

## Research Article

# *Oxynoemacheilus ciceki*, new nemacheilid species (Teleostei, Nemacheilidae) from the Sultan Marsh, Kayseri Province, Turkey

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**Abstract:** A new species of nemacheilid fish, *Oxynoemacheilus ciceki* sp. n. is described from the Sultan Marsh, Kayseri Province, Turkey. The species differs from its congeners in the combination of the following characters: flank yellowish brown or pale gray with irregular spot; cheeks with numerous tiny spots; lacking scale; thinner caudal peduncle; complete lateral line; 4 central and 4 lateral pores in the supra-temporal canal; lower lip thick with a deep median interruption and marked furrows and small median incision in upper lip.

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

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## Introduction

Stone loaches of the family Nemacheilidae, are small fishes occurring in fresh waters of Asia, Europe, and northeast Africa (Nelson et al. 2016; Coad 2017). Due to small size and low economic value, they are poorly known group of freshwater fishes (Kottelat 2012; Mafakheri et al. 2015a) and their taxonomic status is still complicated (Prokofiev 2009, 2010; Sayyadzadeh et al. 2016, 2017). They inhabit a variety of water bodies from turbulent mountain streams to salty rivers in dry lowlands (Mafakheri et al. 2015a, b, 2016). The family Nemacheilidae 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). They have a great diversity in Turkish inland waters, with about 35 reported species belonging to the six genera, including *Barbatula*, *Oxynoemacheilus*, *Paracobitis*, *Schistura*, *Seminemacheilus*

and *Turcinoemacheilus* (Çiçek et al. 2015).

Stoumboudi et al. (2006) and Prokofiev (2009) placed the most nemacheilid loaches from Eastern Europe and the Middle East in the genus *Oxynoemacheilus* (Freyhof et al. 2011). A recent study on the spatial heterogeneity of freshwater fishes in the Mediterranean revealed that some populations of this genus were not identified as any described species (Geiger et al. 2014). Among them, the population of Sultan Marshes which is an isolated part of Kızılırmak basin, is an unrecognized candidate species. Hence, this study aimed to describe an additional species of the genus *Oxynoemacheilus* collected from the Sultan Marsh, Kayseri Province, Turkey based on differences found.

## Materials and Methods

The specimens were collected by an electrofishing

device. After anaesthesia, fishes were fixed in 5% formaldehyde and stored in 70% ethanol after 48 hours. Measurements follow Kottelat & Freyhof (2007) (Table 1). Standard length (SL) is measured from the tip of the snout to the end of the hypural complex. The length of the caudal peduncle is measured from behind the base of the last anal-fin ray to the end of the hypural complex, at mid-height of the caudal-fin base. The last two branched rays articulating on a single pterygiophore in the dorsal and anal fins are noted as "1½". Measurements were made using a digital caliper to the nearest 0.1 mm.

**Abbreviations used:** SL, standard length; HL, lateral head length; IMNRFI-UT, Ichthyological Museum of Natural Resources Faculty, University of Tehran; NHVUIC, Ichthyology Collections of Nevşehir Hacı Bektaş Veli University, Nevşehir, Turkey.

## Results

### *Oxynoemacheilus ciceki* sp. n.

(Figs. 1-5)

**Holotype:** NHVUIC 2017-03-15-h, 52.3mm SL; Turkey: Kayseri prov.: Sultan Marsh, 38°23'23.53"N 35°21'54.52"E, E. Çiçek, S. Eagderi & S. Sungur Birecikligil, 15 March 2017.

**Paratypes:** NHVUIC 2017-03-16, 15, 41.8-52.0mm SL; data same as holotype.—IMNRF-UT-1036, 5, 48.4-58.3mm SL; data same as holotype.

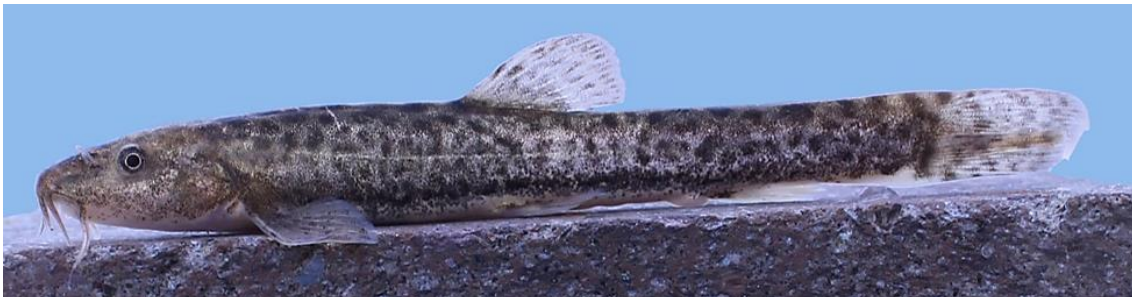
**Diagnosis:** *Oxynoemacheilus ciceki* sp. n. is distinguished from the other species of *Oxynoemacheilus* in the Kızılırmak basin by a combination of characters, none of them unique. *Oxynoemacheilus*

*ciceki* sp. n. is distinguished from *O. angorae* by having flank yellowish brown or pale gray with irregular spots (vs. yellowish with a mid-lateral row of horizontally elongated fused blotches), cheeks with numerous tiny spots (vs. without pigmentation), without scale (vs. scaled), shorter pelvic fin (11.3-13.6 vs. 14.9-17.0 %SL), lower mouth width (16.0-22.0 vs. 20.6-26.7 %HL).

*Oxynoemacheilus ciceki* sp. n. is distinguished from *O. kosswigi* by having flank yellowish brown or pale gray with irregular spots (vs. with irregular vertical elongated blotches, sometimes fused in lateral line), without scale (vs. scaled), without adipose crest (vs. having a short and shallow dorsal and ventral adipose crest), lower caudal peduncle (8.4-10.7 vs. 10.9-14.4 %SL), thinner head (47.3-62.0 vs. 64.0-71.0 %SL), shorter inter-orbital distance (20.2-24.6 vs. 27.0-30.3 %HL), shorter inter-nasal distance (15.4-20.4 vs. 23.7-28.6 %HL).

*Oxynoemacheilus ciceki* sp. n. is distinguished from *O. samanticus* by having flank yellowish brown or pale gray with irregular spots (vs. flank with prominent bars on posterior half of body, particularly behind dorsal-fin origin), without scale (vs. scaled), deeper caudal peduncle (8.4-10.7 vs. 6.6-8.2 %SL), longer post-dorsal distance (39.3-44.5 vs. 32.1-39.0 %SL), shorter pelvic fin (11.3-13.6 vs. 16.2-19.0 %SL), less maximum caudal peduncle width (4.3-6.5 vs. 6.7-7.9 %SL).

**Description:** For general appearance see Figures 1-5; morphometric characters are provided in Table 1. Small sized species with pointed or rounded snout.



**Fig.1.** Uncatalogued live specimen of *Oxynoemacheilus ciceki* sp. n., Turkey: Kayseri prov.: Sultan Marsh.



**Fig.2.** *Oxynoemacheilus ciceki* sp. n., NHVUIC 2017-03-15-h, holotype, 53.2mm SL, Turkey: Kayseri prov.: Sultan Marsh.

Head flattened on ventral surface. Mouth arched. Upper lip with a small median incision and shallow furrows, and lower lip thick with a deep median interruption and marked furrows. Inner rostral barbel reaching (or not reaching) to base of maxillary barbel. Outer one reaching vertical to anterior edge of eye (sometimes pass it), maxillary barbel reaching vertical to the posterior margin of eye (pass it in some specimens). Four central and four lateral pores in the supra-temporal canal. Anterior half of body convex from snout to anterior base of dorsal fin. Widest part of body in the front of dorsal fin origin. Pelvic fin origin below second or third branched rays of dorsal fin, not reaching to anus. Pelvic fin without axillary lobe or with a small axillary lobe in some specimens (n=4). Anal fin origin at the middle distance between insertion of dorsal fin base and caudal fin origin. Margin of dorsal and anal fins straight. Caudal peduncle compressed laterally, 1.1-2.2 (mean 1.9)

times longer than deep. Caudal fin emarginated.

Body without scales and in some parts with tiny unculi. Lateral line complete, reaching to caudal fin. Dorsal fin with 4 unbranched and 7½ branched rays, anal fin with 3 unbranched and 5½ branched rays, pectoral fin with 10-11 branched rays, pelvic fin with 7-8 branched rays and caudal fin with 10+9 or 9+9 rays. Longest known specimen 58.3mm SL.

**Coloration:** Flank yellowish-brown (in specimens fixed in formalin) or pale gray (in live specimens) with irregular spots from posterior part of opercula to anterior base of caudal fin. 3-6 paired rounded saddles usually fused and make ellipsoid shape on back between anterior origin of dorsal fin to nape and 4-7 saddles between insertions of dorsal fin to caudal fin origin. Head yellowish brown or pale gray sometimes with small blotches on top, cheeks with numerous tiny spots. No pigmentation from tip of snout to anus ventrally. Dorsal fin with tessellated

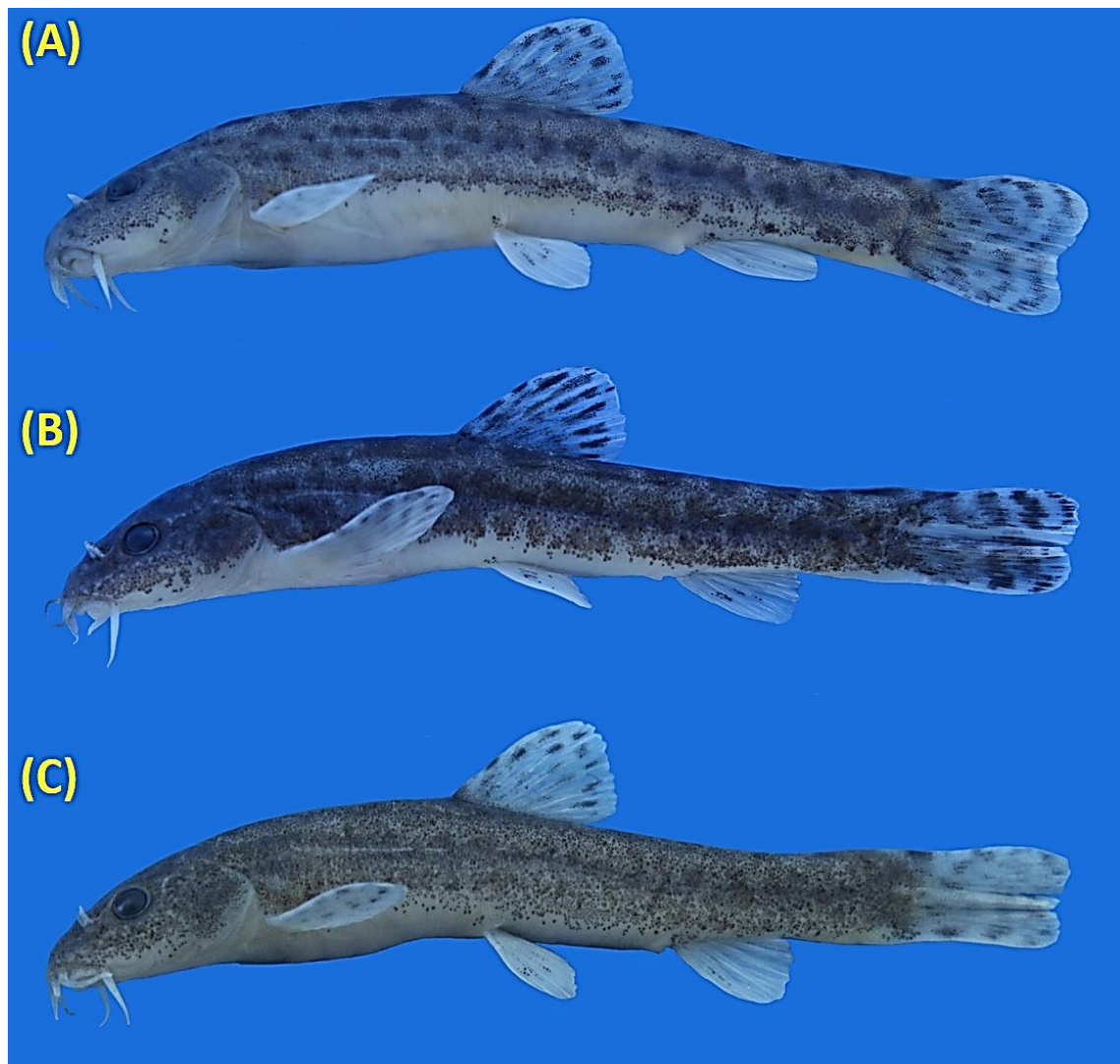
**Table 1.** Morphometric data of *Oxynoemacheilus ciceki*. sp. n. (holotype, NHVUIC 2017-03-15-h; paratypes, NHVUIC 2017-03-16-15, 15 specimens)

	Holotype	Range		Mean	±SD
Standard length (mm)	52.3	41.8	52.0		
<b>In percent of standard length</b>					
Body depth maximal	17.6	13.1	18.9	16.9	1.6
Caudal peduncle depth	10.3	8.4	10.7	9.9	0.6
Predorsal length	50.5	46.6	50.7	49.2	0.9
Postdorsal length	44.4	39.3	44.5	42.5	1.6
Prepelvic length	52.5	48.2	52.6	50.2	1.3
Preanal length	75.3	71.3	75.4	72.7	1.1
Caudal peduncle length	18.8	18.4	21.1	19.1	2.4
Dorsal-fin base length	11.3	9.5	12.3	11.5	1.9
Dorsal-fin depth	18.2	18.2	20.3	19.3	0.6
Anal-fin base length	7.7	6.3	8.3	7.2	0.6
Anal-fin depth	13.0	11.7	15.5	14.1	1.0
Pectoral fin length	16.7	16.5	22.8	19.2	2.2
Pelvic fin-length	12.0	11.3	13.6	12.5	0.6
Pectoral–pelvic-fin origin distance	28.5	24.1	28.5	26.0	1.0
Pelvic–anal fin origin distance	21.7	20.5	25.1	21.9	1.3
Caudal-fin length	16.1	17.3	19.5	18.2	0.6
Body width	14.3	11.5	15.2	13.4	0.9
Caudal peduncle width maximum	5.7	4.3	6.5	5.6	0.6
Caudal peduncle width minimum	2.1	1.4	3.2	2.2	0.4
Head length	24.1	23.5	26.3	24.5	0.8
<b>In percent of Head length</b>					
Snout length	39.1	30.0	41.6	38.0	2.7
Eye horizontal diameter	12.9	12.2	15.9	13.3	2.6
Postorbital distance	48.4	39.0	49.9	45.8	2.7
Head depth at nape	54.2	45.2	61.2	55.2	3.8
Head width	57.9	47.3	62.0	56.6	3.8
Inter Orbital	21.8	20.2	24.6	22.2	1.3
Inter nasal	19.8	15.4	20.4	18.1	1.7
Mouth width	18.7	16.0	22.0	19.3	1.8
Inner rostral barbel	19.1	17.7	21.4	19.5	1.1
Outer rostral barbel	27.9	25.3	33.0	28.2	2.3
Maxillary barbe	30.4	23.3	34.4	28.9	3.0

pattern on rays (3 bands in most specimens, 4 bands in one specimens). Anal fin without pigment or with brown spots on 3 first rays and rarely on others. Caudal fin with 3 or 4 bands on rays. Pectoral fin with dark brown (in males) or pale brown (in some

females) tessellated pattern. Pelvic fin usually with brown pigment on rays and rarely without pigment.

**Etymology:** The new species is named after Prof. Dr. Erdoğan Çiçek, for his valuable contribution to the knowledge of freshwater fishes of Turkey.



**Fig.3.** *Oxynoemacheilus ciceki* sp. n., NHVUIC 2017-03-15-h, holotype, 53.2mm SL, Turkey: Kayseri prov.: Sultan Marsh.

**Distribution:** *Oxynoemacheilus ciceki* sp. n. is known only from the Sultan Marsh, Kayseri Province (Fig. 6). This species mostly found slow-flowing parts of streams in the Sultan Marsh. *Pseudophoxinus elizavetae*, *Aphanius marassantensis*, *Seminemacheilus lendlii* and *Cobitis* sp. co-exist in the type locality with *Oxynoemacheilus ciceki* sp. n.

**Remarks:** Geiger et al. (2014) suggested that species diversity of the genus *Oxynoemacheilus* in Turkey is underestimated and introduced the population of Sultan Marshes as an unrecognized species. Therefore, we compared DNA sequence data (i.e., DNA barcodes viz. COI data) of our collected

specimens from the Sultan Marshes with sequences from NCBI GenBank (KJ553909 and KJ553936) and the results revealed both share the same COI.

**Material examined:** All from Turkey.

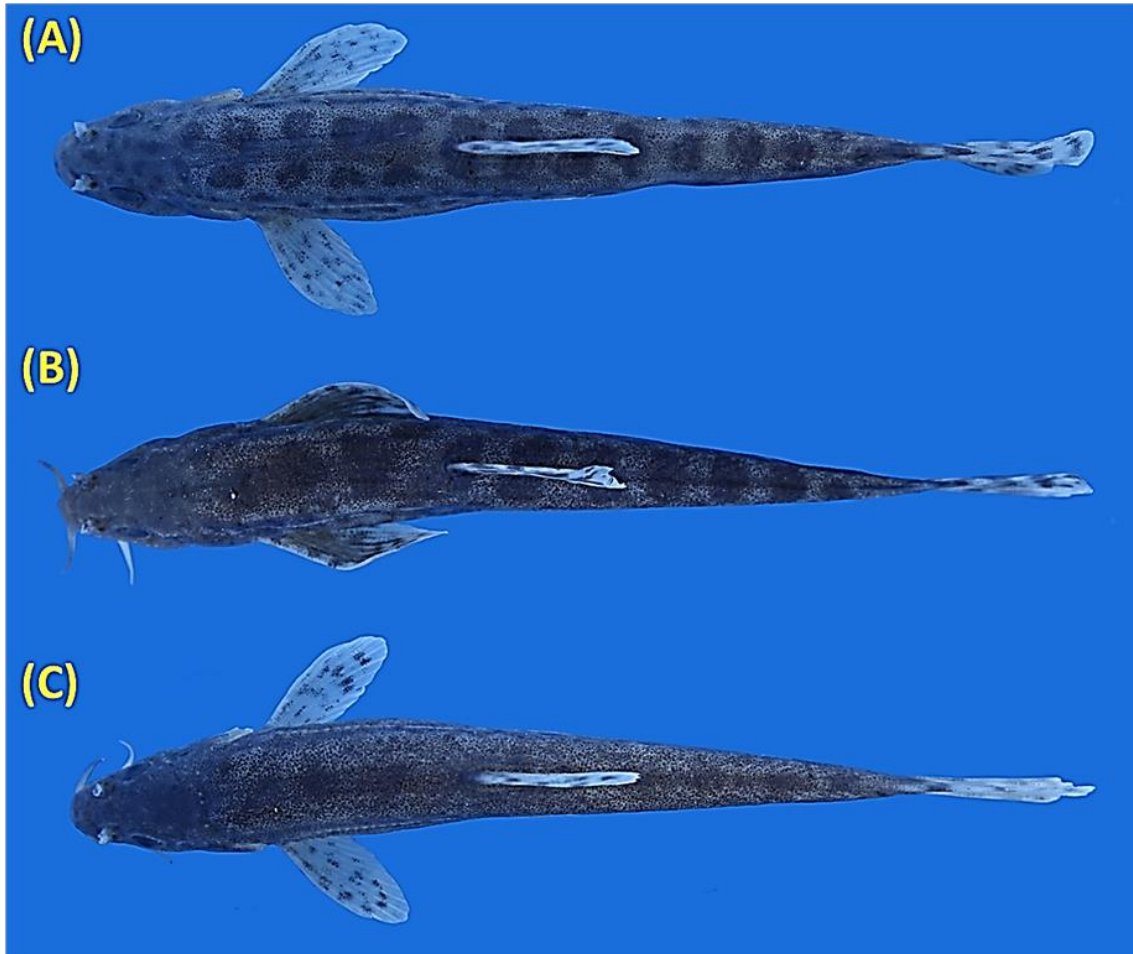
**Comparative materials:** *Oxynoemacheilus samanticus*: NHVUIC 2017-08-7, 15, 50.8-67.8mm SL; Turkey: Kayseri prov.: stream Zamantı at Pınarbaşı, Seyhan drainage, 38°44'10.76"N 36°24'46.43"E.

*Oxynoemacheilus kosswigi*: NHVUIC 2017-08-5, 10, 48.3-73.2mm SL; Turkey: Sivas prov.: stream Yıldız, Kizilirmak basin, 39°47'49.06"N 36°45'58.10"E.

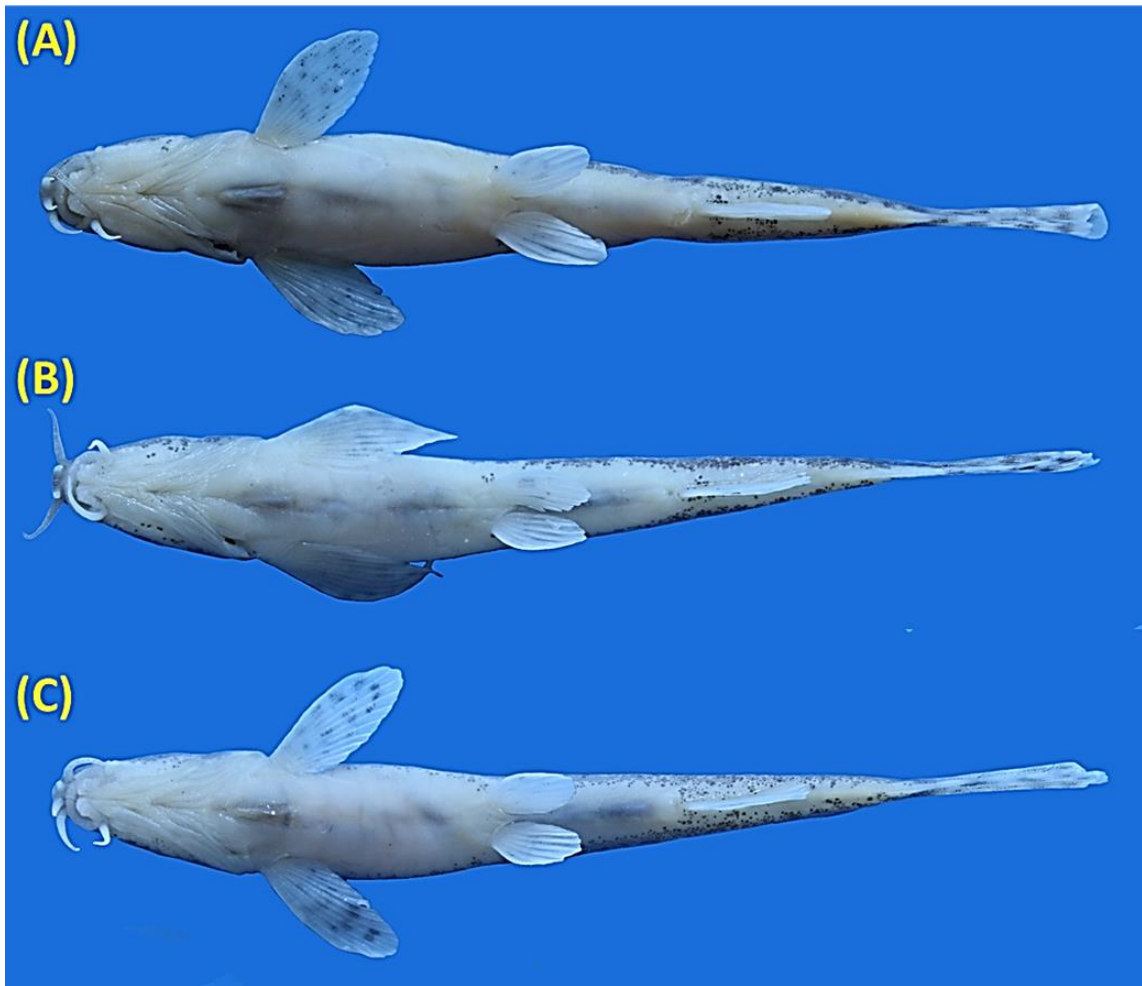
*Oxynoemacheilus angorae*: NHVUIC 2014-06-



1, 14, 39.2-61.9mm SL, Turkey: Nevsehir prov.:  
Kizilirmak River, Kizilirmak basin, 38°37'45.27"N  
34°17'54.47"E.



**Fig.4.** *Oxynoemacheilus ciceki* sp. n., paratypes; Turkey: Kayseri prov.: Sultan Marsh; (A) NHVUIC 2017-03-16-3, 51.4mm SL; (B) NHVUIC 2017-03-16-10, 47.7mm SL; (C) NHVUIC 2017-03-16-12, 42.5mm SL.



**Fig.5.** *Oxynoemacheilus ciceki* sp. n., paratypes; Turkey: Kayseri prov.: Sultan Marsh; (A) NHVUIC 2017-03-16-3, 51.4mm SL; (B) NHVUIC 2017-03-16-10, 47.7mm SL; (C) NHVUIC 2017-03-16-12, 42.5mm SL.



**Fig.6.** Turkey: Kayseri prov.: Sultan Marsh; type locality of *Oxynoemacheilus ciceki* sp. n.

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## مقاله پژوهشی

# معرفی گونه جدید *Oxynoemacheilus ciceki* (Teleostei, Nemacheilidae) از مرداب سلطان، استان کایسری، ترکیه

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**چکیده:** یک گونه جدید از خانواده لوچ ماهیان، *Oxynoemacheilus ciceki* از مرداب سلطان واقع در استان کایسری ترکیه معرفی شد. این گونه از سایر گونه‌های هم جنس پیرامونی خود به واسطه داشتن صفات زیر قابل شناسایی است: پهلوها به رنگ قهوه‌ای مایل به زرد یا خاکستری روشن به همراه لکه‌های کوچک و نامنظم، گونه دارای لکه‌های ریز، فاقد فلس، ساقه‌دمی باریک‌تر، ساقه دمی فشرده از طرفین، خط جانبی کامل، کانال فوق گیجگاهی با چهار منفذ مرکزی و چهار مرکز جانبی، ضخیم بودن لب پایین به همراه یک انقطاع در بخش میانی، وجود یک شکاف میانی و شیارهای کاملاً مشخص در لب بالا.

**کلمات کلیدی:** ماهیان آب شیرین، آرایه‌شناسی، ریخت‌شناسی، لوچ.