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ARAŞTIRMA MAKALESİ **RESEARCH PAPER**

New Record of *Alburnoides kosswigi* (Pisces: Leuciscidae) in the Ilgın Lake Basin

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Abstract: *Alburnoides kosswigi* was described in the Sakarya River. In this study, it was also recorded in the stream Beykonak, a tributary of the Ilgın Lake in central Anatolia. Based on the morphological data, the Ilgın population of *A. kosswigi* has a distinguistic characteristics such as; a scaleless ventral keel between the back edge of the pectoral fin base and anus, eye diameter approximately equal to the nose length and distance between eyes, 42-47 scales on the ligne lateral, 11½–13½ branched fin rays in the anal fin, 38-39 total vertebrae, 11-12 predorsal vertebrae and 7-8 gill rakers.

Anahtar sözcükler: Freshwater biodiversity, Lake Ilgın, spirlin, taxonomy.

Alburnoides kosswigi Türü İçin Ilgın Gölü Havza'sından Yeni Kayıt (Pisces: Leuciscidae)

Öz: *Alburnoides kosswigi* Sakarya Nehri'nden tanımlanmıştır. Bu çalışmada, bu türün aynı zamanda İç Anadolu'daki Ilgın Gölü'nün bir kolu olan Beykonak Deresi'nde de yayılış gösterdiği tespit edilmiştir. Morfolojik verilere göre *Alburnoides kosswigi* türünün Ilgın populasyonları, pelvik yüzgeç kaidesinin arka kenarı ile anüs arasında bulunan ventral karinanın pulsuz olması, göz çapının yaklaşık olarak burun uzunluğu ve gözlerarası mesafeyle eşit olması, ligne lateralde 42-47 pul bulunması, anal yüzgeçte 11½–13½ dallanmış ışın bulunması, 38-39 toplam omurunun bulunması, 11-12 predorsal omurunun bulunması ve 7-8 solungaç dikeninin bulunması gibi ayırt edici karakterlere sahiptir.

Keywords: Ilgın Gölü, noktalı inci balığı, taksonomi, tatlısu biyoçeşitliliği

INTRODUCTION

Sprilins of the genus *Alburnoides* are widespread from France east to Central Asia (Kottelat & Freyhof, 2007). While Kottelat and Freyhof, (2007) still recognized only two species from Turkey (*A. bipunctatus*, *A. tzanevi*), in the last years, eleven species of *Alburnoides* have been described or treated as valid in the region. These are: *A. diclensis* in the Greater Zab drainage, a tributary of the Tigris, *A. eichwaldii* in the Kura and Aras drainages, *A. emineae* in the stream Beyazsu, Euphrates drainage, *A. fasciatus* in rivers of the Eastern Black Sea basin, *A. freyhofi* in the Kızılırmak River, *A. kosswigi* in the Sakarya River, *A. kurui* in the Yeşilırmak River, *A. manyasensis* in the Simav River,*A.* cf. *smyrnae* in the Büyük Menderes River drainage, *A. tzanevi* in rivers flowing south of the Danube to the Black Sea east to the Yenice River, and *A. velioglui* in the northern tributaries of the Euphrates (Turan et al. 2013; 2014; 2016; 2017). However, taxonomic positions of some populations still have not been settled.

Up to now, there has not been any record of spirlins from the large endorheic basin in Central Anatolia. We have collected some specimens of spirlin from the stream Beykonak, which is a tributary to Lake Ilgın in Central Anatolia. Here, we present results of our study on the *Alburnoides* population from this stream and identify as *A. kosswigi*.

MATERIALS and METHODS

Fish were caught by pulsed DC electro-fishing equipment and killed by over anaesthetization, fixed in 10% formaldehyde and stored in 4% formaldehyde. Measurements were made with dial caliper and recorded to 0.1 mm. All measurements were made point to point, never by projections. Counts and measurements follow Turan et al. (2016). Lateral line scale count includes scales on the base of the caudal fin. The last two branched dorsal and anal fin rays articulating on a single pterygiophore were counted as 1½. Gill rakers were counted on the outer side of the first gill arch. Vertebral counts were obtained from radiographs and counted as total, predorsal, abdominal and caudal vertebrae following Bogutskaya and Coad, (2009). Predorsal vertebrae include the Weberian vertebrae and abdominal vertebrae anterior to the first dorsal-fin pterygiophore. Abdominal vertebrae were counted from the first Weberian vertebra to the one just anterior the first caudal vertebra. The first caudal vertebra is that with its haemal spine fully developed. The count of total and caudal vertebrae includes the last complex vertebra bearing hypurals. Abbreviations used: SL, standard length; HL, lateral head length. Collection codes: FFR, Recep Tayyip Erdogan University Zoology Museum of the Faculty of Fisheries, Rize.

The morphometric and meristic data for *A. freyhofi, A. kurui, A. manyasensis*, *A.* cf. *smyrnae* and *A. tzanevi* were taken from Turan et al., (2013; 2017). Authors of species names were listed in Table 1.

Table1. Species names mentioned in this study, and their authors.

Alburnoides diclensis Turan, Bektaş, Kaya & Bayçelebi, 2014
A. eichwaldii De Filippi, 1863
A. emineae Turan, Kaya, Ekmekçi & Bayçelebi, 2014
A. fasciatus (Nordmann, 1840)
A. freyhofi Turan, Kaya, Bayçelebi, Bektaş & Ekmekçi
A. kosswigi Turan, Kaya, Bayçelebi, Bektaş & Ekmekçi
A. kurui Turan, Kaya, Bayçelebi, Bektaş & Ekmekçi
A. manyasensis Turan, Ekmekçi, Kaya & Güçlü, 2013
A. cf. *smyrnae* Pellegrin, 1927
A. tzanevi Chichkoff, 1933
A. velioglui Turan, Kaya, Ekmekçi & Bayçelebi, 2014

RESULTS

Morphological investigation of the *Alburnoides kosswigi* populations from Lake Ilgın and Sakarya revealed no morphological differences except by having less scale rows between lateral line and anal-fin origin (3–4 in Lake Ilgın populations, vs. 4–5 in Sakarya populations), less total vertebrae (38–39, vs. 39–42) and less predorsal vertebrae (11–12, vs. 13–14).

Figure 1. *Alburnoides kosswigi,* FFR 07008, from the top, 78 mm SL; 60 mm SL; 55 mm SL; Turkey: stream Beykonak.

Description of Alburnoides kosswigi from Lake Ilgın: General appearance of the species was given in Figure 1. Morphometric and meristic data were also provided in Table 2. Body relatively slender and compressed laterally. Dorsal profile slightly convex, ventral profile less convex than dorsal profile. Head short, approximately 0.9–1.0 times

in body depth at dorsal-fin origin, dorsal snout profile slightly convex, interorbital space slightly convex. Caudal peduncle depth 1.6–2.2 times in its length. Snout tip slightly pointed, snout length almost equal to eye diameter and interorbital width. Mouth terminal and lips equal. Ventral keel between pelvic-fin base and anus scaleless. Largest known individual 78 mm SL.

Table 2. Morphometric data of *A. kosswigi* from Lake Ilgın (FFR 07008, n = 23). Mean values are given in the parentheses.

Standard length (mm)	**Range**
In percent of standard length	**47–78**
Head length	24.9–28.3 (26.1)
Body depth at dorsal-fin origin	25.0–28.0 (26.9)
Body depth at anal-fin origin	21.5–24.7 (23.3)
Caudal–peduncle depth	10.1–12.4 (11.1)
Predorsal length	51.2–54.8 (52.8)
Prepelvic length	46.0–49.5 (47.6)
Preanal length	62.8–67.1 (65.2)
Pectoral-fin origin to anal-fin origin	37.0–43.2 (40.0)
Pectoral-fin origin to pelvic-fin origin	20.0–23.0 (21.9)
Pelvic-fin origin to anal-fin origin	16.5–20.1 (18.1)
Caudal-peduncle length	18.4–23.1 (19.9)
Dorsal-fin depth	22.6–27.5 (25.6)
Pectoral-fin length	18.4–21.5 (20.3)
Pelvic-fin length	15.5–18.7 (16.9)
Anal-fin depth	15.7–19.7 (17.7)
Anal-fin length	15.1–20.9 (17.9)
Length of lower caudal-fin lobe	23.0–30.5 (26.2)
Length of upper caudal-fin lobe	19.3–28.4 (23.9)
Head width at anterior eye margin	8.6–11.9 (10.4)
Head width at posterior eye margin	12.6–16.2 (14.0)
Head width at opercle	13.2–16.4 (14.7)
Head depth at interorbital region	12.9–16.5 (14.4)
Head depth at nape	17.5–22.3 (20.0)
Eye diameter	6.8–9.2 (7.9)
Snout length	6.9–8.8 (8.0)
Interorbital width	7.5–8.9 (8.1)
Snout width at nostrils	7.9–10.7 (9.2)
Snout depth at nostrils	8.1–11.3 (9.3)
Width of mouth gape	6.7–9.7 (8.4)
Length of mouth gape	7.4–10.5 (9.0)

Lateral-line with 42 (1), 43 (5), 44 (2), 45 (10), 46 (3) and 47 (2) scales, 8 (3), 9 (18) and 10 (2) scale rows between lateral-line and dorsal-fin origin and 3 (14) and 4 (9) scale rows between lateral-line and anal-fin origin. Gill rakers 2 + 4–5 = 6-7 on outer side of first gill arch. Dorsal fin with 3 simple and 8½ (22) and -9½ (1) branched rays, outer margin straight. Pectoral fin with 1 simple and 13 (18) and -14 (5) branched rays, outer margin slightly convex. Pelvic fin with 1 simple and 7 branched rays, outer margin slightly convex. Anal fin with 3 simple and 11½ (4), 12½ (16) and 13½ (3) branched rays, outer margin concave. Caudal-fin forked, lobes slightly rounded.

Pharyngeal teeth 2.5-4.2, markedly hooked at tip, not serrated. Total vertebrae 38 (2) and 39 (8), predorsal vertebrae 11 (1) and 12 (9), abdominal vertebrae 19 (1) and 20 (9) and caudal vertebrae 18 (2), 19 (7) and 20 (1). Abdominal region generally equal to caudal region, and difference between abdominal and caudal numbers varies from -1 to +1. Vertebral formulae 19+20 (1), 20+18 (2) and 20+19 (7).

Coloration: Formalin-preserved individuals brownish on back and upper part of flank, yellowish on lower part of flank and belly. Spots along lateral line above and below pores distinct in both anterior and posterior part of flank in most individuals. A black stripe presents on upper part of flank from posterior margin of operculum to hypural complex, its width approximately equals to eye diameter. Numerous small black spots on the scale pockets on flank above lateral line in most individuals. Caudal, dorsal pectoral, pelvic and anal fins pale grey or yellowish.

***Distribution and notes on biology*:** *Alburnoides kosswigi* is known from the Sakarya River and the stream Beykonak (a tributary of Lake Ilgın) (Figure 2). It inhabits swift and clear flowing water with cobble and pebbles.

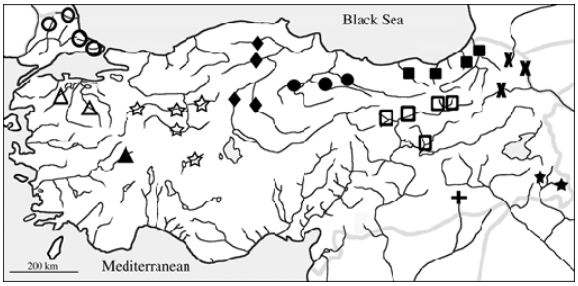

Figure 2. Distribution of *Alburnoides* species in Turkey: *A.* cf. *smyrnae* (▲), *A. diclensis* (★), *A. eichwaldii* (**X**), *A. emineae* (+), *A. fasciatus* (■), *A. freyhofi* (◆), *A. manyasensis* (Δ), *A. kosswigi* (☆), *A. kurui* (●), *A. tzanevi* (O) and *A. velioglui* (□).

The differences between Alburnoides kosswigi populations from Lake Ilgın and species in adjacent waters: *Alburnoides kosswigi* from Lake Ilgın differs from *A. freyhofi* by having less branched anal-fin rays (11½-13½, vs. 14½-16½), less scale rows between the anal-fin origin and the lateral line (3-4, vs. 4-6), less total vertebrae (38-39, vs. 40-42), less predorsal vertebrae (11-12, vs. 13-14), a more slender body (body depth at the dorsal-fin origin 25-28% SL, mean 26.9, vs. 28-34, mean 30.8) and a longer caudal peduncle (18-23 % SL, vs. 15-17). In *Alburnoides kosswigi,* the eye diameter is approximately equal to the snout length and the interorbital distance whereas in *A. freyhofi*, the eye diameter is smaller than the interorbital distance but greater than the snout length.

Alburnoides kosswigi from Lake Ilgın differs from *A.* cf. *smyrnae* by having a scaleless keel between the posterior pelvic base and the anus (vs. covered by 3-4 scales). *Alburnoides kosswigi* further differs from *A.* cf. *smyrnae* by having less total vertebrae (38-39, vs. 41-42), less predorsal vertebrae (11-12, vs. 13-14) and a more slender body (body depth at dorsal fin origin 25-28% SL vs. 28-30). In *Alburnoides kosswigi*, the eye diameter is approximately equal to snout length and interorbital distance (vs. eye diameter approximately equal to interorbital distance but greater than snout length).

DISCUSSION

The fish fauna of Ilgın Lake is very similar to that of the Sakarya River. It is supposed that the lake Ilgın isolated from the Sakarya River. Unpublished molecular data and our current morphological data show that the *Alburnoides* species from Ilgın Lake basin does not clearly distinguished from that of Sakarya River.

Comparative materials.

***Alburnoides kosswigi*:** FFR 07007, 23, 47-78 mm SL; FFR 07019, 53, 53-91 mm SL; Turkey: Konya prov.: stream Beykonak at Mahmuthisar, Lake Ilgın basin, 38.182, 32.031. - FFR 01107, 25, 41-82 mm SL; Turkey: Eskişehir prov.: stream Porsuk about 7 km south of Sazak, 39º43'26"N, 31º37'09"E. - FFR 01133, 52, 48-97 mm SL; Turkey: Ankara prov.: stream Kirmir about 2 km south of Yeşilöz, 40º14'13"N, 32º15'43"E. - FFR 01060, 27, 33-72 mm SL; Turkey: Ankara prov.: stream İlhanlı about 2 km south of İlhanköy, 40º05'38"N, 32º14'53"E.

***Alburnoides freyhofi*:** FFR 01149, 56, 53-93 mm SL; Turkey: Yozgat prov.: stream Delice southeast of Yerköy, 39º37'19"N, 34º29'23"E. - FFR 07000, 25, 37-69 mm SL; Turkey: Kastamonu prov.: stream Devrez about 2 km south of Tosya, 40º59'02"N, 34º05'57"E. - FFR 07001, 22, 57-89 mm SL; Turkey: Sinop prov.: stream Delice, 1 km south of Çarşak, 41º27'11"N, 34º53'19"E. - FFR 07004, 17, 66-85 mm SL; Turkey: Çankırı prov.: stream Devrez, 1 km west of İnköyü, 40º54'16"N, 33º38'15"E.

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REFERENCES

Bogutskaya, N.G. & Coad, B.W. (2009). A review of vertebral and fin-ray counts in the genus *Alburnoides* (Teleostei: Cyprinidae) with a description of six new species. *Zoosystematica Rossica*, ***18*** (1), 126−173.

Chichkoff, G. (1933). Sur un nouveau spirlin − *Alburnoides bipunctatus tzanevi subsp. nova*. *Izvestiya na Bulgarskota Georgrafsko Druzhestvo*, 1 (1933 [1934]), 375−383. [In Bulgarian, French summary].

De Filippi, F. (1863). Nuove o poco note specie di animali vertebrati raccolte in un viaggio in Persia nell'estate dell'anno 1862. *Archivio per la Zoologia, l'Anatomia e la Fisiologia, **2***, 377−394.

Kottelat, M. & Freyhof, J. (2007). *Handbook of European freshwater fishes*. Publications Kottelat, Cornol, Switzerland. 646 pp.

Nordmann, A. (1840). Prodrome de l'ichthyologie pontique. Voyage dans la Russie méridionale et la Crimée, par la Hongrie, la Valachie at la Moldavie, exécute en 1837, sous la direction de M. Anatole de Demidoff. *T. 3. Observation sur la faune pontique*. Paris: Ernest Bourdin et Co., 353–549.

Pellegrin, DJ. (1927). Poissons d'Asie Mineure recueillis par M. H. Gadeau de Kerville. *Bulletin de la Societe Zoologique de France*, ***52***, 36–37.

Turan, D., Ekmekçi, F.G., Kaya, C. & Güçlü, S.S. (2013). *Alburnoides manyasensis* (Actinopterygii, Cyprinidae), a new species of cyprinid fish from Manyas Lake basin, Turkey. *ZooKeys*, ***276***, 85–102. doi: 10.3897/zookeys.276.4107.

Turan, D., Kaya, C., Ekmekçi, F.G. & Bayçelebi, E. (2014). Three new species of *Alburnoides* (Teleostei: Cyprinidae) from Euphrates River, Eastern Anatolia, Turkey. *Zootaxa*, ***3754*** (2), 101–116.

Turan, D., Bektaş, Y., Kaya, C. & Bayçelebi, E. (2016). *Alburnoides diclensis* (Actinopterygii: Cyprinidae), a new species of cyprinid fish from the upper Tigris River, Turkey. *Zootaxa*, ***4067*** (1), 79–87.

Turan, D., Kaya, C., Bayçelebi, E., Bektaş, Y. & Ekmekçi, F.G. (2017). Three new species of *Alburnoides* from the southern Black Sea basin (Teleostei: Cyprinidae). *Zootaxa*, ***4242*** (3), 565–577.

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