

## Research Article

# *Oxynoemacheilus veyseli*, a new nemacheilid species from the upper Aras River drainage of Turkey (Teleostei: Nemacheilidae)

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**Abstract:** A new species of nemacheilid fish, *Oxynoemacheilus veyseli* sp. n., is described from the upper Aras River drainage, Kars Province, Turkey. The species differs from its congeners in the Caspian Sea basin in the combination of the following characters: flank with a set of mid-lateral elongated, irregular-shaped dark brown blotches, sometimes fused, interrupted by lateral line; dorsum with three or four separated dark-brown roundish to elongated blotches predorsally and postdorsally; a deep and marked suborbital groove and many small unculi on rays of pectoral and dorsal-fin in male; small eye diameter (9.6-13.7 %HL); a short dorsal-fin base (10.1-13.3 %SL); 3-4 lateral and 3 central pores in supratemporal canal; deep body and caudal peduncle (17.3-19.4 and 10.2-11.4 %SL, respectively) and slightly emarginated caudal fin.

**Keywords:** Freshwater fish, Taxonomy, Morphology, Loach.

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## Introduction

The family Nemacheilidae are small fishes inhabiting fresh waters of Asia, Europe, and northeast Africa (Nelson et al. 2016; Coad 2018). They inhabit a variety of water bodies from turbulent mountain streams to salty rivers in dry lowlands (Kottelat & Freyhof 2007; Mafakheri et al. 2016; Sungur et al. 2017). This family has about 48 genera and more than 661 species (Freyhof et al. 2015; Nelson et al. 2016), with more expected to be described (Geiger et al. 2014; Freyhof & Geiger 2017). The nemacheilid family has 39 reported species from Turkey, belonging to six genera, *Barbatula*, *Oxynoemacheilus*, *Paracobitis*, *Schistura*, *Seminemacheilus* and *Turcinoemacheilus* (Çiçek et al. 2015; Kaya et al. 2016; Freyhof et al. 2017; Sungur et al. 2017).

The taxonomic status of the nemacheilid loaches is still complicated (Prokofiev 2009, 2010; Sayyadzadeh et al. 2016, 2017), especially in the Middle East because of the difficulties in the diagnosis of the genera and the high number of poorly diagnosed species described from this area (Freyhof et al. 2011; Sayyadzadeh et al. 2016). This issue is the main obstacle in the study of nemacheilid of the Kura-Aras river drainage, the longest river of the southern Caspian Sea. The Kura-Aras river system is mostly inhabited by species of the Caspian Sea basin and has a number of endemic species such as several species of loaches belonging to the genus *Oxynoemacheilus*. The taxonomic status of the members of this genus in the Kura-Aras river system is complex and require further study.

Several species and subspecies have been reported

from the Kura-Aras river system, including *Oxynoemacheilus angorae* (Steindachner, 1897), *N. angorae alasanicus* Elanidze, 1983, *O. araxensis* (Banareescu & Nalbant, 1978), *Nemacheilus bergi* Gratsianov, 1907, *O. bergianus* (Derzhavin, 1934) *O. brandti* (Kessler, 1877), *N. brandti gibbusnazus* Elanidze 1983, *O. cyri* (Berg, 1910) and *O. lenkoranensis* (Abdurakhamanov, 1962). Prokofiev (2009) considered *N. bergi* and *N. a. alasanicus* as synonyms of *O. angorae*, and *N. b. gibbusnazus* as a subspecies of *O. brandtii* (Kottelat 2012; Coad 2018). However, *O. angorae* (Steindachner, 1897) is restricted to Western and Central Anatolian Black Sea basin, Turkey (Freyhof et al. 2011; Coad 2018; Çiçek et al. 2015; Coad 2018). In addition, Freyhof et al. (2011) pointed out that *N. bergi* and *N. a. alasanicus* may be synonyms of *O. araxensis* or *O. lenkoranensis* although *N. bergi* is an earlier name and *N. b. gibbusnazus* a synonym of *O. brandtii* as both occur in the same drainage. Based on the examination of the specimens from their type localities, we do agree with Prokofiev (2009), Freyhof et al. (2011), Kottelat (2012), and Coad (2018) by accepting *N. b. gibbusnazus* as junior synonym of *O. brandtii*, and *O. bergi* as the priority name for *O. lenkoranensis* and *N. a. alasanicus*.

In addition to *O. brandtii*, *O. bergi*, *O. bergianus* and *O. cyri* as confirmed nemacheilid loaches of the Kura-Aras river drainage, *O. araxensis* (Banareescu & Nalbant, 1978) is described from the Aras River of Turkey as *Orthrias angorae araxensis* (Coad, 2018). Nalbant & Bianco (1998), Fricke et al. (2007) and Freyhof et al. (2010) elevated this taxon to a species. The holotype of *O. araxensis* (ZMH 4827) along with 5 paratypes (ZMH 4826) are from the Kandili Karassu River and 4 paratypes (ZMH 5951) are from the Aras River, Turkey (Wilkins & Dohse 1993). However the Kandili locality is in the upper parts of the Karasu River, Euphrates-Tigris river system and therefore it is mistakenly reported from the Kura-Aras basin (Erkakan & Kuru 1986; Kottelat 2012). Hence, we compare the specimens of *O. araxensis* from the Karasu (Euphrates-Tigris river system) and

Aras (Kura-Aras river drainage) rivers and based on differences found between them, we describe those specimens of previously assigned as *O. araxensis* from Aras River, eastern Turkey as a new species.

### Materials and Methods

The fishes were sampled from the Bozkus River, Kura-Aras river drainage, Kars Province, Turkey by an electrofishing device. After anesthesia using MS222, they were fixed in 5% buffered formaldehyde and then stored in 70% ethanol after 48 hours. Measurements were made using a digital caliper to a precision of 0.1mm. Methods for counts and measurements of morphological characters, and terminology of the pigmentation pattern follow Kottelat & Freyhof (2007). Based on Kottelat & Freyhof (2007), the last two branched rays articulating on a single pterygiophore bone in the dorsal and anal fins were considered as "1½". The data are presented as standard and head lengths.

**Abbreviations used.** SL, standard length, HL, lateral head length, NHVUIC, Nevşehir Hacı Bektaş Veli University Ichthyology Collection, Nevşehir.

### Results

*Oxynoemacheilus veyseli* new species

(Figs. 1-5, Table 1)

**Holotype:** NHVUIC 14004-h, 97.7mm SL; Turkey: Kars prov.: Bozkuş River a tributary of the Aras River at Kars, 40°37'03.7"N 42°47'04.9"E. Çiçek, 06 August 2014.

**Paratypes:** NHVUIC 14005, 14, 63.3-98.7mm SL; data same as holotype.

**Diagnosis:** *Oxynoemacheilus veyseli* is distinguished from *O. bergianus* by having a longer outer rostral barbel reaching the vertical from the anterior edge of the eye (vs. a short outer rostral barbel reaching the vertical from the anterior nostril opening), a deep and marked suborbital groove (vs. a shallow suborbital groove) in the male, flank with a set of mid-lateral elongated, irregular-shaped dark brown blotches, sometimes fused, interrupted by the lateral line (vs. a series of irregular brown blotches on above and



**Fig.1.** (A) Live specimens of *Oxynoemacheilus veyseli* n. sp., uncatalogued, Turkey: Kars prov.: Bozkuş River, Aras River drainage, and (B) *Oxynoemacheilus araxensis* NHVUIC 17006-1, 52.9mm SL, Turkey: Erzurum prov.: Karasu River at Kandilli, Euphrates-Tigris river system.



**Fig.2.** *Oxynoemacheilus veyseli* n. sp., holotype; NHVUIC 14005-H, 97.7mm SL; Turkey: Kars prov.: Bozkuş River, Caspian Sea basin.

**Table 1.** Morphometric data of *Oxynoemacheilus veyseli* n. sp. from Bozkuş River, Caspian Sea basin (holotype, NHVUIC 14005-h; paratypes, NHVUIC 14005-14).

	Holotype	min	max	mean	±SD
Standard length (mm)	97.7	63.3	98.7	86.5	10.51
<b>In percent of SL</b>					
Body depth maximal	17.9	17.3	19.4	18.1	0.58
Caudal peduncle depth	10.5	10.2	11.4	10.7	0.43
Predorsal length	49.2	48.0	51.0	49.6	0.79
Postdorsal length	40.4	36.5	43.3	39.2	1.74
Prepelvic length	49.8	48.8	55.0	51.7	1.65
Preanal length	69.9	69.4	75.8	72.7	1.91
Caudal peduncle length	21.3	18.2	21.7	20.4	0.84
Dorsal-fin base length	12.1	10.1	13.3	12.1	0.84
Dorsal-fin depth	19.7	15.4	20.3	18.8	1.19
Anal-fin base length	7.7	5.7	7.7	6.7	0.55
Anal-fin depth	17.0	15.0	17.3	16.2	0.77
Pectoral fin length	23.4	18.8	25.2	22.0	2.03
Pelvic fin-length	16.0	14.1	16.8	15.6	0.67
Pectoral – pelvic-fin origin distance	28.4	26.6	32.5	30.4	1.64
Pelvic – anal fin origin distance	21.2	21.0	24.6	22.4	0.99
Caudal-fin length	18.4	13.3	20.0	18.3	1.69
Body width	14.0	13.0	16.7	14.7	1.10
maximum Caudal peduncle width	8.3	6.8	8.5	7.7	0.46
minimum Caudal peduncle width	2.4	2.3	3.6	2.8	0.39
Head length	21.2	20.5	23.1	22.1	0.78
<b>In percent of HL</b>					
Snout length	40.3	36.7	44.5	40.3	2.22
Eye horizontal diameter	11.3	9.6	13.7	12.5	1.12
Postorbital distance	47.8	36.9	49.1	44.6	2.91
Head depth at nape	55.8	45.0	61.9	56.6	3.94
Head width	66.9	58.2	72.7	66.6	3.46
Inter Orbital	29.1	25.0	31.1	27.5	1.79
Inter nasal	27.4	22.5	28.5	25.1	1.59
Mouth width	23.9	18.8	28.6	23.5	2.47
Inner rostral barbel	27.1	20.1	27.0	22.0	1.93
Outer rostral barbel	32.8	20.8	33.4	29.1	3.40
Maxillary barbel	35.0	27.8	37.8	32.7	2.74

below the lateral line, usually connected saddles forming bars), dorsum with three or four separated dark-brown roundish blotches predorsally and postdorsally (vs. irregular molted dark grey to brown blotches predorsally and 3-5 brown saddles

postdorsally), shorter dorsal-fin base (10.1-13.3 vs. 13.6-17.4 %SL), deeper and wider caudal peduncle (10.2-11.4 and 2.3-3.6 vs. 7.1-9.3 and 1.7-2.1, respectively %SL), and slightly emarginated (vs. deeply emarginated) caudal fin.



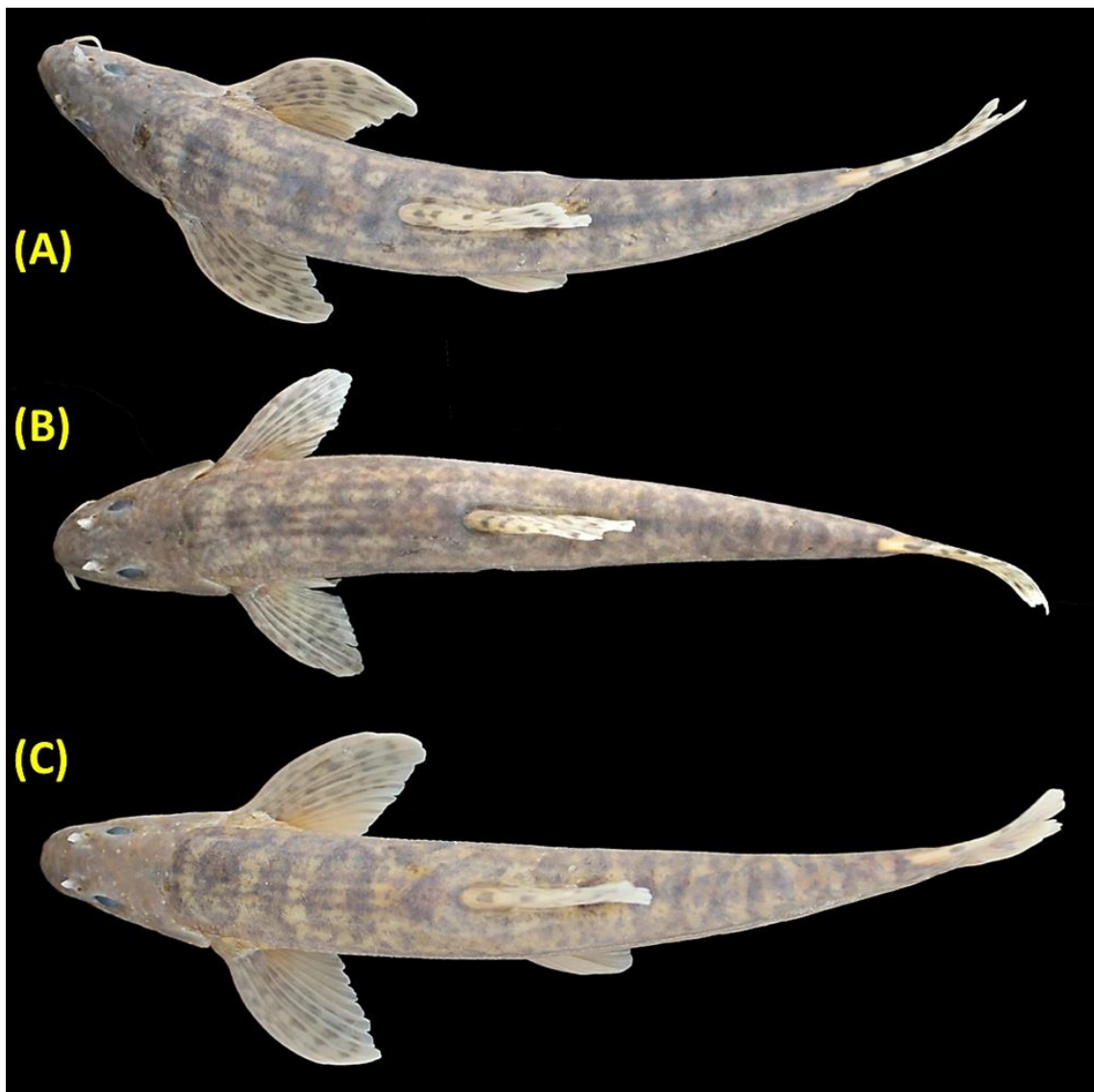
**Fig.3.** *Oxynoemacheilus veyseli* n. sp., paratypes; Turkey: Kars prov.: Bozkuş River, Caspian Sea basin. (A) NHVUIC 14005-4, 98.7mm SL; (B) NHVUIC 14005-5, 93.5mm SL; (C) NHVUIC 14005-11, 88.2mm SL.

*Oxynoemacheilus veyseli* is distinguished from *O. brandti* by having the flank with a set of mid-lateral elongated, irregular-shaped dark brown blotches, sometimes fused, interrupted by the lateral line (vs. flank with separated dark-brown bars anteriorly, and fused posteriorly on the caudal peduncle forming a mottled pattern), dorsum with three or four separated dark-brown roundish to elongated blotches predorsally and postdorsally (vs. dorsum with elongated blotches fused completely or incompletely with the flank bars), shorter pelvic fin (14.1-16.8 vs. 17.0-18.1 %SL), deeper caudal peduncle (10.2-11.4 vs. 7.2-8.7 %SL), and slightly emarginated (vs. deeply emarginated) caudal fin.

*Oxynoemacheilus veyseli* is distinguished from *O. bergi* by having a flank with a set of mid-lateral elongated, irregular-shaped dark brown blotches, sometimes fused, interrupted by the lateral line (vs.

flank with separated or fused dark-brown elongated blotches anteriorly and wide dark-brown bars posteriorly, interrupted by the lateral line), dorsum behind dorsal-fin with three or four separated dark-brown elongated blotches (vs. postdorsal blotches fuse completely or incompletely with the lateral flank bars), shorter postdorsal (36.5-43.3 vs. 43.6-52.0 %SL), shorter dorsal-fin base (10.1-13.3 vs. 14.3-17.3 % SL), longer pelvic- anal-fin distance (21.0 - 24.6 vs. 17.0-21.0 %SL), lower width of body (6.8-8.5 vs. 12.5-15.8 %SL), deeper caudal peduncle (10.2-11.4 vs. 7.9-9.7 %SL), and slightly emarginated (vs. deeply emarginated) caudal fin.

*Oxynoemacheilus veyseli* is distinguished from *O. cyri* by having a flank with a set of mid-lateral elongated, irregular-shaped dark brown blotches, sometimes fused, interrupted by the lateral line (vs. flank with 12-17 dark-brown bars rarely interrupted



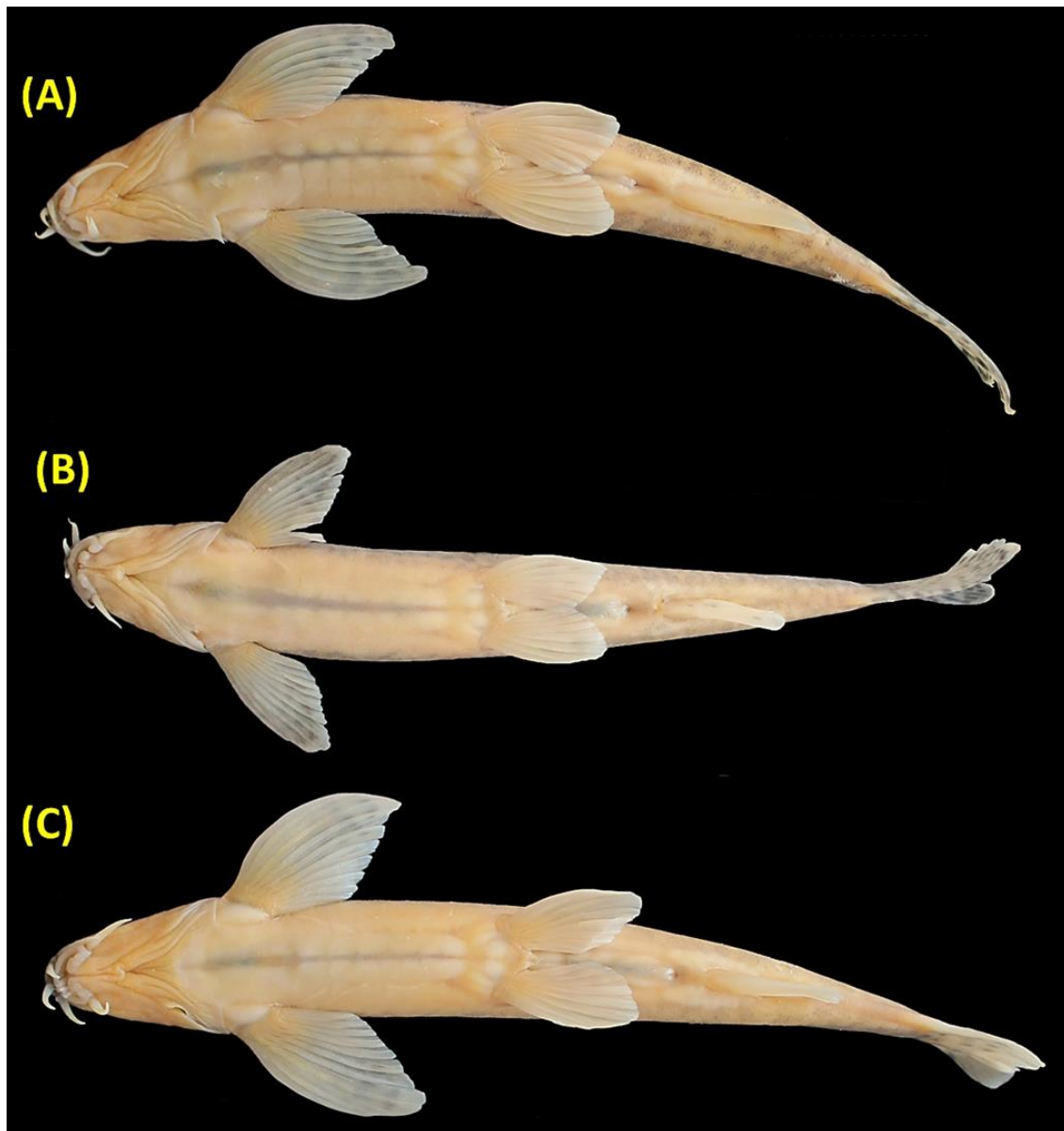
**Fig.4.** *Oxynoemacheilus veyseli* n. sp., paratypes; Turkey: Kars prov.: Bozkuş River, Caspian Sea basin. (A) NHVUIC 14005-4, 98.7mm SL; (B) NHVUIC 14005-5, 93.5mm SL; (C) NHVUIC 14005-11, 88.2mm SL.

by the lateral line), a deep and marked suborbital groove in the male (vs. absent), a thinner body (13.0-16.7 vs. 16.8-19.5 %SL), lower caudal peduncle depth (10.2-11.4 vs. 11.7-14.7 %SL), longer caudal peduncle (18.2-21.7 vs. 15.7-18.0 %SL), and slightly emarginated (vs. truncate) caudal fin.

*Oxynoemacheilus veyseli* is distinguished from *O. araxensis* by having a flank with a set of irregular-shaped dark brown blotches, sometimes fused (vs. flank with small to medium mid-lateral black blotches along with small mottles from the pectoral fin origin to the caudal fin base), smaller eye diameter (9.6-13.7 vs. 14.0-17.3 %HL), longer Inner rostral

barbel (20.1-27.0 vs. 18.9-19.4 %HL), deeper body (17.3-19.4 vs. 14.4-16.1 %SL), shorter pectoral-pelvic-fin distance (21.0-24.6 vs. 28.9-31.0 %SL), and lower minimum caudal peduncle width (2.3-3.6 vs. 3.6-4.2 %SL).

**Description:** Morphometric data are given in Table 1 and general appearance are illustrated in Figures 1-5. Large sized and stout species with a narrow blunt head. Dorsal profile convex predorsally. Body deepest at dorsal-fin base decreasing towards caudal-fin base. A hump at occipital region. Widest section of body at pectoral-fin origin. A deep suborbital groove in male. Head flattened ventrally. Caudal



**Fig.5.** *Oxynoemacheilus veyseli* n. sp., paratypes; Turkey: Kars prov.: Bozkuş River, Caspian Sea basin. (A) NHVUIC 14005-4, 98.7mm SL; (B) NHVUIC 14005-5, 93.5mm SL; (C) NHVUIC 14005-11, 88.2mm SL.

peduncle compressed laterally, 1.3-1.6 (mean 1.4) times longer than deep. Pectoral fin reaching approximately 65-90% of distance from pectoral-fin origin to pelvic-fin origin and its margin convex with a small axillary lobe at its base. Pelvic-fin origin below second or third rays of dorsal-fin, reaching or not reaching to anus. Anal fin origin front middle between dorsal-fin insertion and caudal-fin origin. Short dorsal adipose crest on caudal peduncle. Margin of the dorsal and anal fins straight. Caudal fin slightly emarginated.

Body covered with minute scales. Lateral line complete, reaching to caudal fin origin. Long outer rostral barbel reaching to middle of maxillary barbel or vertical from the anterior edge of eye, inner one reaching to anterior base of maxillary barbel, and maxillary one reaching or passing posterior margin of eye. Dorsal fin with 3 unbranched and 7-8½ branched rays. Anal fin with 2 unbranched (3 in one specimen) and 5½ branched rays. Pectoral fin with 1 unbranched and 10-12 branched and pelvic fin with 2 unbranched and 7 branched rays. Three or four



**Fig.6.** Secondary sexual dimorphism characteristics in the matured males (a) uncini on rays of dorsal-fin, and (b) suborbital groove.



**Fig.7.** Type locality of *Oxynoemacheilus veyseli* n. sp., Turkey: Kars prov.: Bozkuş River, near Kars city, Caspian Sea basin.

lateral and three central pores in supratemporal canal. Anterior nostril opening at end of a low, pointed and flap-like tube. Mouth arched. Lower lip thick with a deep median interruption and some marked furrows in lower lip, upper lip with a small inception (not marked in some individuals). Caudal fin with 8+9 or 9+9 rays. Longest known specimen 116.8mm SL.

**Coloration:** Body yellowish in life and freshly preserved individuals. Head dark-brown dorsally,

without color pattern ventrally, and cheeks with irregular dark-brown spots, sometimes fused or mottled. No pigmentation pattern from tip of snout to anus ventrally. Dorsum with three or four separated dark-brown roundish to elongated blotches predorsally and postdorsally. Flank mottled with a set of mid-lateral elongated irregular shaped dark-brown blotches, sometimes fused horizontally, interrupted by lateral line and mottled in some specimens.



Anterodorsal part of flank, above lateral line, forming a marbled brown pattern. Unbranched dorsal-fin rays with a black blotch at base. Dorsal fin with two or three dark-brown bands on rays, caudal fin with four to five bands on rays, in some individuals with one or two obvious bands and rest as tessellated pattern. Anal and pelvic fins hyaline without color pattern. Pectoral fin with small separated, fused or elongated spots on rays.

**Sexual dimorphism:** Males with longer pectoral fin, covered with many small unculi on dorsal surface of their rays as well as on rays of dorsal-fin. A deep suborbital groove in males. Many tiny unculi in front of eyes just above suborbital groove of males, absent in females (Fig. 6).

**Distribution and habitat:** *Oxynoemacheilus veyseli* sp. n. is known from the upper parts of the Aras River in Turkey. Type specimens were collected from a slow flowing creek with stony and sandy substrate. During the sampling, stream width and depth, water temperature and current were 2.5m, 17.0cm, 16°C and 0.6m/s, respectively (Fig. 7).

**Etymology:** The new species is named in honor of Veysel Cicek who are father and son of the first author.

**Comparative material:** *Oxynoemacheilus bergianus*: IMNRF 1032, 7, 36.5-61.0mm SL, Iran: Guilan Prov.: Tutkabon River near Rostam-Abad, Sefid river drainage, Caspian Sea basin, 36°50'53"N 49°36'3"E, 20 June 2014, S. Eagderi. — IMNRF-UT-1040, 4, 37.0-45.0mm SL, Iran: Guilan prov.: Sefid River near Gisum town, Caspian Sea basin, 37°14'00.0"N 49°51'00.0"E, 20 June 2014, S. Eagderi.

*Oxynoemacheilus brandti*: NHVUIC 17004, 5, 46.2-66.4mm SL, Turkey: Ardahan Prov.: Kura River, 40°50'32"N 42°48'57.2"E & 41°06'06.1"N 042°39'38.0"E, 2 August 2017, E. Çiçek.

*Oxynoemacheilus cyri*: NHVUIC 17005, 15, 40.5-73.7mm SL, Turkey: Ardahan Prov.: Kura River, 40°50'32"N 42°48'57.2"E. 1 August 2017, E. Çiçek.

*Oxynoemacheilus araxensis*: NHVUIC 17006, 4,

52.9-61.4mm SL, Turkey: Erzurum Prov.: Karasu River at Kandili, Euphrates-Tigris river system, 39°55'01"N 40°40'21"E. 1 August 2017, E. Çiçek.

*Oxynoemacheilus bergi*: IMNRF-1030-2, 20, 51.3-73.2mm SL, Azerbaijan: Kura River, 41°14'25"N 45°25'57"E.

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## مقاله پژوهشی

***Oxynoemacheilus veyseli***, یک گونه جدید سگ ماهی جویباری از بالادست حوضه رودخانه ارس  
ترکیه (ماهیان استخوانی عالی: سگ ماهیان جویباری)اردوغان چیچک<sup>۱\*</sup>، سهیل ایگدری<sup>۲</sup>، سویل سونگر<sup>۳</sup><sup>۱</sup>گروه زیست‌شناسی، دانشکده هنر و علوم، دانشگاه حاجی بکتاش ولی نوشهیر، نوشهیر، ترکیه.<sup>۲</sup>گروه شیلات، دانشکده منابع طبیعی، دانشگاه تهران، کرج، ایران.<sup>۳</sup>مدرسه فنی و حرفه‌ای خدمات بهداشتی، دانشگاه حاجی بکتاش ولی نوشهیر، نوشهیر، ترکیه.

**چکیده:** یک گونه جدید سگ ماهی جویباری *Oxynoemacheilus veyseli* از بالادست حوضه رودخانه ارس در استان کارس ترکیه توصیف می‌شود. این گونه از هم‌تابان خود در حوضه آبریز دریای خزر براساس ترکیبی از صفات زیر متمایز می‌گردد: یک سری خال‌های کشیده با شکل نامنظم به رنگ قهوه‌ای تیره در میانه پهلوها که گاهی به هم چسبیده بوده و توسط خط جانبی قطع می‌شوند، ناحیه پشتی بدن با ۳-۴ خال گرد تا کشیده به رنگ قهوه‌ای تیره جدا و گاهی چسبیده به هم در جلو و عقب باله پشتی، یک شیار کاملاً مشخص و عمیق و برجستگی‌های ریز بسیار زیاد بر روی شعاع‌های باله‌های سینه‌ای و پشتی در جنس نر، قطر چشم کوچک (۱۳/۷-۹/۶ درصد طول سر)، قاعده باله پشتی کوتاه (۱۰/۱-۱۳/۳ درصد طول استاندارد)، به ترتیب ۳-۴ و ۳ منفذ جانبی و مرکزی در کانال سوپراتمپورال، بدن و ساقه دم عمیق (به ترتیب ۱۷/۳-۱۹/۴ و ۱۰/۲-۱۱/۴ درصد طول استاندارد) و باله دم اندکی فرورفته.

**کلمات کلیدی:** ماهی آب شیرین، آرایه‌شناسی، ریخت‌شناسی، سگ ماهی جویباری.