.c	K. l	K.c	K. l	K.c	K. l	K.c	K. l	K.c	K. l	K.c
Min	3.27	2.86	5.30	6.18	4.06	3.21	1.87	2.19	1.27	2.06	3.50	4.08
Max	3.82	3.27	6.94	8.79	5.45	5.24	2.86	3.22	1.97	3.09	4.55	5.70
Mean	3.59	3.08	6.05	7.05	4.72	4.29	2.24	2.66	1.61	2.49	4.11	4.87
SD	0.14	0.13	0.44	0.90	0.47	0.66	0.27	0.31	0.19	0.30	0.34	0.51
V	0.02	0.02	0.19	0.81	0.22	0.44	0.07	0.09	0.04	0.09	0.12	0.26

(*K.l: K. longicaudata*, *K.c: K. caucasica,* SL: Standard length, HL: Head length, HW: Head width, MBD: Maximum body depth, NL: Nose length, ED: Eye diameter, IOD: Intraorbital distance, CPL: Caudal peduncle length, CPD: Caudal peduncle depth)

Discussion

So far, 3 species (*Knipowitschia caucasica*, *K. ephesi*, *K. mermere*) of *Knipowitchia* (Perciformes, Gobiidae) have been reported from Turkey (Meriç, 1986; Ahnelt et al., 1995; Ahnelt, 1995; Neer et al., 1999). *K. ephesi* and *K. mermere* were reported from Ephesus and Marmara Lake (Ahnelt, 1995). *K. caucasica* was reported from Lake Manyas, Bafa Lake, Eğirdir Lake, Doğanbey Stream and Değirmendere Stream (Ahnelt et al., 1995; Neer et al., 1999). Furthermore, Sözer (1941) reported *Bubyr caucasica kosswigi* from Lake Manyas. *Bubyr caucasica kosswigi* is known as a synonym of *K. caucasica.* Sözer (1941) reported the meristic characters of *Bubyr caucasica kosswigi* as D_1. V-VIII, D_2. I 8-9, P. 16-18, A. I 8-9, V. I 10, Sq. 34-37. Sözer (1942) did not mention the presence of the posterior oculoscapular canal. Ahnelt et al. (1995) examined 9 specimens of *K. caucasica* from Lake Manyas and recorded the meristic characters of the specimens as D_1. V-VII (M. VI) , D_2. 8-9 (M. 8), A. 8-9 (M. 8), Sq. 32-34 (M. 33). Ahnelt et al. (1995) reported the species without the posterior oculoscapular canal. Ahnelt et al. (1995) explained, in particular, that the frequent occurrence of specimens without the posterior oculocapular canal in different populations of *K. caucasica* had been reported by Economidis and Miller (1990). Whitehead et al. (1984) reported the lateral line system with posterior oculoscapular canal and meristic characters as D_1. V-VII, D_2. I 8 (7-10), P. 15-18, A. I 8 (7-10), Sq. 33-35 (31-38).

Morphometric and meristic characters of specimens of K. *caucasica* collected from Lake Eğirdir are shown Tables 1 and 2.

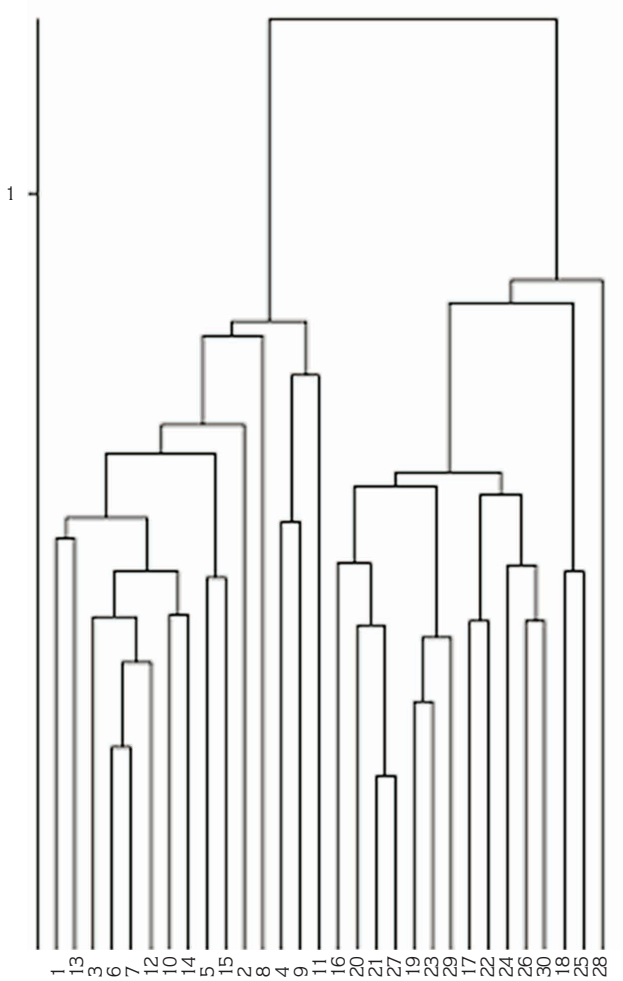

Figure 4. Cluster analysis was carried out using the Syntax program to compare morphometric and meristic characteristics of the samples of *K. caucasica* (from 1 to 15) and *K. longicaudata* (from 16 to 30) with each other.

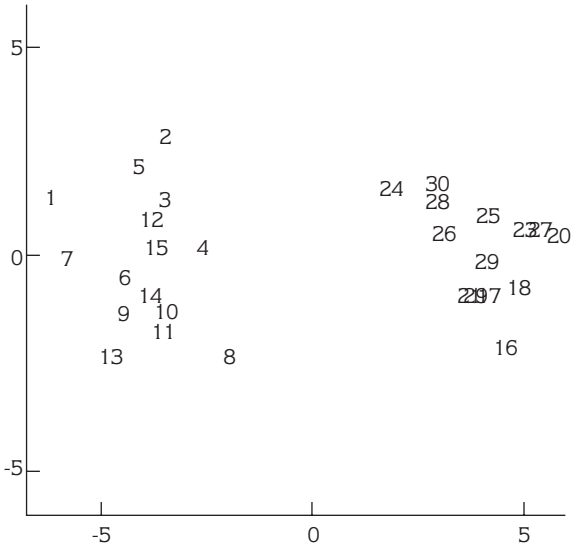

Figure 5. Principal component analyses was carried out using the Syntax program to compare morphometric and meristic characteristics of the samples of *K. caucasica* (from 1 to 15) and *K. longicaudata* (from 16 to 30) with each other.

In this paper, specimens collected from Lake Manyas were compared with specimens *K. caucasica* collected from Lake Eğirdir. They seemed to be 2 different species when their morphometric and meristic characteristics were compared using cluster and principal component analyses.

The results of cluster and principal component analyses are shown in Figures 3 and 4. Our specimens were differend from *K. caucasica* in terms of some meristic and metric characters such as D_1. 5-7; D_2. I 8-10; A. I 8-9; P. 16-18; Sq. 36-39 and SL/HL: 2.86-3.27; SL/MBD: 6.18-8.79; HL/NL: 3.21-5.24; HL/HW: 2.19-3.22; ED/IOD: 2.06-3.09; CPL/CPD: 4.08-5.70.

Statistical analyses revealed that our specimens were *K. longicaudata*. *K. longicaudata* is distinguished from *K. caucasica* in that there is no lateral line system with a posterior oculoscapular canal, the scale number in the lateral line is more than 35 and the ratio of ED/IOD is less than 2.

The specimens from 1 to 15 in Figures 3 and 4 are *K. caucasica* and the specimens from 16 to 30 in Figures 3 and 4 are K. *logicaudata.*

K. longicaudata (Kessler, 1877) inhabits fresh and brackish waters and is widely distributed in the coastal waters of the Black Sea, the Caspian Sea and the Sea of Azov (Berg, 1949; Whitehead et al., 1984). Akşiray (1987) reported this species in Turkish Black Sea waters, but did not describe its distribution areas in detail. Lake Manyas is located in the north of the Aegean region. According to Kosswig (1955), the fauna of this region consists of usually Sarmatic Sea and European originated species.

The meristic characters of specimens distributed along the coast of N Black Sea, the coast of the Caspian Sea and the coast of Sea of Azov were given as D_1. (V) VI (VII), D_2. I 7-9, A. I 8-9, Sq. 36-45 by Berg (1949), D1. (V) VI (VII), D_2.I 7-9, A.I 8-9, Sq. 36-43 by Slastenenko (1956), and D_1. VI (V-VII), D_2. I 8-9 (7-10), A.I 8-9 (7-10), P. 17-18 (15-19), Sq. 35-37 (33-40) by Whitehead et al. (1984). The maximum total length of this species was reported to be 3.5 cm in the female and 5 cm in the male (Berg, 1949; Slastenenko, 1956). The meristic characters of the specimens collected in the present study were as D_1. (V) VI (VII), D_2 . I (8) 9 (10), P. 16-17 (18), A.I 8-9, Sq . (36) 37 (39) and lateral line system had no posterior oculoscapular.

The metric and meristic characters of the specimens collected in the present study were similar to those of specimens distributed in the coastal waters of the Black Sea, the Caspian Sea and the Sea of Azov.

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