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Stone loaches of Choman River system, Kurdistan, Iran (Teleostei: Cypriniformes: Nemacheilidae)

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Abstract

For the first time, we present data on species composition and distributions of nemacheilid loaches in the Choman River basin of Kurdistan province, Iran. Two genera and four species are recorded from the area, of which three species are new for science: *Oxynoemacheilus kurdistanicus*, *O. zagrosensis*, *O. chomanicus* spp. nov., and *Turcinoemacheilus kosswigi* Băn. et Nalb. Detailed and illustrated morphological descriptions and univariate and multivariate analysis of morphometric and meristic features are for each of these species. Forty morphometric and eleven meristic characters were used in multivariate analysis to select characters that could discriminate between the four loach species. Discriminant Function Analysis revealed that sixteen morphometric measures and five meristic characters have the most variability between the loach species. The dendrograms based on cluster analysis of Mahalanobis distances of morphometrics and a combination of both characters confirmed two distinct groups: *Oxynoemacheilus* spp. and *T. kosswigi*. Within *Oxynoemacheilus*, *O. zagrosensis* and *O. chomanicus* are more similar to one other rather than either is to *O. kurdistanicus*.

Key words: Nemacheilidae, Iran, Kurdistan, taxonomy, new species

Introduction

Located in a major zoogeographical interchange area Iran has one of the diverse fish faunas; however, this biodiversity hotspot has not, as yet, been appropriately inventoried and described (Coad, 1998a). Based on research conducted on its ichthyofaunal composition to 1998, the area encompasses two major zoogeography regions, the eastern Mediterranean (western Palearctic region) and the southern Asian (Indo-Oriental region) (Nalbant & Bianco, 1998). Western and Northern parts of Iran lie at Irano-Anatolian region that includes different important areas of local endemism that can be referred to as hot spots in terms of biodiversity (Esmaeili *et al.* 2007).

The Nemacheilidae is a species-rich lineage of cypriniforms, consisting mostly of small benthic fishes inhabiting freshwaters of Europe, Asia and Ethiopia. Little is known about the nemacheilid loaches of Western Asia because of their small size and low value for marketing (Golzaripour *et al.* 2009). About 30 species in six genera have been reported from Iran (Nalbant & Bianco, 1998; Coad & Nalbant, 2005; Prokofiev, 2009; Golzaripour *et al.* 2011), but this is predicted to be incomplete.

Kurdistan province lies in the west of Iran. There are several main river basins in this area; Sefid-Rud, Sirvan, Zarineh (Urmia), Razawar (Karkheh) and little Zab rivers. The little Zab River basin originates in Iran and joins the Tigris in Iraq. The Choman watershed is a subbasin of little Zab and the area of this basin is about 1550 Km². Baneh city is located in this watershed. Several rivers and their tributaries occur in Choman watershed including Choman, Shooei, Boein, Garmab, Bashvan and Baneh rivers. Under the zoogeographical study by Armantrout

angorae lenkoranensis Abdurachmanov, 1962); IEE, uncatalogued, 15 specimens SL 37.5–65.2 mm, Agstev, Akera and Vorotan rivers, Aras basin, Armenia.

Oxynoemacheilus argyrogramma: FCFUK, uncatalogued, 10 specimens SL 37.3–58.2 mm, Gaveh-Rud River, Sirvan basin, a tributary of Tigris, Kurdistan, Iran, 34° 56' 33" N, 47° 12' 15" E, August 2011; FCFUK, uncatalogued, 10 specimens SL 48.3–62.5 mm, Do-rud River, Sirvan basin, a tributary of Tigris, Sarvabad, Kurdistan, Iran, 35° 18' 45" N, 46° 20' 14" E, October 2011, leg. B.B. Kamangar, E. Ghaderi.

Oxynoemacheilus brandti/bergianus–complex: ZIN nr. 25433, 42.7 mm SL, Kisum, Shah-rud river (holotype of *Nemachilus bergianus*); ZIN nr. 47324, 5 specimens SL 38.7–64.8 mm, Samur river; IEE, uncatalogued, 10 specimens SL 35.5–60.0 mm, Badara river, Kura basin, Armenia; FCFUK, uncatalogued, 10 specimens SL 30.1–48.6 mm, Chehl-Cheshmeh, Ghezel-Ozan basin, a tributary of Sefid-Rud River, Kurdistan, Iran, 35° 53' 22" N, 46° 59' 09" E, November 2011, leg. B.B. Kamangar, E. Ghaderi.

Oxynoemacheilus frenatus: ZIN nr. 6749, SL 45 mm, Ain-es Sghair, Jericho, 1884, leg. Lortet.

Oxynoemacheilus hamwii: FCFUK, uncatalogued, 10 specimens SL 41.3–62.1 mm, Gaveh-Rud River, Sirvan basin, a tributary of Tigris, Kurdistan, Iran, 34° 56' 33" N, 47° 12' 15" E, August 2011; FCFUK, uncatalogued, 3 specimens SL 37.3–42.3 mm, Razavar River, Karkheh basin, Kurdistan, Iran, 34° 44' 51" N, 46° 51' 53" E, September 2011, leg. B.B. Kamangar, E. Ghaderi.

Oxynoemacheilus insignis: IEE, uncatalogued, 3 specimens SL 42.0–60.5 mm, Lake Kinneret.

Oxynoemacheilus panthera: IEE, uncatalogued, 2 specimens SL 50.5 and 52.5 mm, pound at Elisha, Jordan basin, May 1998.

Oxynoemacheilus tigris: IEE, uncatalogued, 4 specimens SL 44.5–58.0 mm, Lake Kinneret.

Note: Traditionally, two species of loaches, namely *O. angorae* and *O. brandti*, were recognized in most of Transcaucasia excluding the Sefid-Rud basin, where *O. bergianus* (Berg, 1949). According to the modern hypothesis by Freyholf *et al.* (2011), *O. angorae* should be replaced by *O. araxensis* in the Caspian Sea basin here, and the population from the Lenkoran area (Azerbaijan) deserves a full species status (*O. lenkoranensis*). However, results of an unpublished molecular analysis (I-Shiung Chen, B.A. Levin, personal communication 2012) indicate a very complex situation with at least four different lineages of loaches in Armenian part of Aras basin (the samples from Azerbaijan are being processed now). Morphological differences between *O. brandti* and *O. bergianus* in current understanding of these species are obscure, and it is possible that more than two species are mixed under these names. Thus, at present we accept “*angorae/araxensis*–” and “*brandti/bergianus*–complexes” for definition of these materials.

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