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A new species of trout from the Köprüçay River, a drainage of Mediterranean Sea, Türkiye (Salmoniformes, Salmonidae)

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Abstract

Salmo ekmekciae, new species, is described from the Köprüçay River, a drainage of Mediterranean Sea. It is distinguished from *Salmo* species in adjacent water by having 9–10 parr marks on flank; 11–13 scale rows between end of base of adipose-fin and lateral line; 22–24 gill rakers on first gill arch; a shorter distance between adipose-fin and caudal-fin base; a slenderer caudal peduncle; and a slenderer body at adipose-fin origin. According to the Bayesian, and maximum likelihood analyses, *Salmo ekmekciae* cyt *b* gene resulted in coherent trees supported by high bootstrap values.

Key Words

cytochrome b, freshwater fish, salmo, taxonomy

Introduction

The first known record of Anatolian inland fishes was provided by Abbolt K.E. in the first half of the 19th century, and later studies were particularly encountered in the Works of Heckel (1843), Boulenger (1896), and Steindachner (1897) (Geldiay and Balık 1999; Çiçek et al. 2023). In the subsequent century, Turkish researchers participated in studies aimed at determining the ichthyofauna. For example, F. Battalgil described 25 fish species from Turkish inland waters between 1940–1944. The studies of this researcher were followed by the works of Kuru (1975, 2004) and Geldiay and Balık (1999). Since the beginning of the 21st century, the number of described inland fish species in Türkiye has rapidly increased, supported by detailed morphology and molecular characteristics. Noteworthy contributions to the taxonomy of Anatolian freshwater fishes, in particular, can be attributed to the studies of Bogutskaya (1997), Bogutskaya et al. (2000), Turan et al. (2006, 2008, 2017, 2024), Özuluğ and Freyhof (2011), Küçük et al. (2016, 2017), Turan et al. (2010, 2012, 2020) and Yoğurtçuoğlu et al. (2022).

Salmo trutta has traditionally been acknowledged as a species widely distributed across Europe, extending southward to the Atlas Range (Morocco, Algeria) and eastward to the upper Amu-Darya drainage in Afghanistan. Despite numerous identified subspecies or distinct species over time, there has been a persistent inclination to dismiss this diversity, asserting a priori that they all fall under a highly variable "species" (Ferguson 1989, 2004; Guinand et al. 2021). This perspective contends that 'classical' taxonomy is inadequate for addressing this species. The state of *Salmo* taxonomy has been summarized in detail by Kottelat (1997), with some discussion of North African species by Delling and Doadrio (2005) and Balkan ones by Delling (2003), indicating some improvement in the taxonomic situation. Kottelat and Freyhof (2007) provide an overview of available data for European species, tentatively recognizing 29 species, though the status of several populations and nominal species remains unclear.

Recent molecular studies have revealed the existence of at least five molecular lineages (Bernatchez et al. 1992; Bernatchez and Osinov 1995; Bernatchez 2001),

yet modern biology has not effectively resolved the taxonomy of the species. Notably, no efforts have been made to correlate the molecular lineages with morphological data, resulting in a wealth of untapped, intriguing data. Although molecular data such as *COI*, *d Loop* and *Cyb* are not fully successful in distinguishing species, they have long been providing an important source of knowledge regarding *Salmo* lineages. Emerging next generation sequencing technologies seem to offer a much better resolution to better understand *Salmo* taxonomy. Segherloo et al. (2021) reviewed the taxonomic status of some species in Europe and Asia using the next generation DNA sequence method and successfully presented the taxonomic position of most species under investigation. More recently, Turan et al. (2024) put forward the distribution and taxonomic position of *S. duhani* (Marmara and Aegean basin) as well as described a new species, *S. brunoi*, from Susurluk (Marmara basin) for the first time using next generation sequencing technologies.

Extensive fieldwork and research carried out in Türkiye has demonstrated a significant diversity. A total of eighteen valid species were recorded or identified (Table 1). Of these, 9 species (*S. abanticus*, *S. araxensis*, *S. ardahanensis*, *S. brunoi*, *S. coruhensis*, *S. duhani*, *S. euphrataeus*, *S. fahrettini*, *S. murathani*, *S. rizeensis*) belong to the Danubian lineage, *Salmo tigridis* to the Tigris lineage. Other species of which (*S. baliki*, *S. kottelati*, *S. labecula*, *S. munzuricus*, *S. okumusi*, *S. opimus S. platycephalus*) belong to Adriatic lineage. (Tortonese 1955; Behnke 1968; Bernatchez and Osinov 1995; Sušnik et al. 2005; Bardakçı et al. 2006; Turan et al. 2010, 2011, 2012, 2014a, b, 2017, 2020, 2021, 2022; Ninua et al. 2018; Turan and Aksu 2021).

We reassessed Mediterranean *Salmo* populations in Türkiye. In our previous study (Turan et al. 2012), we examined only 4 samples from the Köprüçay River. In the study, we compared these samples and new materials from Köprüçay River in detail with the samples from the type locality of *S. labecula.* As a result of this comparison, it was concluded that the Köprüçay population belongs to a new species, thus was named as *S. ekmekciae*.

Table 1. Native *Salmo* species distributed in Türkiye.

Species	Type locality	Synonyms	Coordinates
Salmo abanticus Tortonese, 1954	FFR 3163, 13, 113–222 mm SL; Türkiye: Bolu prov.: Lake Abant Basin	None	40°36'47.32"N, 31°17'12.57"E
Salmo araxensis Turan, Kottelat & Kaya, 2022	FFR 3224, 259 mm SL; FFR 3122, 6, 140–250 mm SL; Türkiye: Kars prov.: Kırkpınar Stream, a tributary of Kars Stream, Aras River drainage	*Salmo trutta caspius*, Kessler, 1877 *Salmo caspius*, Kessler, 1877	40°51'0.00"N, 43°1'0.00"E
Salmo ardahanensis Turan, Kottelat & Kaya, 2022	FFR 3239, 222 mm SL; FFR 1130, 12, 135–253 mm SL; Türkiye: Ardahan prov.: Stream Toros, Kura River drainage	*Salmo trutta caspius*, Kessler, 1877 *Salmo caspius*, Kessler, 1877	41°6'0.00"N, 42°25'60.00"E
Salmo baliki Turan, Aksu, Oral, Kaya & Bayçelebi, 2021	FFR 3242, 212 mm SL; FFR 3234, 6, 132–276 mm SL; Türkiye: Ağrı prov.: Stream Sinek, a tributary of Murat River, Euphrates River drainage	None	39°45'31.50"N, 43°27'52.13"E
Salmo brunoi Turan, Baycelebi, Aksu & Oral, 2024	FFR 3243, 175 mm SL; FFR 3216, 188–153 mm SL; Türkiye, Bursa prov.: stream Aras, a tributary of Nilüfer River, Susurluk River drainage	None	40°03'13.07"N, 29°10'20.03"E
Salmo chilo Turan, Kottelat & Engin, 2012	FFR 3054, 190 mm SL; FFR 3055, 23, 65-235 mm SL; Türkiye: Sivas prov.: Akdere Stream, Ceyhan River drainage	*Salmo trutta macrostigma* (non Dumeril, 1858)	38°34'53.89"N, 36°57'17.62"E
Salmo coruhensis Turan, Kottelat & Engin, 2010	FFR 3036, 291 mm SL; FFR 3037, 10, 90-380 mm SL; Türkiye: Erzurum prov.: Pehlivanlı Stream, Çoruh River drainage	*Salmo trutta labrax*, Pallas, 1814	40°30'25.20"N, 41°29'10.20"E
Salmo duhani Turan & Aksu, 2021	FFR 3183, 228 mm SL; FFR 3184, 15, 95-287 mm SL; Türkiye: Çanakkale prov.: Stream Zeytinli, Gönen River drainage	*Salmo trutta macrostigma* (non Dumeril, 1858)	39°45'0.00"N, 27°1'1.20"E
Salmo euphrataeus Turan, Kottelat & Engin, 2014	FFR 1219, 195 mm SL; FFR 1220, 24, 80-260 mm SL; Türkiye: Erzurum prov.: Kuzgun Stream, a tributary of Karasu Stream, Euphrates River drainage	None	40°13'11.10"N, 41°6'18.30"E
Salmo fahrettini Turan, Kalaycı, Bektaş, Kaya & Bayçelebi, 2020	FFR03231, 232 mm SL; FFR03232, 20, 134–227 mm SL; Türkiye: Erzurum prov.: Stream Ömertepesuyu, a tributary of Karasu Stream, Euphrates River drainage	None	39°41'44.97"N, 34°56'4.07"E
Salmo kottelati Turan, Doğan, Kaya & Kanyılmaz, 2014	FFR 3180, 205 mm SL; FFR 03181, 21, 98–210 mm SL; Türkiye: Antalya prov.: Alakır Stream, a coastal stream in Mediterranean Sea Basin	None	36°32'34.85"N, 30°17'11.39"E
Salmo labecula Turan, Kottelat & Engin, 2012	FFR 3056, 208 mm SL; FFR 3057, 6, 103-237 mm SL; Türkiye: Nigde prov.: Ecemiş Stream, Seyhan River drainage	None	37°51'53.31"N, 35°4'46.37"E
Salmo munzuricus Turan, Kottelat & Kaya, 2017	FFR 3161, 205 mm SL; FFR 03162, 17, 127-270 mm SL; Türkiye: Tunceli prov.: Stream Munzur, Euphrates River drainage.	*Salmo trutta macrostigma* (not Dumeril, 1858)	39°20'50.00"N, 39°8'3.00"E
Salmo murathani Turan, Kottelat & Kaya, 2022	FFR 3240, 255 mm SL; FFR 3121, 18, 60–233 mm SL; Türkiye: Kars prov.: Keklik Stream, a tributary of Kars Stream, Aras River drainage	*Salmo trutta caspius*, Kessler, 1877 *Salmo caspius*, Kessler, 1877	40°16'60.00"N, 42°38'60.00"E
Salmo okumusi Turan, Kottelat & Engin, 2014	FFR 1251, 213 mm SL; FFR 1254, 10, 75-202 mm SL; Türkiye: Malatya prov.: Sürgü Stream, Euphrates River drainage	None	37°59'51.10"N, 37°57'29.90"E
Salmo opimus Turan, Kottelat & Engin, 2012	FFR 3047, 180 mm SL; FFR 3048, 12, 118-180 mm SL; Türkiye: Antalya prov.: Alara Stream, a coastal stream in Mediterranean Sea Basin	*Salmo trutta macrostigma* (non Dumeril, 1858)	36°45'45.04"N, 32°1'35.02"E
Salmo platycephalus Behnke, 1968	FFR 972, 7, 145-184 mm SL; Türkiye: Kayseri prov.: Pınarbaşı Stream, Seyhan River drainage	None	38°24'15.80"N, 37°27'39.44"E
Salmo rizeensis Turan, Kottelat & Engin, 2010	FFR 3000, 234 mm SL; FFR 3001, 16, 90-220; FFR 3038, 1, 250 mm SL; Türkiye: Erzurum prov.: Ovit (Kan) Stream, Çoruh River drainage	*Salmo trutta macrostigma* (non Dumeril, 1858)	40°35'19.20"N, 40°51'30.00"E
Salmo tigridis Turan, Kottelat & Bektaş, 2011	FFR 1250, 220 mm SL; FFR 1253, 9, 136–227 mm SL; Türkiye: Van prov.: Çatak Stream, Tigris River drainage	*Salmo trutta macrostigma* (non Duméril, 1858)	38°2'27.63"N, 43°2'57.29"E

Material and methods

Fish sampling

The care of experimental animals was in accordance with the animal welfare laws, guidelines declared by Republic of Türkiye and the policies approved by RTE University Local Ethics Committee for experimentations (Permit reference number 2014/72). First, 80mg/L MS222 was performed for anaesthesia. Secondly, fish were collected for faunal surveys and preserved in 5% formaldehyde or 96% ethanol, later stored in 70% ethanol. Surgical procedures were only performed for excision of fin clips. Thus, the experimental conditions did not cause severe stress on specimens under investigation.

Morphological analyses

All measurements were done point to point (never by projections) as specified in Turan et al., (2010) with a dial caliper calibrated to 1 mm. Number of lateral line scale count, standard length, and the length of the caudal peduncle were recorded according to Turan et al. (2010). The last two branched rays articulating on a single pterygiophore in the anal and dorsal fins are counted as "1½". Comparative materials used in this study are listed in Turan et al. (2010); Turan et al. (2011); Turan et al. (2014a, b); Turan et al. (2017); Turan et al. (2020); and Turan et al. (2022).

Comparison material

All materials are from Türkiye except *Salmo labrax*.

***Salmo abanticus*:** FFR 3163, 13, 77–272 mm SL; Bolu prov.: outlet of Abant Lake, 40.5737°N, 31.2957°E.

***Salmo ardahanensis*:** FFR 3164, 10, 154–217 mm SL; Ardahan prov.: stream Toros, Kura River drainage, 41.1000°N, 42.4333°E.—FFR 3107, 4, 156–192; FFR 3167, 2, 155–182 mm SL; Ardahan prov.: stream Alabalık, Kura River drainage, 41.0500°N, 42.3666°E.—FFR 3110, 4, 67–118 mm SL; Ardahan prov.: stream Karaman at Aşıkzülal, Kura River drainage, 41.4166°N, 42.6500°E.—FFR 3136, 16, 99–185 mm SL; Ardahan prov.: stream Kınavur at Çataldere, Kura River drainage, 41.1833°N, 42.6000°E.

***Salmo araxensis*:** FFR 3114, 12, 116–201 mm SL; Kars prov.: Susuz district Kayalık stream, a tributary of Kars Stream, Aras River drainage, 40.8166°N, 43.1166°E.—FFR 3115, 15, 93–237 mm SL; Kars prov.: Susuz district: Porsuklu (Akçalı) Stream, a tributary of Kars Stream, Aras River drainage, 40.8000°N, 43.1833°E.—FFR 3118, 6, 95–132 mm SL; Kars prov.: Sarıkamış district: Boyalı Stream, a tributary of Kars Stream, Aras River drainage, 40.4333°N, 42.5666°E.—FFR 3144, 16, 87–265 mm SL; Kars prov.: Susuz district: İncilipınar Stream, a tributary of Kars Stream, Aras River drainage, 40.8166°N, 43.0666°E.

Salmo brunoi: FFR 3213, 7, 142–195 mm SL;—FFR 3215, 7, 142–195 mm SL; Türkiye, Bursa prov.: stream Deliçay at Kestel, 40.1241°N, 29.2737°E.—FFR 3211, 18, 93– 180 mm SL; —FFR 3217, 12, 85–153 mm SL; Türkiye, Bursa prov.: stream Ericek at Osmangazi, 40.0426°N, 29.2098°E.

***Salmo baliki*:** FFR 3234, 6, 132–276 mm SL; Ağrı prov.: stream Sinek a tributary of Murat River at Taşlıçay, 39.7587°N, 43.4644°E.—FFR 3205, 3, 175–267 mm SL; Ağrı prov.: a tributary of Murat River, 39.7307°N, 43.4818°E.

***Salmo chilo*:** FFR 3055, 23, 65–235 mm SL; Sivas prov.: stream Akdere at Gürün, Ceyhan River drainage, 38.6088°N, 36.8962°E.

***Salmo coruhensis*:** FFR 3004, 16, 95–240 mm SL; Artvin prov.: stream Osmaniye at Karaosmaniye village, 41.4689°N, 41.5105°E.—FFR 3011, 11, 90–189 mm SL; Artvin prov.: stream Hopa at Çavuslu village, 41.4509°N, 41.7001°E.—FFR 3021, 25, 90–520 mm SL; Rize prov.: stream Fırtına at Çat village, 40.8653°N, 40.9311°E.—FFR 3022, 9,95–228 mm SL; Rize prov.: stream Kendirli at Kalkandere District on road to Kendirli village, İyidere drainage, 40.9373°N, 40.4320°E.—FFR 3023, 13, 120–450 mm SL; Rize prov.: stream Iyidere (Ikizdere) at Güneyce, 40.8219°N, 40.4765°E.—FFR 3024, 13, 115–330 mm SL; Artvin prov.: stream Dörtkilise at Tekkale village, Çoruh River, 40.7877°N, 41.4946°E.—FFR 3025, 13, 80–550 mm SL; Erzurum prov.: stream Çayırbası (Kırık) at Kırık village, Çoruh River, 40.2904°N, 40.8097°E.—FFR 3026, 6, 160–290 mm SL; Erzurum prov.: stream Büyük at Büyükköy village, Çoruh River, 40.4452°N, 40.8513°E.—FFR 3027, 6, 130–420 mm SL; Rize prov.: stream Veliköy at Veliköy village, 41.0332°N, 40.6145°E.—FFR 3029, 6, 130–220 mm SL; Rize prov.: stream Bozukkale at Bozukkale village, 41.0543°N, 40.6297°E.—FFR 3030, 6, 80–170 mm SL; Rize prov.: stream Çaglayan at Çaglayan district, 40.9230°N, 40.4452°E.—FFR 3031, 6, 190–265 mm SL; Bayburt prov.: stream Ölçer at Ölçer village, Çoruh River, 40.5147°N, 40.5609°E.—FFR 3032, 16, 70–310 mm SL; Rize prov.: stream Sögütlü at Sögutlü village, about 5 km west of Çayeli, 41.0659°N, 40.6526°E.—FFR 3033, 16, 110–210 mm SL; Bayburt prov.: stream Kurtbogazı at Kurtbogazı village, Çoruh River, 40.1883°N, 40.5033°E.—FFR 3034, 16, 70–210 mm SL; Gümüşhane prov.: stream Harşit at Yağmurdere, 40.5746°N, 39.8645°E.—FFR 3035, 9, 160–450 mm SL; Sivas prov.: stream Gemin at Camili, Yeşilırmak River drainage, 38.0536°N, 40.0619°E.—FFR 3037, 10, 90–380 mm SL; Erzurum prov.: stream Pehlivanlı at Pehlivanlı village, tributary of Tortum, Çoruh River, 40.5176°N, 41.4780°E.—FFR 3041, 10, 115–250 mm SL; Trabzon prov.: stream Solaklı at Taskıran village 40.6722°N, 40.2568°E.—FFR 3042, 6, 95–117 mm

SL; Rize prov.: stream Sarayköy at Sarayköy village, 41.0190°N, 40.3807°E.—FFR 3043, 5, 130–229 mm SL; Artvin prov.: stream Barhal at Sarıgöl village, Çoruh River, 40.9744°N, 41.4184°E.—FFR 3043, 9, 110–223 mm SL; Rize prov.: stream Derepazarı at Derepazarı 41.0237°N, 40.4293°E.—FFR 3044, 6, 100–250 mm SL; Rize prov.: stream İyidere at İyidere, 40.9676°N, 40.3778°E.—FFR 3045, 7, 150–450 mm SL; Rize prov.: stream Fırtına at Çamlıhemsin, 41.0517°N, 41.0032°E.—FFR3046, 5, 10–280 mm SL; Rize prov.: stream Limanköy at Limanköy village, 41.0714°N, 40.7121°E.

***Salmo duhani*:** FFR 3184, 15, 95–287 mm SL; Çanakkale prov.: stream Zeytinli about 9 km east of Kazdağı National Park, 39.750°N, 27.017°E. –FFR 3185, 14, 85–170 mm SL; Çanakkale prov.: stream Zeytinli, 39.749°N, 27.015°E.—FFR 3186, 12, 108–160 mm SL; Çanakkale prov.: stream Zeytinli 39.759°N, 27.021°E.—FFR 3194, 10, 62–122 mm SL; Çanakkale prov.: stream Kocaçayı, 12 km west of Kalkım, 39.804°N, 27.071°E.—FFR 3195, 15, 93–275 mm SL; Çanakkale prov.: stream Kocaçay at Yenice, 39.817°N, 27.099°E.

Salmo euphrataeus: FFR 1220, 24, 80–260 mm SL; Erzurum prov.: stream Kuzgun, a tributary of Karasu Stream, Euphrates River drainage, 40.2198°N, 41.1051°E.—FFR 1255, 25, 88–230 mm SL; Erzurum prov.: stream Şenyurt at Şenyurt, a tributary of Karasu Stream, Euphrates River, 40.1830°N, 41.5037°E.—FFR 1223, 5, 122–222 mm SL; Erzurum prov.: stream Sırlı, a tributary of Karasu Stream, Euphrates River, 40.2183°N, 41.1010°E.—FFR 1269, 8, 117–198 mm SL; Erzurum prov.: stream Kuzgun, Euphrates River, 40.2198°N, 41.1050°E.

***Salmo fahrettini*:** FFR 3232, 20, 134–227 mm SL; Erzurum prov.: stream Ömertepesuyu at Palandöken 39.7958°N, 40.9444°E.—FFR 3233, 5, 126–194 mm SL; Erzurum prov.: stream Tekke at Palandöken, 39.8197°N, 41.1516°E.

***Salmo kottelati*:** FFR 3181, 21, 98–210 mm SL; Antalya prov.: stream Alakır at Altınyaka, 36.5608°N, 30.3428°E.—FFR 3182, 16, 98–176 mm SL; Antalya prov.: stream Alakır at Altınyaka, 36.5608°N, 30.3428°E.

***Salmo labecula*:** FFR 3057, 4, 103–237 mm SL; Niğde prov.: stream Ecemiş at Çamardı, Seyhan River drainage, 37.8253°N, 34.9902°E.—FFR 3058, 5, 142–241 mm SL; Isparta prov.: stream Kartoz at Aşağıyaylabel, Köprüçay drainage, 37.5532°N, 31.3070°E.—FFR 3059, 5, 140–184 mm SL; Antalya prov.: stream Zindan at Aksu, Köprüçay drainage, 37.8064°N, 31.0734°E.

***Salmo munzuricus*:** FFR 3162, 17, 127–270 mm SL; Tunceli prov.: stream Munzur at Koyungölü, 39.3472°N, 39.1341°E.—FFR 3147, 8, 146–320 mm SL; stream Munzur at Koyungölü, 39.3461°N, 39.1316°E.

Salmo murathani: FFR 3121, 18, 60–233 mm SL; Kars prov.: Keklik stream [a tributary of Kars stream], Sarıkamış district, Aras River drainage, 40.2833°N, 42.6500°E.—FFR3117, 22, 95–192 mm SL; FFR 3113, 17, 91–206; Kars prov.: Keklik stream [a tributary of Kars stream] Sarıkamış district, Aras River drainage, 40.2500°N, 42.6666°E.—FFR 3120, 10, 69–163 mm SL, Kars prov.: Maksutçuk Stream [a tributary of Kars stream], Aras River drainage, 40.5333°N, 42.8666°E.—FFR 3108, 14, 90–186 mm SL; Ardahan prov.: Çıldır Lake, Aras River drainage, 41.0500°N, 43.3166°E.—FFR 3228, 23, 95–241 mm SL; Kars prov.: Arpaçay stream [a tributary of Kars stream] Arpaçay district, Aras River drainage, 40.9000°N, 43.1666°E.—FFR 3229, 8, 110–156 mm SL; Kars prov.: Keklik Stream [a tributary of Kars stream] Sarıkamış District, Aras River drainage, 40.2833°N, 42.6500°E.

***Salmo okumusi*:** FFR 1254, 10, 75–202 mm SL; Malatya prov.: stream Sürgü, Euphrates River drainage, 37.9975°N, 37.9583°E.—FFR 125, 10, 129–169 mm SL; Sivas prov.: stream Gökpınar, a tributary of Tohma Stream, Euphrates River, 38.6600°N, 37.3089°E.—FFR 1256, 10, 68–280 mm SL; Sivas prov.: stream Gökpınar, Euphrates River, 38.6600°N, 37.3089°E.—FFR 124, 2, 149–175 mm SL; Kahramanmaraş prov.: stream Göksu 4 km north of Düzbağ, Euphrates River, 37.8331°N, 37.4756°E.

***Salmo opimus*:** FFR 3048, 12, 118–180 mm SL; Antalya prov.: stream Alara at Gündoğmuş, 36.7921°N, 31.9749°E.—FFR 3049, 20, 115–186; Kahramanmaraş prov.: stream Göçüksu at Kömürköy, Ceyhan River drainage, 38.1447°N, 36.5630°E.—FFR 3050, 4, 175–210 mm SL; Kahramanmaras prov.: drainage of stream Tekir at Tekir, Ceyhan River drainage, 37.8767°N, 36.6058°E.—FFR 3051, 9, 90–300 mm SL; Kahramanmaras prov.: stream Fırnız at Fırnız, Ceyhan River drainage, 37.7591°N, 36.6983°E.

***Salmo platycephalus*:** FFR 972, 7, 145–184 mm SL; Kayseri prov.: Pınarbası Stream at Pınarbası district, Seyhan River drainage, 38.4043°N, 37.4609°E —FFR 1260, 10, 137–237 mm SL; Kayseri prov.: Pınarbası Stream at Pınarbası district, Seyhan River drainage, 38.4044°N, 37.4609°E.

***Salmo rizeensis*:** FFR 3001, 15, 90–220 mm SL; Erzurum prov.: stream Ovit (2) [Kan] at Ovit mountain, Çoruh River, 40.5887°N, 40.8583°E.—FFR 3002, 10, 114–245 mm SL; Trabzon prov.: stream Degirmen at Çosandere village, 40.7512°N, 39.5908°E.—FFR 3003, 12, 112–230 mm SL; Trabzon prov.: stream Solaklı at Demirkapı village, 40.7586°N, 40.5913°E.—FFR 3005, 13, 111–220 mm SL; Rize prov.: stream Çağlayan at Gürcüdüzü plateau, 41.1905°N, 41.3086°E.—FFR 3006, 18, 95–226 mm SL; Rize prov.: stream Sehitlik at Sehitlik village, 41.1407°N, 40.9828°E.—FFR 3007, 12, 90–118 mm SL; Rize prov.: stream Çayeli at Kaptanpasa village, 40.958°N, 40.7794°E.—FFR 3008, 18, 91–198 mm SL; Rize prov.: stream Fırtına at Tunca village, 41.1259°N, 41.1310°E.—FFR 3009, 10, 110–240 mm SL; Rize prov.: stream Taşlıdere at Pasaçur village, 40.8837°N, 40.5796°E.—FFR 3010, 9, 110–240 mm SL; Rize prov.: stream Taslıdere at Kangel village, 40.9453°N, 40.6642°E.—FFR 3011, 7, 100–180 mm SL; Rize prov.: stream Erenler at Erenler village, 41.0914°N, 40.8298°E.—FFR

3012, 7, 88–237 mm SL; Artvin prov.: stream Dörtkilise at Tekkale Village, Çoruh River, 40.7800°N, 41.5098°E.—FFR 3013, 12, 75–167 mm SL; Artvin prov.: Çifteköprü Stream at Cankurtaran mountain, Çoruh River, 41.3844°N, 41.5691°E.—FFR 3014, 7, 112–201 mm SL; Artvin prov.: stream Kapisre at Küçükköy village, 41.2753°N, 41.3755°E.—FFR 3015, 9, 113–228 mm SL; Bayburt prov.: stream Kop at Kop Mountain, Çoruh River, 40.0654°N, 40.4331°E.—FFR 3016, 9, 113–221 mm SL; Erzurum prov.: stream Yağlı at Yaglı village, Çoruh River, 40.3643°N, 41.0728°E.—FFR 3017, 12, 112–223 mm SL; Erzurum prov.: stream Büyük at Büyükdere plateau, Çoruh River drainage, 40.5698°N, 40.7140°E.—FFR 3018, 16, 145–224 mm SL; Gümüşhane prov.: stream Akbulak at Akbulak village, Yesilırmak River drainage, 40.281462°N, 39.0896°E.—FFR 3019, 10, 122–221 mm SL; Kütahya prov.: stream Sefaköy at Domaniç, Sakarya River drainage, 39.8426°N, 29.6706°E.—FFR 3020, 10, 111–119 mm SL; Kütahya prov.: Çatalalıç Stream at Domaniç, Sakarya River, 39.8600°N, 29.6291°E.—FFR 3036, 10, 130–170 mm SL; Rize prov.: stream Ikizdere at Anzer plateau, 40.5926°N, 40.5148°E.—FFR 3038b, 7, 130–170 mm SL; Rize prov.: stream Çiftekavak at Ortapazar village, 40.9959°N, 40.4851°E.—FFR 3039a, 14, 120–200 mm SL; Rize prov.: stream Fırtına at Elevit Plateau, 40.8471°N, 41.0151°E.—FFR 3038a, 1, 250 mm SL; Erzurum prov.: stream Ovit (2) [Kan] at Ovit mountain, Çoruh River, 40.5735°N, 40.8634°E.—FFR 3039b, 10, 90–238 mm SL; Rize prov.: stream Ovit at Ovit mountain, İyidere drainage, 40.6361°N, 40.8214°E.—FFR 3040, 14, 90–190 mm SL; Erzurum prov.: stream Merekum at Merekum, Çoruh River, 40.5527°N, 41.4592°E.

***Salmo tigridis*:** FFR 1253, 9, 136–227 mm SL; Van prov.: stream Çatak, Tigris River, 38.0077°N, 43.0652°E.

DNA extraction, PCR and Sequencing

Total DNA was extracted from fin clips via Hibrigen Genomic DNA isolation kit and DNA quality were checked on 0.8% agarose gel electrophoresis. Mitochondrial *cytochrome b* gene (Cyt *b*) (991 bp) was amplified using SsaL14437 (Warheit and Bowman 2008) and StrCBR (Turan et al. 2010) primer pair. PCRs were applied in a 50 µL reaction volume with a T100 thermal cycler (Bio-Rad, Hercules, CA, USA), including 100 ng of DNA, 10X PCR buffer, 3 mM $MgCl_2$, 5 µL of 0.5 mM dNTPs mix, 1 u Taq DNA polymerase (Thermo Scientific Inc.) and 0.5 mM of each primer. PCR amplifications were conducted under the following conditions: initial denaturation 2 min at 95 °C, denaturation 30 s at 95 °C, annealing 30 s at 56 °C, extension 70 s at 72 °C through 35 cycles and a final extension 7 min at 72 °C. The PCR products were run at 1% agarose gel electrophoresis and visualized under the UV Quantum–Capt ST4 system (Vilber Lourmat, France). Purification and sequencing of PCR products were performed by Macrogen Europa Inc. (Amsterdam, Netherlands).

Molecular data analysis

We have used the newly generated twelve Cyt *b* sequences from the present study and included an additional 51 specimens from earlier studies deposited to NCBI GenBank (Crête-Lafrenière et al. 2012; Tougard et al. 2018; Turan et al. 2020; Turan et al. 2022). Clustal W algorithm (Thompson et al. 1994) in Bioedit v7.2.5 (Hall, 1999) was used to align Cyt *b* sequences. Sequences were submitted to NCBI GenBank with accession numbers OR713904–OR713909. Nucleotide substitution model TrN+I+G model: -ln= 1781.6420 (Tamura and Nei 1993) was chosen as the best nucleotide substitution model according to the Bayesian information criterion (BIC) in jModeltest v. 0.0.1 (Posada, 2008). Phylogenetic relationships among species were carried out using maximum likelihood (ML) using MEGA X (Kumar et al. 2018) with 100 bootstrap and Bayesian inference (BI) analysis using MrBayes 3.2 software (Ronquist et al. 2012). BI analysis was run using a Metropolis-coupled Markov chain Monte Carlo (MCMC) algorithm for one million generations in the MrBayes 3.1.2 software (Ronquist and Huelsenbeck 2003), and the initial 25% of the saved trees sampled in each MCMC run were discarded as burn-in. *Salmo ohridanus* (JX960763) was selected as an outgroup taxa for all phylogenetic analyses. Pairwise genetic distance estimation among the species was calculated by MEGA X software using the *p-distance* substitution model (Kimura, 1980).

Collection codes

IFC-ESUF, Inland Fishes Collection, Faculty of Eğirdir Fisheries, Isparta University of Applied Sciences, Isparta; and FFR, Zoology Museum, Faculty of Fisheries, Recep Tayyip Erdoğan University, Rize.

Results

Phylogenetic placement of *Salmo ekmekciae*

The resulting phylogeny indicates that the studied *Salmo* species are divided into six main clades: Adriatic, Danubian, Tigris, Atlantic, Mediterranean and Marmoratus lineage. *Salmo ekmekciae* is involved Adriatic lineage with *S. kottelati*, *S. chilo*, *S. labecula*, *S. munzuricus*, *S. okumusi*, *S. baliki*, *S. platycephalus* and *S. opimus* with Marmoratus lineage. *Salmo ekmekciae* more closely related *Salmo chilo* and *Salmo kottelati* than to other species included in the analysis (Fig. 1). The Bayesian and Maximum Likelihood analyses of Cyt *b* gene resulted in coherent trees supported by high bootstrap values. *p* distance between species ranged from 0.00% (*S. kottelati* and *S.chilo*; *S. opimus* and *S. marmoratus*; *S. duhani* and *S. brunoi*; *S. euphrataeus* and *S. murathani*) to 1.6% (*S. tigridis* and *S. araxensis* (Suppl. material 1). *P* distance is 0.001% between *S. ekmekciae* sp nova and its closest relatives *S. kottelati* and *S.chilo*.

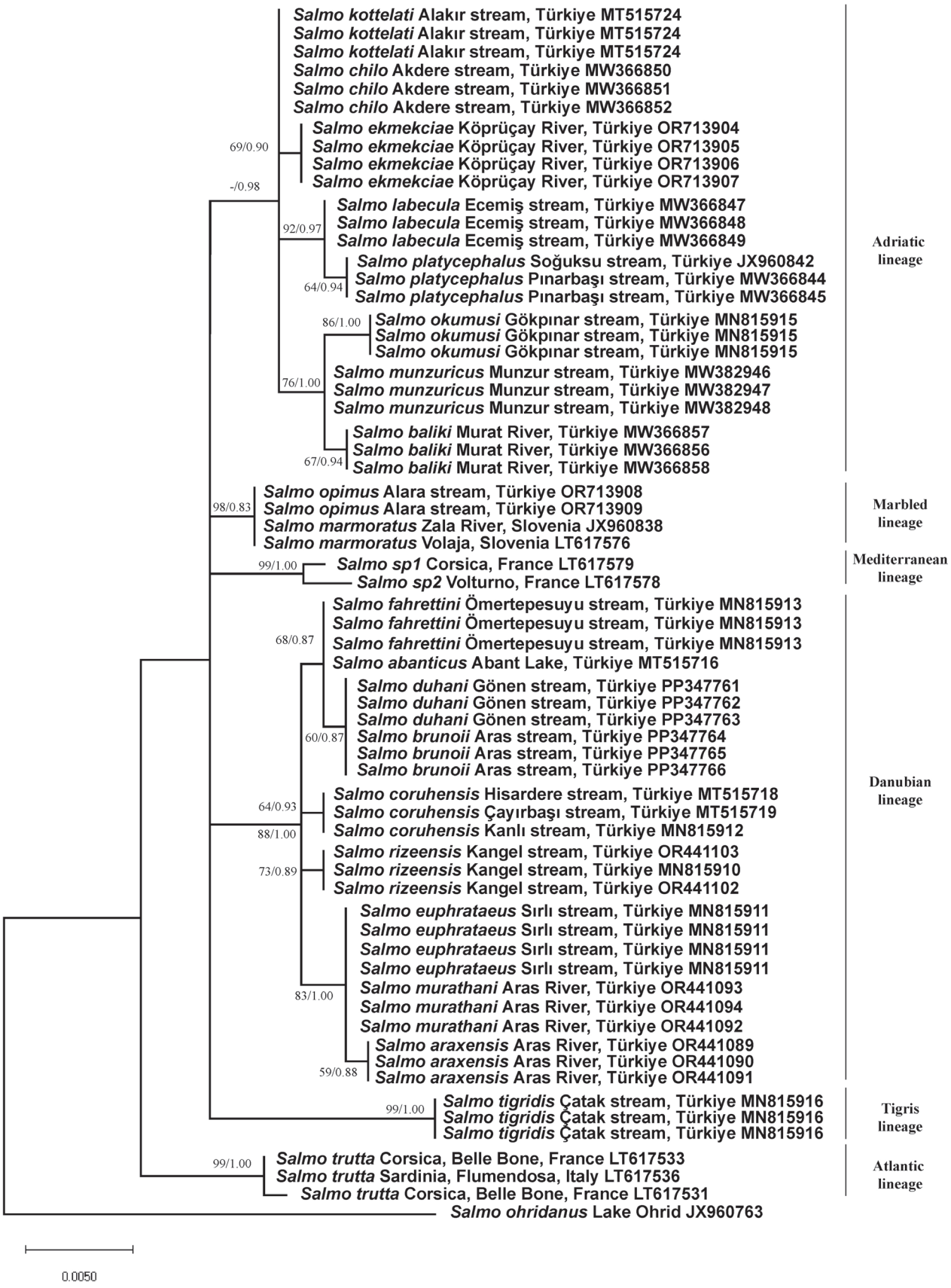

Figure 1. Maximum likelihood (ML) tree based on mitochondrial cytochrome b gene sequences of Salmo species. Bayesian inference and ML analyses resulted in congruent trees. Bootstrap and posterior probability values are shown above nodes on tree if 50% or higher.

Morphological differences and comparisons

Salmo populations from Köprüçay River are distinguished from the other species of trout recorded from the streams and rivers in Turkish Mediterranean coast (*S. labecula*, *S. kottelati*, *S. platycephalus*, *S. opimus* and *S. chilo*) by the following characters: *Salmo* populations from Köprüçay River differ from *S. labecula* by having fewer parr marks on flank (9–10, vs. 11–12), fewer scale rows between end of base of adipose fin and lateral line (11–13, vs. 14–15), a longer head (27–30% SL, vs. 25–27), a shorter distance between adipose fin and caudal-fin base (13–15% SL, vs. 16–18), a slenderer caudal peduncle (9–10% SL, vs. 10–11) and a slenderer body at adipose-fin origin (13–14% SL, vs. 14–15). *Salmo* populations from Köprüçay River differ from *S. kottelati* by the general body colour silvery in life (vs. brownish), and no black spots on top of head (vs. more or less presence). *Salmo* populations from Köprüçay River further differ from *S. kottelati* in having more gill rakers on first gill arch (22–24, vs. 18–20), a slenderer caudal peduncle (9–10% SL, vs. 10–13), a shorter maxilla in male (8–10% SL, vs. 10–13) and a smaller mouth gape in males (11–13% SL, vs. 13–19). *Salmo* populations from Köprüçay River differ from S. *platycephalus* by having fewer parr marks along lateral line (9–10, vs. 12–13), the presence of black spots in all size (vs. absent in specimens larger than about 200 mm SL), the head not flattened dorso-ventrally (vs. flattened dorso-ventrally), a shorter distance between adipose fin and caudal-fin base (13–15% SL, vs. 15–17), a slenderer caudal peduncle (9–10% SL, vs. 11–12) and a slenderer body at adipose-fin origin (13–14% SL, vs. 14–16. *Salmo* populations from Köprüçay River differ from *S. opimus* by no red spots on flank in specimens larger than about 160 mm SL, if the red spot present in specimens larger than about 160 mm SL, they almost covered with black dots (vs. presence in all size and not covered with black dots), a slenderer caudal peduncle (9–10% SL, vs. 11–12) and a slenderer body at adipose-fin origin (13–14% SL, vs. 15–17). It differs from *S. chilo* by the absence of red spots on flank in specimens larger than about 160 mm SL, if the red spot is present in specimens larger than about 160 mm SL, they are almost covered with black dots (vs. presence in all size, and red spots not covered with black dots), fewer parr marks along lateral line (9–10, vs. 11–13), more gill rakers on first gill arch (22–24, vs. 18–21) and a slenderer caudal peduncle (9–10% SL, vs. 11–12).

Salmo populations from Köprüçay River are distinguished from *S. baliki*, S. *okumusi* and *S. munzuricus* by having more gill rakers on first gill arch (22–24, vs. 16–21), fewer scale rows on lateral line and dorsal-fin origin (21–25, vs. 26–30), fewer scale rows on lateral line and anal-fin origin (16–18, vs. 18–28) and fewer scale rows between origin of the adipose fin and lateral line (11–13, vs. 13–17) and a longer head in males (28–30% SL, vs. 24–27). It further differs from *S. okumusi* and *S. munzuricus* by having fewer parr marks on flank (9–10, vs. 10–14).

Salmo populations from Köprüçay River are also distinguished from other species (*S. abanticus*, *S. araxensis S. ardahanensis*, *S. brunoi*, *S. coruhensis*, *S. duhani*, *S. euphrataeus*, *S. fahrettini*, *S. munzuricus*, *S. murathani*, *S. rizeensis*, *S. tigridis*) by having the presence of four broad dark bands on flank (vs. absent), black spots on body irregularly shaped (vs. roundish), height of parr marks on anterior of the flank 2.5–3.5 times its width (vs. 1.4–2.5), fewer parr marks on flank (9–10, vs. 10–14), more gill rakers on first gill arch (22–24, vs. 16–22, except *S. murathani*), fewer scale rows lateral line and dorsal-fin origin (21–25, vs. 26–35, except *S. araxensis*), fewer scale rows lateral line and anal-fin origin (16–18, vs. 18–26, except *S. ardahanensis*) and fewer scale rows between origin of the adipose fin and lateral line (11–13, vs. 13–20).

Thus, we describe *Salmo* populations from Köprüçay River, as a new species, *Salmo ekmekciae* sp. nov.

Salmo ekmekciae sp.nov

https://zoobank.org/32FCE1C6-ABD9-485A-9B37-D825C523447A

Type material. ***Holotype.*** IFC ESUF 02-0029, holotype, 216 mm SL, male; Türkiye: Isparta prov.: Yayla Stream, a drainage of Köprüçay River, 37.8115°N, 31.0925°E.

Paratypes. IFC-ESUF 02-0022, 6, 70–150 mm SL; same data as holotype; FFR 3058, 4, 141–185 mm SL; Türkiye: Isparta prov.: Kartoz Stream (Köprüçay River drainage), 37.7162°N, 31.1616°E.

Diagnosis. *Salmo ekmekciae* is distinguished from all the species of *Salmo* in Türkiye and adjacent areas by combination of follow characters: one small black spot in postorbital and suborbital areas, greater than pupil; seven to seventeen black spots on opercle; black spots on body few or numerous, scattered on the back (missing in the predorsal area), a middle portion of flank, sometimes upper and lower halves of the flank. Red spots few, ocellated, organized in two or three irregular longitudinal rows on median part of the body, and half of lower part of the flank; commonly no black spots on flank in specimens larger than 160 mm SL, if red spots present in specimens larger than about 160 mm SL, they are almost covered with black dots; maxilla short and narrow; lateral line with 108–118 scales; 21–25 scale rows between dorsal-fin origin and lateral line; 16–18 scale rows between anal-fin origin and lateral line; 11–13 scale rows between origin of the adipose fin and lateral line. 22–24 gill rakers on outer side of first gill arch.

Description. The general appearance is shown in Figs 2–4, morphometric data are in Table 2. Body moderately deep, compressed laterally, its maximum depth markedly smaller than head length. Dorsal profile slightly convex and ventral profile less convex than the dorsal profile. Head somewhat long, upper profile slightly convex in interorbital area, markedly convex in interorbital and on snout. Mouth small, slightly sub-terminal in males, sub-inferior in females. Tip of lower jaw slightly curved upwards, slightly pointed, with a slightly developed process at symphysis in males larger than 180 mm SL. Maxilla short, not reaching beyond posterior margin of the eye in males and females. Snout short, slightly rounded in males, rounded in females. Adipose fin somewhat large,

Figure 2. *Salmo ekmekciae*, IFC ESUF 02-0029, holotype, 216 mm SL, male; Türkiye: Köprüçay River.

Figure 3. *Salmo ekmekciae*, IFC-ESUF 02-0022, paratype, 150 mm SL, female; Türkiye: Köprüçay River.

Figure 4. *Salmo ekmekciae*, IFC-ESUF 02-0022, paratype, 84 mm SL, juvenile; Türkiye: Köprüçay River.

its height 7–9% SL in males and about 7% SL in females, slightly increasing with body size. Largest observed specimen 185 mm SL.

Lateral line with 108–118 scales; 21–25 scale rows between dorsal-fin origin and lateral line; 16–18 scale rows between anal-fin origin and lateral line; 11–13 scale rows between origin of the adipose fin and lateral line. Dorsal fin with 9–10 branched and 3–4 unbranched rays, its distal margin straight or slightly convex. Pectoral fin with 1 unbranched and 11–13 branched rays, its external margin convex. Pelvic fin with 1 unbranched and 8 branched rays, its external margin slightly convex. Anal fin with 3 unbranched and 8 branched rays, its distal margin straight or slightly convex anteriorly and slightly concave posteriorly. Caudal fin slightly forked, lobes slightly pointed. 22–24 gill rakers on the outer side of first gill arch.

Coloration. In formalin: General coloration of freshly preserved specimens silvery on back and flank, yellowish

Table 2. Morphometry of *Salmo ekmekciae* (holotype, IFC-ESUF 02-0029; paratypes FFR 3058, IFC-ESUF 02-0022, n=9. The calculations include the holotype.

	Holotype	Paratypes	
Sex	**male**	**male**	**female**
Number of specimens		**n = 5**	**n = 5**
Standard length (mm)	216	101–185	84–150
In percentage of standard length		Range (mean)	Range (mean)
Head length	25.9	27.5–30.4 (28.7)	27.1–28.0 (27.4)
Predorsal length	45.2	44.9–50.0 (47.2)	45.4–47.0 (46.3)
Prepelvic length	55.5	53.4–57.3 (55.4)	52.6–54.3 (53.4)
Preanal length	75.6	74.3–75.8 (75.2)	73.2–74.8 (73.4)
Body depth at dorsal-fin origin	20.9	24.1–27.5 (25.8)	22.3–23.5 (23.0)
Body depth at dipose-fin origin	14.1	13.1–14.4 (13.9)	12.7–13.0 (12.9)
Depth of caudal peduncle	10.2	9.2–10.2 (9.9)	9.6–10.1 (9.8)
Length of caudal peduncle	15.0	14.6–18.0 (16.1)	14.4–15.3 (15.0)
Distance between adipose- and caudal-fins	13.9	14.0–15.3 (14.6)	13.1–14.5 (14.0)
Body width at anal-fin origin	9.7	8.7–11.0 (10.2)	9.1–9.3 (9.2)
Length of dorsal-fin base	15.7	14.8–19.9 (17.3)	14.6–15.4 (15.0)
Depth of dorsal-fin	15.6	14.9–19.8 (18.4)	17.0–17.7 (17.3)
Length of pectoral-fin	18.3	17.3–22.3 (19.8)	18.3–20.9 (19.7)
Length of adipose-fin base	3.8	3.8–4.9 (4.4)	3.8–3.9 (3.9)
Depth of adipose-fin	7.1	7.0–8.7 (7.8)	6.6–7.5 (7.0)
Length of pelvic-fin	13.3	13.1–15.6 (14.8)	13.6–14.8 (14.2)
Depth of anal-fin	15.7	14.3–18.3 (15.7)	14.2–16.8 (15.3)
Length of anal-fin base	12.1	9.9–12.9 (11.5)	10.6–11.6 (11.2)
Length of upper caudal-fin lobe	13.4	15.8–20.0 (17.1)	14.3–15.9 (15.4)
Length of median caudal-fin rays	12.2	12.9–15.6 (14.1)	12.8–13.8 (13.3)
Length of lower caudal-fin lobe	14.6	15.9–20.3 (17.8)	16.3–17.5 (16.9)
Snout length	7.5	6.7–7.2 (7.0)	6.6–7.6 (7.0)
Distance between nasal openings	4.1	3.7–4.9 (4.4)	4.1–4.6 (4.3)
Eye diameter	4.8	5.6–7.3 (6.2)	5.4–6.3 (5.9)
Interorbital width	7.1	7.0–7.5 (7.3)	7.0–7.3 (7.2)
Head depth through eye	12.8	12.8–14.7 (13.9)	12.3–13.0 (12.7)
Head depth at nape	16.8	17.3–20.4 (18.9)	16.5–17.6 (17.0)
Length of maxilla	8.1	7.8–10.1 (8.8)	7.8–8.3 (8.1)
Maximum height of maxilla	2.5	3.0–3.8 (3.4)	3.1–3.5 (3.3)
Width of mouth gape	9.3	8.5–10.4 (9.6)	8.5–9.3 (8.9)
Length of mouth gape	11.2	11.8–13.1 (12.4)	11.3–12.2 (11.6)

on the belly. Four broad dark bands on flank, without or very faintly marked in specimens smaller than approximately 160 mm SL. One small black spot in postorbital and suborbital areas, greater than pupil; seven to seventeen black spots on opercle, smaller than pupil. Black spots on body few or numerous (more than 70 in most specimens larger than about 160 mm SL), smaller than pupil, ocellated, scattered on the back (missing in the predorsal area), a middle portion of flank, sometimes over upper and lower halves of the flank. No black spot on top of the head. Red spots few (less than about 20), ocellated, organized in two or three irregular longitudinal rows on median part of the body, and half of lower part of the flank. Commonly no red spots on flank in specimens larger than 160 mm SL, if red spots present in specimens larger than about 160 mm SL, they are almost covered with black dots; dorsal fin grey, with three or five rows of black spots (smaller than pupil), and one or two rows of red spots (smaller than pupil) in specimens smaller than about 120 mm SL. Caudal fin grey or dark grey; pectoral, anal and pelvic fins grayish. Adipose-fin plain greyish. Nine or ten mostly vertically elongated parr marks on the body, distinct in specimens up to at least about 160 mm SL.

In life: General body colour silvery. Back and halves of upper part of flank silver, belly and halves of lower part of flank yellowish. All fins yellowish. A conspicuously black spots behind eye, smaller than pupil. Red spots few and with almost covered black pigment in specimens larger than about 160 mm SL, scattered on median part of the body, and half of lower part of the flank. Adipose-fin plain greyish, with very inconspicuous reddish margin. Nine or ten vertically elongated dark grey parr marks along middle part of flank.

Distribution. *Salmo ekmekciae* inhabits clear and moderately swift-flowing water, with a substrate of stones and pebbles. It is only known from the Köprüçay River and its tributaries in Antalya-Isparta province (Fig. 5).

Sexual dimorphism. The snout of the male is more pointed than that of the female. The length of the head, and the length of the maxilla of the male are slightly greater than those of the female counterparts.

Etymology. The species is named for Dr. Fitnat Güler Ekmekçi (Türkiye), ichthyologist, in appreciation of her contribution to literature.

Conservation status. *Salmo ekmekciae* is only known from Köprüçay River, most probably endemic to that area. The species is threatened by overfishing similar to other Salmonids and there are rainbow trout (*Oncorhynchus mykiss*) farms in the region.

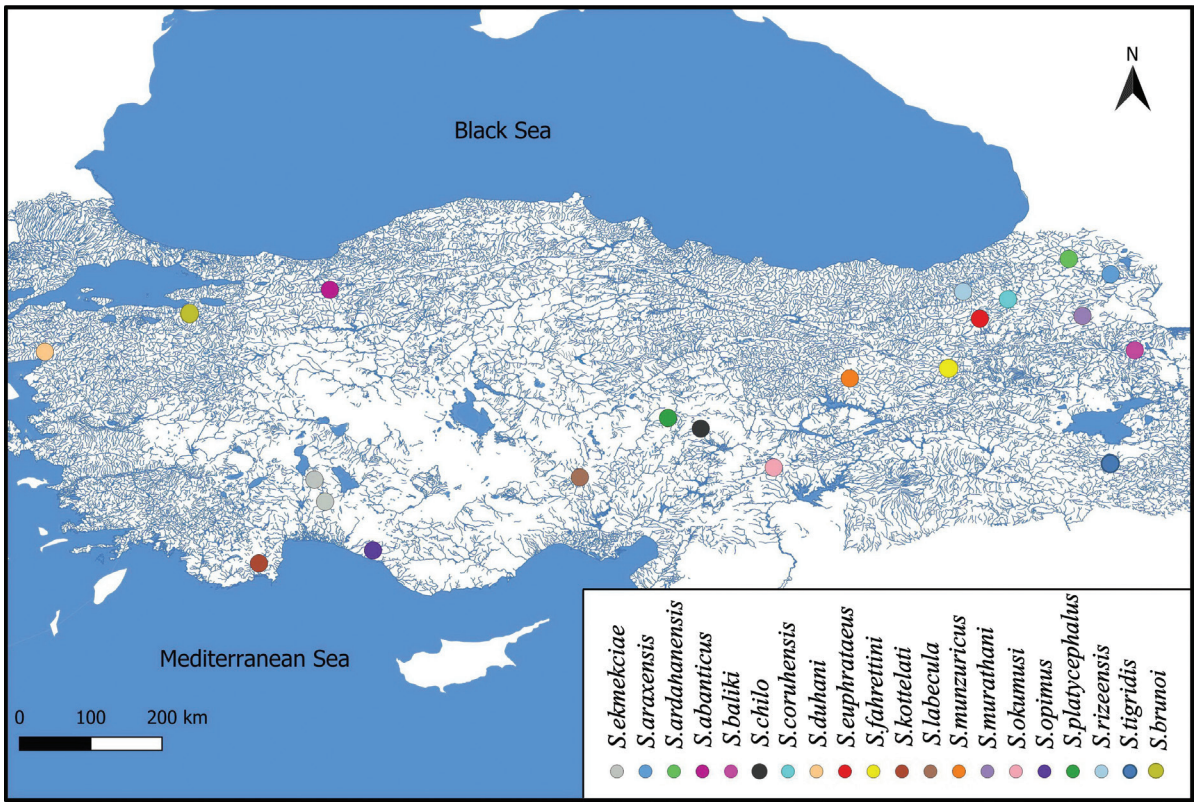

Figure 5. Type localties of *Salmo* species in the Türkiye.

Key to native *Salmo* species distributed in Türkiye

1 Red spots larger than eye pupil..... *S. baliki*
– Red spots smaller than eye pupil 2
2 There are four dark bands on flank; black spots on body irregularly shaped; in males, the lower jaw not curved upward; height of parr marks on anterior of the flank 2.5–3.5 times its width..... 3
– There are no dark bands on body; black spots on body roundish; in large males, the lower jaw curved upward; height of parr marks on anterior of the flank 1.4–2.5 times its width..... 11
3 There are no red spots in adult specimens..... 4
– There are red spots in both juvenile and adult specimens..... 5
4 The head flattened dorsoventrally; there are no black spots in specimens larger than 175 mm SL; there are numerous black dots on body..... *S. platycephalus*
– The head not flattened dorsoventrally; there are black spots in both juveniles and adults; there is no black dots on body ..... *S. labecula*
5 Length of maxilla more than 10% SL..... *S. kottelati*
– Length of maxilla less than 10% SL..... 6
6 There are 9–10 parr marks on flank..... *S. ekmekciae*
– There 10–13 parr marks on flank..... 7
7 22–23 gill rakers on first gill arch; a large (lager than eye pupil) white ring around red spots ..... *S. opimus*
– 18–21 gill rakers on first gill arch; a narrow (equal or smaller than eye pupil) white ring around red spots..... 8
8 There are 24–26 scales row between dorsal-fin origin and lateral line; 15–18 scale rows between anal-fin origin and lateral line..... *S. chilo*
– There are 26–35 scales row between dorsal-fin origin and lateral line; 18–26 scale rows between anal-fin origin and lateral line 9
9 There are 32–35 scales row dorsal-fin origin and lateral line..... *S. tigridis*
– There are 26–30 scales row dorsal-fin origin and lateral line..... 10
10 Lateral line with 103–112 scales ..... *S. okumusi*
– Lateral line with 116–123 scales ..... *S. munzuricus*
11 There are no black spots on the body in specimens larger than 200 mm SL; shape of black spots on body polygonal ... . *S. abanticus*
– There are red spots on body of both juvenile and adult specimens; shape of black spots on body circular 12

12 There are few black and red spots on body; number of black and red spots not increasing with size and age; black spots scattered on back and upper part of flank; one black spot behind eye 13
– There are numerous black and red spots on body; number of black and red spots increasing with size and age; black spots scattered on back, upper part and middle part of flank; more than one spots behind eye in specimens larger than 230 mm SL 16
13 General body colour silveri in life; length of maxilla 9–10% SL in males ..... *S. araxensis*
– General body colour brownish or greenish in life; length of maxilla 10–12% SL in males 14
14 Distance between adipose fin and caudal fin bases in females 12–14% SL ..... *S. brunoi*
– Distance between adipose fin and caudal fin bases 14–17% SL 15
15 The head slightly compressed in adult male; anal-fin and adipose fins reaching to caudal-fin base ..... *S. euphrataeus*
– The head not compressed in adult male, anal-fin and adipose fins not reaching to caudal-fin base in adult males ..... *S. rizeensis*
16 There are 19–23 gill rakers on first gill arch; adipose-fin reaching to caudal-fin base; head slightly flattened 17
– There are 16–19 gill rakers on first gill arch; adipose-fin not reaching to caudal-fin base; head not flattened 18
17 Pores on top of head with small black spots (smaller than pupil) ..... *S. ardahanensis*
– There are no black spots on pores on top of head ..... *S. murathani*
18 Dorsal-fin with 8–9 unbranched rays; upper profile of head markedly convex in males ..... *S. fahrettini*
– Dorsal-fin with 9–11 unbranched rays; upper profile of head straight or slightly convex 19
19 The number of spots conspicuously increasing with sizes in males ..... *S. coruhensis*
– The number of spots not increasing with sizes in males ..... *S. duhani*

Discussion

In this study molecular data revealed that *Salmo ekmekciae* belongs to the Adriatic lineage. A total of 8 species of this lineage are distributed in Turkish inland waters. Among these species, *S. chilo*, *S. kottelati*, *S. labecula* and *S. platycephalus* are distributed in the streams and rivers in the Mediterranean region of Türkiye, while *S. baliki*, *S. munzuricus* and S. *okumusi* are found in the Euphrates River. On the other hand, the *S. opimus*, whose type locality is Alara Stream (a coastal stream in Mediterranean), belong to Marmoratus lineage together with *Salmo marmoratus* species. More detailed studies should be carried out to reveal the lineage status of this species. Molecular data from the present study show that *S. chilo* (upper drainage of Ceyhan River) is very closely related to other populations that were previously reported as *S. opimus* by Turan et al. (2012) in the lower part of Ceyhan River. Therefore, to the best of the authors' knowledge *S. opimus* is only restricted to Alara Stream. In the present study, we treated all Ceyhan trout as *S. chilo.* There is no genetic difference between *S. kottelati* and *S. chilo*, *S. opimus* and *S. marmoratus*, *S. duhani* and *S. brunoi*, and *S. euphrataeus* and *S. murathani*. They also share the same mt DNA *Cyt b* haplotypes. Segherloo et al. (2021) stated that the mostly absent or shallow mtDNA diversity leads to difficulties in defining salmonid taxonomy, despite the wide geographical distribution and high morphological and ecological diversity. However, they have published full genome data of some species in Europe and Asia. These results have begun to contribute significantly to new taxonomic studies based on the whole genome data. Following this, whole genome data were used for the first time to describe the *S. brunoi* species (Turan et al. 2024). Additionally, unpublished whole genome data confirms that mt DNA haplotypes only determine the level of lineage. Turan et al. (2012) examined a small number of samples from Köprüçay River in their study and reported this population as *S. labecula*. However, in this study, a thorough examination was carried out between these two populations and it was concluded that they are separate species. *Salmo ekmekciae* are similar to *S. labecula* in terms of color and pattern as well as number of gill rakers on the first gill arch, but there are significant morphological differences between these two species. Differences between *Salmo ekmekciae* and *S. labecula* are given in the diagnosis section. More detailed studies covering all natural trout in Türkiye are needed. However, this study focused on a new species distributed only in Köprüçay River.

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Supplementary material 1

Pairwise distance values (p distance model) based on cytochrome b sequences of *Salmo* species

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Data type: xlsx

Link: https://doi.org/10.3897/zse.100.121174.suppl1