

Two New *Oxynoemacheilus* (Teleostei: Nemacheilidae) Species from Western Turkey

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Abstract: In this study, *Oxynoemacheilus mesudae* from Kufu stream, Buyuk Menderes river, Dinar and *Oxynoemacheilus atili* Eflatun Pinari, Beysehir Lake Basin were described. These two new species are distinguished from the other members of *Oxynoemacheilus* by the shape of swim bladder bony capsule, colour pattern and some morphometric characteristics.

Key words: *Oxynoemacheilus mesudae*, *Oxynoemacheilus atili*, new species, swim bladder, bony capsule, Western Turkey

INTRODUCTION

According to the last study about Western palaeartic loach genus *Oxynoemacheilus*, 41 species are recognized as valid. Of these, 30 species are living in Anatolia. In this study, two additional new species from Western Turkey were described. Also, molecular studies with cytochrome *b* and *R4G* genes of collected specimens supported this study.

MATERIALS AND METHODS

Specimens were collected from Buyuk Menderes river Basin, Dinar, Civril and Eflatun pinari (Beysehir Lake Basin) by electro-fishing equipment, respectively in June, 2007 and 2010 and preserved 5% solution of formaldehyde. Eighteen morphometric, 5 meristic characteristics were measured by following Banarescu and Nalbant (1964) and Erk'akan *et al.* (2007, 2008). Specimens are deposited in HUIC; Hacettepe University, Ichthyological collection.

Comperative material

Oxynoemacheilus anatolicus: HUIC: AKD, 15 specimens, 38-52 mm SL; Southwest Turkey: Burdur, Ynput of Karamanli Dam Lake; 37°24'34.33''N 29°49'54.94''E; F. Erk'akan.

Oxynoemacheilus cinicus: HUIC: BM-3, 23 specimens, 25-59 mm SL; Turkey: Denizli, Cin Stream; 37°40'41.07''N 29°30'13.08''E; F. Erk'akan.

Oxynoemacheilus germencicus: HUIC: BM-1, 8 specimens, 40-63 mm SL; Turkey: Aydyn, Germencik 15th km; 37°38'N 27°28' E; F. Erk'akan.

Oxynoemacheilus simavicus: HUIC: KM-1, 55 specimens, 27-37 mm SL; Turkey: Aydyn, Odemis; 38°39'N 27°28'E; F. Erk'akan.

Oxynoemacheilus theophilii: HUIC: KE-1, 17 specimens, 32-54 mm SL; Turkey: Bergama, Kozak (Madra) Creek, 39°40'N, 27°28'E; F. Erk'akan.

Oxynoemacheilus mediterraneus: HUIC: AKD-2a, 8 specimens, 53-67 mm SL; Turkey: Eoirdir, Candyr, Aksu Stream, 37°38'N 30°31'E; F. Erk'akan. HUIC: AKD-3, 27 specimens, 49-58 mm SL; Turkey: Madenli-Aksu Stream, Eoirdir; F. Erk'akan.

Oxynoemacheilus phoxinoides: HUIC: 712, 10 specimens, 32-52 mm SL; Turkey: Yznik; 40°41'N 29°30'E; S.C. Ozeren.

Oxynoemacheilus angorae: HUIC: SA-19, 50 specimens, 34-63 mm SL; Turkey: Gicik Village, 40°04'K 32°52'D Ankara; F. Erk'akan.

Oxynoemacheilus eregliensis: HUIC (uncataloged): 26 specimens, 25-61 mm SL. Turkey: Ybrala stream, Yesildere, Karaman; 37°12'279''N 33°24' 173''E; F. Erk'akan.

Oxynoemacheilus banarescui: HUIC: BK-5, 18 specimens, 25-53 mm SL, Turkey: Devrek stream, Devrek; 41°11' 0842''K 31°55' 5605''D; F. Erk'akan.

Oxynoemacheilus kosswigi: HUIC: KI- 8, 23 specimens, 38-83 mm SL, Turkey: Yildiz stream, Kizilirmak., Yildizeli-Sivas; 39°52' 2441''K 36°48' 5418'' D; F. Erk'akan.

RESULTS AND DISCUSSION

***Oxynoemacheilus mesudae* n sp.**

Holotype: About 60.8 mm SL, Buyuk Menderes river, Dinar, Civril, 38° 07' 366''N 30° 05' 723''E leg. F. Erk'akan and F. Ozdemir, coll F. Erk'akan (June *et al.*, 2007).

Paratypes: HUIC, 15 specimens, 54.49-71.73 mm SL.

Diagnosis: *Oxynoemacheilus mesudae* is an angorae group species and distinguished from all other angorae group species of *Oxynoemacheilus* in Turkey by its shape of bony capsule of swim bladder, colour pattern and some body ratios.

Description: General appearance of *O. mesudae* is shown in Fig. 1. Morphometric data of holotype (HUIC, uncataloged specimen) and 15 paratypes (HUIC, uncataloged specimens) are shown in Table 1. Body elongated and moderately stout. Body depth 5.8-7.2 times in the standard length. Lateral line complete. Head pointed.

Head depth is 1.96-2.08 times in head length. Eyes are upper position and 5.6-6.8 times in head length. Anterior nare prolonged in a short tube, posterior nasal opening oval. Mouth arched and lips and barbels are papillated, lips furrowed, lower lip has small incision (Fig. 2c) and upper lip with a median notch. Proessus dentiformis weakly to medium developed. Pectorals are papillated and longer in males. Dorsal fin with 3 simple and 7^{1/2} branched rays, anal fin with two simple and 5^{1/2}, 6 branched rays. Upper margin of dorsal fin strait but anal fin convex. Dorsal fin length is greater than its base

length. Pectoral fin with 11 rays. Pelvic axillary lobe present and pelvic fin with 8 rays and reaching midway to anal fin origin but in some samples reaching anus. Caudal fin with 8 + 8 branched principal rays and slightly forked, lobes rounded. There are low and short dorsal and ventral adipose crests on posterior part of caudal peduncle. Body covered with scales with small excentric focal zone. The shape of digestive track and bony swim-bladder capsule are shown in Fig 2a, b.

Sexual dimorfizm: Suborbital flap is present in males and pectoral fins are more longer in males than females.

Colouration: In fresh material, dorsal posterior part of the body with regular big black spots. Black line extending in

Table 1: Morphometric characteristics of *O. mesudae* n sp.

| Morphometric characters | <i>O. mesudae</i> (n = 16) | | | |
|-------------------------------|----------------------------|-------|-------|------|
| | Min. | Max. | Ort | SD |
| Standart length (mm) | 54.49 | 71.73 | | |
| SL (%) | | | | |
| Head length | 22.48 | 25.71 | 24.16 | 0.90 |
| Pre-dorsal length | 48.31 | 51.01 | 49.42 | 0.93 |
| Pre-pelvic length | 49.16 | 52.29 | 50.88 | 0.90 |
| Pre-anal length | 69.78 | 72.86 | 71.38 | 0.87 |
| Body width | 10.08 | 13.44 | 11.08 | 0.83 |
| Body depth | 14.23 | 16.97 | 15.38 | 0.84 |
| Caudal peduncle depth | 08.51 | 10.79 | 09.66 | 0.67 |
| Caudal peduncle length | 15.05 | 17.44 | 16.28 | 0.89 |
| Dorsal fin base length | 10.63 | 13.94 | 12.16 | 0.94 |
| Dorsal fin last simple length | 14.39 | 17.11 | 15.86 | 0.84 |
| Anal fin depth | 13.96 | 17.83 | 15.79 | 0.93 |
| Pelvic fin length | 14.25 | 17.09 | 15.82 | 0.93 |
| Pectoral fin length | 18.13 | 20.79 | 19.16 | 0.86 |
| Head length (%) | | | | |
| Head depth | 48.04 | 50.79 | 49.45 | 0.91 |
| Eye diameter | 14.70 | 17.75 | 16.41 | 0.88 |
| Snouth length | 38.23 | 40.88 | 39.30 | 0.90 |
| Interorbital length | 23.14 | 26.66 | 24.81 | 0.93 |



Fig. 1: General appearance of *O. mesudae* n sp.

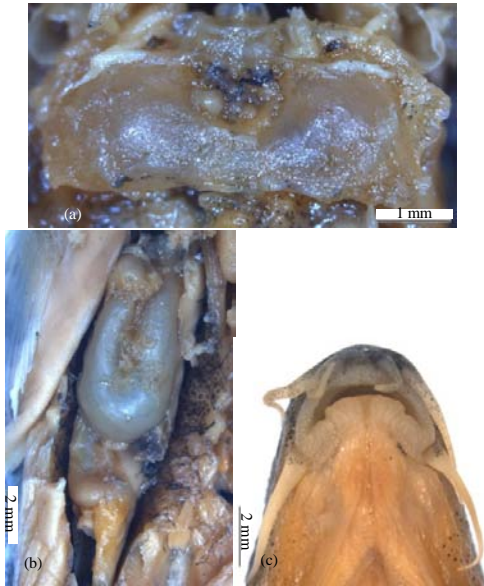


Fig. 2: *O. mesudae* n sp.: a) Bonny swim bladder capsule; b) Digestive tract; c) Mouth shape

the latero-median side of the body and moderately big black spots on the flank. Caudal fin with three regular black bars and dorsal and pectoral fins with irregular black spots.

Etymology: Named for Mesude Kaynak, my mother.

Distribution: Buyuk Menderes river and Isikli Lake. This new species may be found in Kucuk Menderes and Gediz rivers (Western Anatolia).

Remarks: *Oxyzoemacheilus mesudae* differs from its closely related species (unpublished MS with Perdices and Freyhof) *Oxyzoemacheilus germencicus* (Erk'akan *et al.*, 2007) by its shape of bony swim-bladder capsule, digestive track and some morphometric data (Erk'akan *et al.*, 2007). *O. mesudae* is also similiar to *O. angorae* group living in central and western Anatolia: *O. angorae*, *O. anatolica*, *O. eregliensis* and *O. atili* n sp. but is easily distinguished from all members of this group by its colour pattern (Stoumboudi *et al.*, 2006) in fresh material. *Oxyzoemacheilus mesudae* differs from *O. angorae* by prepelvic length 49-52% in SL (vs. 72.5), body depth 14-17% in SL (vs. 18), caudal peduncle depth 8, 5-10, 8% in SL (vs. 11), head depth 48-51% in HL (vs. 56), eye diameter 14.7-18% in HL (vs. 20.7), interorbital length 23-27% in HL (vs. 29) and shape of swim-bladder capsule and digestive track (Erk'akan *et al.*, 2007).

Table 2: Morphometric characteristics of *O. atili* n sp.

| Morphometric Characters | <i>O. atili</i> (n = 34) | | | |
|-------------------------------|--------------------------|-------|-------|------|
| | Min | Max | Ort | SD |
| Standart length(mm) | 33,75 | 75.63 | | |
| SL (%) | | | | |
| Head length | 23.10 | 26.26 | 24.57 | 0.88 |
| Pre-dorsal length | 47.26 | 50.44 | 48.70 | 0.91 |
| Pre-pelvic length | 48.09 | 51.44 | 49.88 | 0.86 |
| Pre-anal length | 70.08 | 73.63 | 71.79 | 0.87 |
| Body width | 12.10 | 15.53 | 13.73 | 0.94 |
| Body depth | 17.01 | 21.23 | 18.25 | 0.92 |
| Caudal peduncle depth | 07.07 | 10.94 | 09.13 | 0.90 |
| Caudal peduncle length | 16.24 | 20.37 | 17.64 | 0.88 |
| Dorsal fin base length | 10.53 | 13.93 | 12.25 | 0.93 |
| Dorsal fin last simple length | 13.97 | 17.02 | 15.50 | 0.93 |
| Anal fin depth | 12.43 | 16.56 | 14.70 | 0.93 |
| Pelvic fin length | 13.99 | 18.06 | 16.07 | 0.94 |
| Pectoral fin length | 17.56 | 20.82 | 19.14 | 0.94 |
| Head length (%) | | | | |
| Head depth | 56.49 | 59.76 | 58.09 | 0.88 |
| Eye diameter | 19.32 | 22.82 | 21.23 | 0.92 |
| Snouth length | 37.32 | 40.11 | 38.67 | 0.92 |
| Interorbital length | 28.57 | 31.76 | 29.97 | 0.89 |

O. mesudae differs from *O. anatolica* by its colour pattern shape of swim-bladder bony capsule and dorsal fin with 8 (vs. 5-7) branched rays and pectorals with 11 rays (vs. 10) (Erk'akan *et al.*, 2008). Also preanal length 70-71% in SL (vs. 69%), head depth 48-51% in HL (vs. 53%) and interorbital length 23-27% in HL (vs. 30%) (Erk'akan *et al.*, 2008).

O. mesudae differs from *O. eregliensis* by the shape of swim-bladder bony capsule, its colour pattern and some body ratios such as predorsal length 48-51% in SL (vs. 45%), preanal length 70-73% in SL (vs. 68%), caudal peduncle length 9-11% in SL (vs. 8%), head depth 48-51% in HL (vs. 42%) and interorbital length 23-27% in HL (vs. 28) (Erk'akan *et al.*, 2007).

O. mesudae differs from *O. phoxinoides* by predorsal length 48-51% in SL (vs. 44), caudal peduncle length 15-17% in SL (vs. 14), preanal length 70-73% in SL (vs. 68), interorbital length 23-26% in HL (vs. 30). It is also easily distinguished from *O. phoxinoides* by its colour pattern and the presence of sub-orbital flap (Erk'akan *et al.*, 2007). *O. mesudae* differs from another new species *O. atili*, described in this M.S., by the shape of bony capsule of swim-bladder, digestive track mouth structure and colour pattern (Fig. 1, 2). Also, it differs from *O. atili* n sp. with body width 10-13% in SL (vs. 14%), body depth 14-17% in SL (vs. 18%), head depth 48-51% in HL (vs 58%) and interorbital length 23-27% in HL (vs. 30%) (Table 1 and 2).

***Oxyzoemacheilus atili* n sp.**

Holotype: About 72.3 mm male, HUIÇ, uncataloged specimen, Eflatun pinari-Beysehir Lake, Turkey 37°49' 30.95'' K, 31°40'29.08'' D, leg and coll. F. Erk'akan.

Paratypes: HUIÇ, 33 uncataloged specimens, 33.75-75.63 mm SL.



Fig. 3: General appearance of *O. atili n sp.*

Diagnosis: *Oxynoemacheilus atili* is distinguished from all other species of *Oxynoemacheilus* in Turkey by its colour pattern, shape of the bony capsule of the swim-bladder, scales present only the posterior part of the body and embedded in the skin and some body ratios.

Description: General appearance of *O. atili* is shown in Fig. 3. Morphometric data of holotype and 33 paratypes are shown in Table 2. Body elongated and moderately stout. Body depth 4.7-5.8 (5.4) times in standard length. Lateral line complete but in some specimens, it is ended close to the the base of the caudal peduncle. No axillary pelvic lobe. Mouth large, upper lip with median notch. Lips fleshy and not papillated (Fig. 4c). Proessus dentiformis weakly to median developed. Suborbital flap can be seen as a shallow groove. Head depressed, head depth 1.96-2.1 (2.02) times in head length. Nostrils much nearer to eye than tip of snout and anterior nostril pierced in front side of a long tube. Eyes in upper position and eye diameter 5.6-6.8 (6.0) times in head length. No scales anterior part of the body. Posterior part of the body scales are seldom and embedded in the body. The shape of bony swim-bladder capsule and digestive track are shown in Fig. 4a, b. Dorsal fin with 3 simple and 7^{1/2} branched rays distal margin of dorsal fin straight. Anal fin with 3 simple and 5-5^{1/2} branched rays. Pelvic fin with 6 rays reaching slightly to anus. Caudal fin with 8 + 8 branched principal rays, slightly forked, lobes rounded. Pectoral fin with 9-10 rays, longer in males, reaching the pelvic fin origin. Low dorsal and ventral adipose crests on posterior part of the caudal peduncle. Largest recorded size 75.63 mm SL.

Sexual dimorphism: In males, pectorals are longer than females and sub-orbital flap with shallow groove.

Colouration: In preserved material, head: dorsal is black and lateral back-ground pale beige with little rounded black spots under eye, big black spot on operculum. Flank: back ground pale beige with big black rounded spots on the body but under lateral line of antero-lateral

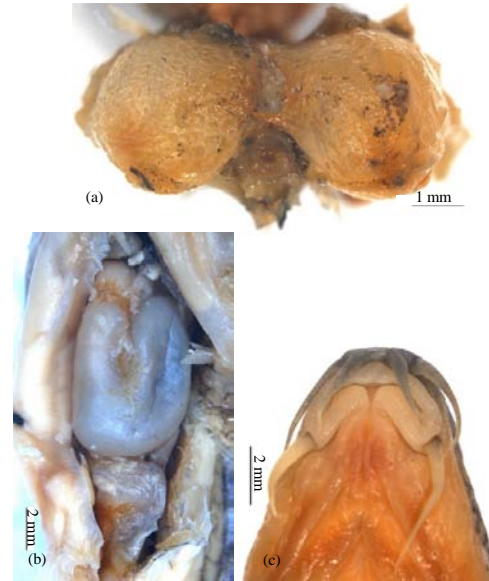


Fig. 4: *O. atili n sp.*: a) Bonny swim bladder capsule; b) Digestive tract; c) Mouth shape

part with irregular little back spots. Black line markedly on the caudal fin base and caudal fin with 2-3 series of black bars.

Distribution: Known from Eflatun pinari, Beysehir lake.

Etymology: Named for Mr. Ahmet Tuncay Atil.

Remarks: *Oxynoemacheilus atili* differs from angorae group of other species of *Oxynoemacheilus* in Western and Cental Turkey with its colour pattern, shape of swim-bladder capsule, digestive track and some body ratios.

Oxynoemacheilus atili easily distinguished from its closely related species *Oxynoemacheilus eregliensis* by its colour pattern (Stoumboudi *et al.*, 2006), shape of swim-bladder capsule, predorsal length 47-50% in SL (vs. 45%), caudal peduncle length 16-20% in SL (vs. 14%), head depth 48-51% in head length (vs. 42) (Erk'akan *et al.*, 2007).

Oxynoemacheilus atili differs from *O. angorae* by predorsal length 47-50% in SL (vs. 51%), head depth 57-60% in HL (vs. 56%), shape of swim-bladder capsule, digestive track and colour pattern (Erk'akan *et al.*, 2007). *Oxynoemacheilus atili* is distinguished from *O. anatolica* by predorsal length 47-50% in SL (vs. 51), preanal length 70-74% in SL (vs. 69), body width 12-16% in SL (vs. 11), body depth 17-21% in SL (vs. 15), head depth 57-60% in HL (vs. 53), eye diameter 19-23% in HL (vs. 16). Also, it differs by the shape of swim-bladder

capsule and colour pattern (Erk'akan *et al.*, 2008). *Oxynoemacheilus atili* differs from by *Oxynoemacheilus phoxinoides* by the shape of the mouth, bony capsule of swim-bladder, colour pattern and body depth 17-21% in SL (vs. 16), predorsal length 47-50% in SL (vs. 44), head depth 57-60% in HL (vs. 50) (Erk'akan *et al.*, 2007).

CONCLUSION

Oxynoemacheilus mesudae and *O. atili* also easily distinguished from *cinicus*, *simavicus*, *germencicus*, *theophili*, *banarescui*, *kosswigi* and *mediterranus* by the angorae shape group of the body, colour pattern and some body ratios (Erk'akan *et al.*, 2011; Stoumboudi *et al.*, 2006).

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