

Article

Review on the taxonomy of Tigris scraper, *Capoeta umbla* (Heckel, 1843) and its confirmation record from the Iranian part of Tigris River, Persian Gulf basin (Teleostei: Cyprinidae)

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Abstract

The systematics, morphology, distribution, and conservation of the Tigris scraper, *Capoeta umbla* (Heckel, 1843) are described and the species is illustrated. Moreover, its new record from Iranian part of the Tigris River basin (a tributary of the Sirvan River) is reported and a bibliography on this species is provided.

Keywords: Cyprinidae, First record, *Capoeta damascina*, Iran.

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Introduction

The genus *Capoeta* was erected by Valenciennes in Cuvier and Valenciennes' "Histoire naturelle des Poissons" in 1842, who described two species: *Capoeta fundulus* from Cyrus (Kura) River and *Capoeta amphibia* from Bombay. He also provided a description of *C. macrolepidota* from Java which is, along with *C. amphibia*, no longer placed in the genus *Capoeta*. In 1843, the Austrian zoologist Heckel erected the genus *Scaphiodon* and described seven new species, including *S. tinca* from Brussa (Bursa), *S. trutta* and *S. umbla* from the Tigris River in Mossul (Mosul), *S. fratercula* and *S. socialis* from/around Damascus and *S. peregrinorum* and *S. capoeta* from Aleppo. In 1849, he described four additional new species from Persia, including *S. amir*, *S. niger*, *S. macrolepis* and *S. saadii*. Günther (1868) considered *Scaphiodon* a synonym of *Capoeta* and regarded *C. damascina*, *C. fratercula*, *C. amir*, *C. umbla* and *C. syriaca* as valid species. In 1909, Boulenger placed *Capoeta* in the genus *Varicorhinus* Rüppell, 1835. Khalaf (1961) considered *V. umbla* from Iraqi waters a subspecies of *V. damascinus*. Berg (1949) considered *V. umbla* as a valid species. Karaman (1969) restricted *Varicorhinus* to African species, while placing Asian species in *Capoeta*. He regarded *C. angorae*, *C. damascina*, *C. kosswigi* and *C. umbla* as subspecies of *C. capoeta* (see also Alwan 2011). Saadati (1977) placed Iranian species in *Varicorhinus* but was aware of the previous taxonomic discussions. He considered *V. fratercula*, *V. damascinus* and *V. umbla* as distinct species. Banarescu (1999) recognized the existence of three additional valid species within the undefined "*C. capoeta* group"; among them *C. umbla* (from the Tigris-Euphrates river system).

Capoeta umbla has been questionably considered as a synonym of *Capoeta damascina* (Valenciennes, 1842) (see Coad 1991, 1995) or a distinct valid species (Banarescu 1999; Turan et al. 2006; Özuluğ and Freyhof 2008). Based on genetic data using the 16S rDNA marker, Turan (2008) suggested the conspecificity of *C. c. umbla* and *C. c. kosswigi* with *C. trutta* despite the morphological differences among them which, according to him, could be environmentally induced. Recently Levin et al. (2012) reconstructed the matrilineal phylogeny of several Asian algae-eating fishes of the genus *Capoeta* (except *C. umbla*) based on complete mitochondrial gene for *cytb* sequences from the majority of their distribution ranges. According to them, *Capoeta* forms a strongly supported monophyletic subclade nested within the genus *Luciobarbus* clade, suggesting that specialized scraping morphology appeared once in the evolutionary history of the genus. They detected three main groups of *Capoeta*:

the Mesopotamian group, which includes three species from the Tigris-Euphrates system and adjacent water bodies, the Anatolian–Iranian group, which has the most diversified structure and encompasses many species distributed throughout Anatolian and Iranian inland waters, and the Aralo-Caspian group, which consists of species distributed in basins of the Caspian and Aral Seas, including many dead-end rivers in Central Asia and Northern Iran. Based on the potential distribution range of *C. umbla*, Freyhof (2014) expected its presence in Iran, Iraq, Syria, and Turkey (Turkey-in-Asia) and listed it in the Least Concern (LC) category.

In this study, we review and provide information on the systematics, morphology, distribution, and conservation of the Tigris scraper, *Capoeta umbla* (Heckel, 1843) and report it from Iranian part of the Tigris River basin (Garan River, a tributary of the Sirvan River) for the first time.

Materials and Methods

This work has been compiled from extensive field expeditions till 2016 in the Tigris River basin and also by examination of the materials in the Zoological Museum of Shiraz University, Collection of Biology Department, Shiraz (ZM-CBSU); Naturhistorisches Museum Wien, Vienna (NMW); the Natural History Museum, London (BMNH) and the private collection of Dr. Jörg Freyhof from Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin (FSJF: Fischesammlung J. Freyhof).

Moreover, 15 specimens of *Capoeta umbla* were captured from Garan River (35°33'01.1"N, 46°18'36.7"E, Alt. 1308 m), a tributary of Sirvan River at Marivan, Kurdistan Province, western Iran. After anaesthesia, fishes were fixed in 5% formaldehyde and later stored in 70% ethanol. Counts and measurements follow Hubbs and Lagler (1958) and Krupp (1983). Measurements were performed using digital calipers to the nearest 0.01 mm. Standard length (SL) was measured from the anterior-most point of the snout tip or upper lip to the base of the median caudal fin ray, total length (TL) was measured from the anterior-most point of the snout tip or upper lip to the farthest tip of the caudal fin. Fin ray counts separate unbranched and branched rays. The last two branched rays articulated on a last compound pterygiophore in the dorsal and anal fins were counted as one.

Results

Systematic ichthyology: We follow the classification given by Nelson (2006):

Class Actinopterygii

Subclass Neopterygii

Division Teleostei

Subdivision Ostarioclupeomorpha

Superorder Ostariophysii

Order Cypriniformes

Superfamily Cyprinoidea

Family Cyprinidae

Subfamily Cyprininae

Genus *Capoeta* Valenciennes [A.] in Cuvier & Valenciennes 1842:278 Fem. *Cyprinus capoeta* Gldenstdt, 1773.

Capoeta umbla (Heckel, 1843)

(Figs. 1-3)

Saphiodon umbla Heckel, 1843: 1060, plate 5, fig. 3, Tigris River in Mossul (“Tigris bei Mossul”).

Capoeta umbla. – Gnther 1868: 79, Tigris River.

Capoeta umbla. – Sauvage 1884: 5, 16, Tigris, Biredjik (Euphrates).



Figure 1. *Capoeta umbla* syntype, NMW 55933, 177.4 mm SL.



Figure 2. *Capoeta umbla* syntype, NMW 55932, 183.55 mm SL.



Figure 3. Live specimen of *Capoeta umbla*, Garan River, a tributary of Sirvan River, Persian Gulf basin (25.Aug.2015).

Varicorhinus umbla. – Kosswig & Battalgil 1943: 24, Mossul, Şitak, Batman suyu, Hazer (Hazar) Gölü.

Varicorhinus umbla. – Berg 1949: 379, fig. 17, Tigris basin from Mosul to the lower reaches.

Varicorhinus umbla. – Ladiges 1960: 132 (listed).

Varicorhinus damascinus umbla. – Khalaf 1961: 34, İraqi waters.

Varicorhinus umbla. – Beckman 1962: 149, Tigris River.

Capoeta capoeta umbla. – Karaman 1969: 32, upper reaches of the Tigris-Euphrates system.

Capoeta capoeta umbla. – Kuru 1971: 139, Euphrates, Murat suyu (Murat Nehri), Kara su.

? *Varicorhinus damascinus* (partim). – Saadati 1977: 74, 192-193, Tigris basin in İraq.

Varicorhinus umbla. – Saadati 1977: 76, 194, Tigris River system.

Capoeta capoeta umbla. – Coad 1980: 91, upper Tigris-Euphrates system.

Varicorhinus umbla. – Banister 1980: 103, Tigris and Euphrates.

Capoeta capoeta umbla. – Kuru 1980: 494, Tigris and Euphrates.

Capoeta capoeta umbla. – Bianco & Banarescu 1982: 87, Tigris-Euphrates drainage

Capoeta damascina (partim). – Coad 1991: 15, Tigris-Euphrates basin (listed).

Capoeta umbla. – Banarescu 1999: 386, Tigris, Euphrates.

Capoeta capoeta umbla. – Kiliç demirok & Ünlü 2001: 389-393, Tigris River (biology).

Capoeta capoeta umbla. – Türkmen et al. 2002: 317-328, Aşkale region of the Karasu River (biology).

C. umbla (partim). – schöter et al. 2009: 234, Tigris-Euphrates system.

Common name: Tigris scraper

Material examined:

Syntypes: NMW 55932, 1, 183.55 mm SL, Iraq: Tigris at Mosul. – NMW 55933, 1, 177.45 mm SL, Iraq: Tigris at Mosul. – NMW 79373, 1, ca. 263 mm SL, Iraq: Mosul. – NMW 79374 (Dry).

Other material examined: – (1) 1, 175.81 mm SL, Turkey: Palu/Murat (source of Euphrates), ca. 38°43'N 39°56'E, V. Pietschmann, NMW 90541. – (2) 1, 42.43 mm SL, Turkey: outflow of Hazar Gölü at Plajköy, 38°30.187'N 39°30.423' E, 24.IX.2008, M. Özuluğ & J. Freyhof, FSJF 1494 (in 96 % alcohol). – (3) 1, bent specimen, Turkey: Hazar Gölü, ca. 38°30'N 39°30'E, 22/23.VII.1914, V. Pietschmann, NMW 90543. – (4) 2, 212.22-220.14 mm SL, Turkey: Kürk at Hazar Gölü, draining to Tigris, ca. 38°30'N 39°30'E, V. Pietschmann, 1914, NMW 91066. – (5) 6, 156.73-216.18 mm SL, Turkey: Kürk at Hazar Gölü, draining to Tigris, ca. 38°30'N 39°30'E, V. Pietschmann, NMW 91067. – (6) 3, 153.47-228.75 mm SL, Turkey: Kürk at Hazar Gölü, draining to Tigris, ca. 38°30'N 39°30'E, V. Pietschmann, NMW 91069. – (7) 3, bent specimen with damaged snout-ca. 227.28 mm SL, Turkey: Wadi Mahmedian Çay, (source of Tigris), ca. 38°20'N 40°45'E, 1914, V. Pietschmann, NMW 90543. – (8) 2, bent specimen with damaged snout-224.04 mm SL, Turkey: Wadi Mahmedian Çay, (source of Tigris), ca. 38°20'N 40°45'E, 1914, V. Pietschmann, NMW 91062. – (9) Fin clip, Turkey: Tigris River, 5 km east of Bismil, 37°50.314'N 40°41.620'E, 25.IX.2008, M. Özuluğ & J. Freyhof, specimen identified by J. Freyhof, FSJF 1425 (in 96 % alcohol). – (10) 2, 123.26-141.95 mm SL, Turkey: Batman (a tributary to Tigris), ca. 37°50'N 41°00'E, V. Pietschmann, NMW 90536. – (11) 2, 132.67- 152.50 mm SL, Syria: Jerablus at Euphrates, ca. 36°49'N 38°02'E, V. Pietschmann, NMW 91078. – (12) 1, bent specimen (ca. 100 mm SL), Iraq: Nahr Rawanduz (Great Zab), N. Sarsam, BMNH 1974.2.22.1390. – (13) 2, bent specimens (ca. 178-ca. 201 mm SL), Iraq: Nahr Rawanduz and Serokani stream (Rawanduz), N. Sarsam, BMNH 1974.2.22.1392-1393. – (14) 2, 173.15-197.74 mm SL, Iraq: Great Zab near Aski Kalak (Eski Kelek) and near Bekhme Dam, N. Sarsam, BMNH 1974.2.22.1394- 1395. – (15) 1, bent specimen (ca. 197 mm SL), Iraq: Siwel River, Little Zab, N. Sarsam, BMNH 1974.2.22.1391. – (16) 1, bent specimen, Iraq: Nahr Qiziljah, Little Zab, N. Sarsam, BMNH 1974.2.22.1396. – (17) Fin clip, Iran: Rud-e Garan (Garan River), Marivan, Kurdistan, 26.VI.2009, H. R. Esmaili, ZM-CBSU uncatalogued (# 11) (in 96 % alcohol). – (17) 15, ZM-CBSU Z290-304, 71.3-148.3 mm SL, Iran: Garan River, Tigris River basin, at Marivan, Kurdistan Province.

Diagnosis: *Capoeta umbla* is distinguished from all other *Capoeta* species by the combination of the following characters: very elongate and slightly compressed body; 8-10 branched dorsal-fin rays; last unbranched dorsal-fin ray weakly to moderately ossified and serrated in 1/2-3/4 of its length; very small scales, 18-25 scales between dorsal-fin origin and lateral line, 10-15 scales between anal-fin origin and the lateral line, 31-39 encircling least circumference of the caudal peduncle, 82-104 total lateral line scales; 12-16 gill rakers on lower limb of first gill arch; 17-20 total gill rakers on first gill arch; 46-50 total vertebrae; one posterior pair of barbels.

Description: General morphology of *C. umbla* is shown in Figures 1-3 and morphometric data are given in Table 1. Body elongate and slightly compressed; greatest body depth at level of dorsal-fin origin; pre-dorsal body profile smoothly convex to dorsal-fin origin; nuchal hump present in well-fed specimens; snout pointed; mouth ventral; lower lip covered with a sharp-edged horny sheath and its anterior margin straight or rounded to almost crescent-

Table 1. Morphometric characters of *Capoeta umbla* (ZM-CBSU Z290-304, 15 specimens) from Garan River, a tributary of Sirvan River, Persian Gulf basin.

	Min	Max	Mean	SD
Standard length (mm)	71.30	148.30	97.55	
In percent of standard length				
Head length	23.24	26.99	25.05	1.31
Body depth at dorsal-fin origin	19.26	23.75	21.51	1.34
Predorsal length	46.67	51.68	48.84	1.52
Postdorsal length	41.13	61.13	58.24	5.06
Preanal length	71.37	75.43	73.58	1.10
Prepelvic length	50.67	55.24	53.38	1.47
Distance between pectoral and pelvic-fin origins	28.45	32.88	30.00	1.36
Distance between pelvic and anal-fin origins	19.01	22.97	21.55	1.02
Depth of caudal peduncle	9.91	10.93	10.33	0.34
Length of caudal peduncle	18.40	20.89	19.56	0.75
Dorsal-fin base length	14.06	17.00	15.16	0.90
Anal-fin base length	6.98	8.44	7.79	0.49
Pectoral-fin length	16.72	21.53	19.20	1.31
Pelvic-fin length	15.19	17.16	16.17	0.54
Length of the longest dorsal fin ray	18.86	23.96	21.57	1.38
Mouth width	7.81	10.10	9.04	0.52
In percent of head length				
Head depth at eye	50.09	55.86	52.18	1.63
Snout length	34.95	39.83	37.00	1.32
Postorbital distance	42.23	50.37	47.20	2.14
Interorbital width	35.18	43.19	39.31	2.10
Eye diameter	15.92	23.65	20.03	2.42
Maximum head width	53.16	62.34	57.58	2.78
Barbel length	11.03	19.27	16.18	1.95

shaped. Dorsal fin inserted anterior to pelvic-fin origin and its outer margin usually concave; 4-6 unbranched and 8-10 branched dorsal-fin rays; last unbranched dorsal-fin ray weakly to moderately ossified, soft and flexible at the tip, serrated in 1/2-3/4 of its length; pectoral fins not extending to pelvic-fin base, outer margins usually slightly convex; pelvic fins not extending to anal-fin base, outer margins straight or slightly rounded; pelvic axillary scale present; anal fin with 3 unbranched and 5 branched rays, outer margin straight or slightly convex; caudal fin forked and its tips pointed; 17-18 branched caudal-fin rays.

Scales very small, 18-24 between dorsal-fin origin and lateral line; 11.5-15.5 between lateral line and anal-fin origin; 32-39 encircling least circumference of caudal peduncle, 86-104 scales in the lateral-line series; ventral midline and pectoral region covered with deeply embedded scales of reduced size; gill rakers slightly hooked; 15-16 gill rakers on the lower limb of the first gill arch; 46-50 total vertebrae; one posterior pair of barbels; pharyngeal teeth arranged in three rows in the following manner: 2.3.5-5.3.2 (f1) and very similar in shape to those of *C. damascina* (see Alwan (2011)).

Remarks: Heckel (1843) in his original description gives: Pectoral fin with 1 unbranched and 18 branched fin rays, pelvic fin with 1 unbranched and 9-10 branched rays, anal fin with 3 unbranched and 5 branched rays, lateral line scales 90-96, 18 and 15 scales above and below lateral line, respectively. Berg (1949) and Saadati (1977) recognize *C. umbla* as a distinct species distinguished from *C. damascina* by a higher scale count (87-99), higher



Figure 4. Head region of *Capoeta umbla* showing breeding tubercles (ZM-CBSU Z290, 148 mm SL; Garan River, a tributary of Sirvan River, Persian Gulf basin, 25.Aug.2015).

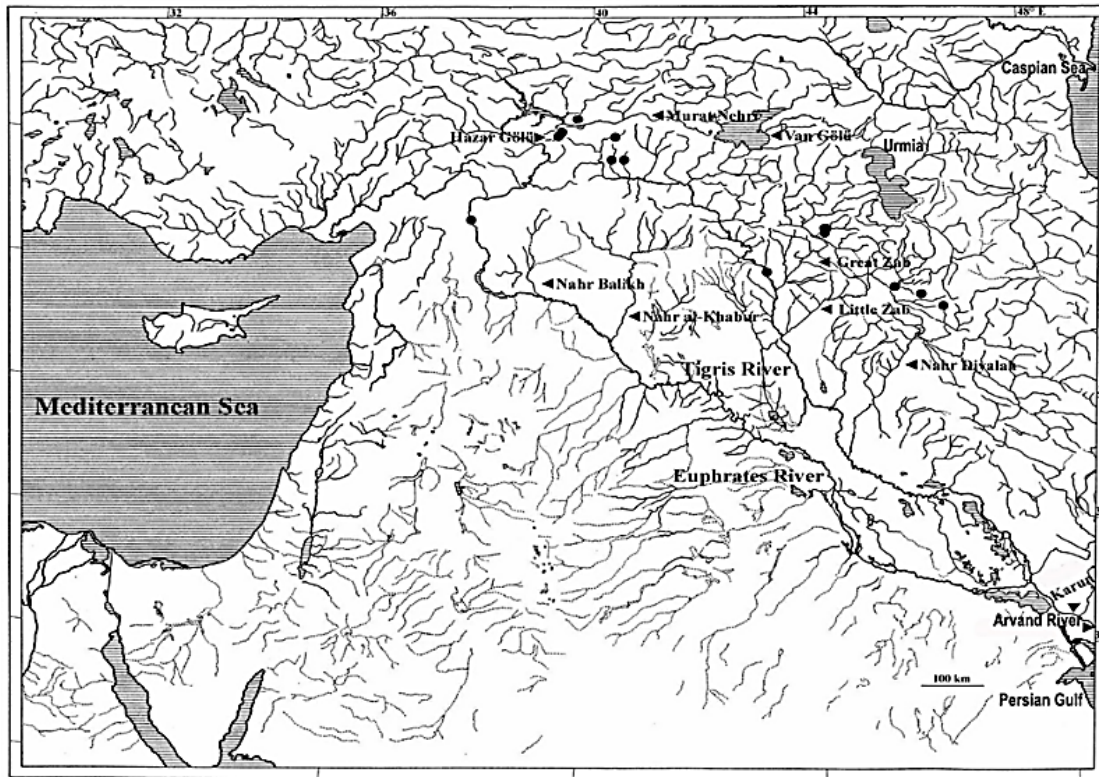


Figure 5. Distribution map of *Capoeta umbla* in the Tigris and Euphrates River system, Persian Gulf basin.

dorsal fin branched rays (9-10), longer dorsal fin, longer caudal fin (shorter than or equal to head length in *C. damascina*), a markedly transverse mouth, and a weaker dorsal fin spine.

Coloration: Live specimens: dorsum, head and body shiny golden-brown (Fig. 3) or yellow, darker dorsally and



Figure 6. Garan River, Tigris River system, Persian Gulf basin, natural habitat of *Capoeta umbla* (26 July 2009).



Figure 7. Habitat destruction of *Capoeta umbla* at Garan River (26 July 2009).

lighter below the lateral line; fins yellowish-golden. Preserved specimens: dorsum, head and upper half of the body brown or brownish-grey; lower half yellow or whitish-yellow; fins yellow or brownish-yellow; black spots in juveniles well discernible.

Sexual dimorphism: In the spawning season, males have well-developed breeding tubercles on the sides of the snout from eye to eye below the nostril, on the back, on the body and on the anal fin (Fig. 4).

Distribution and habitat: *Capoeta umbla* is distributed in the Tigris and Euphrates River system (Persian Gulf basin), in Iran, Iraq, Syria and Turkey (Fig. 5). It inhabits a wide range of water bodies from small headwater streams (Fig. 6) down to large lowland rivers, marshes, lakes and reservoirs (see Freyhof 2014).

Threats and Conservation status: While there are many threats in its whole distribution ranges (Fig. 7), this species is very widespread and often abundant in a wide range of habitats. It is not believed to decline fast enough to qualify for Near Threatened (NT) or any threat categories. It is therefore assessed as Least Concern, LC (see Freyhof 2014).

Discussion

Due to several main important factors promoting speciation and diversification, including (I) topographical complexity, (II) biogeographical situation (interfacing between three zoogeographic realms, including Palearctic, Oriental (Indomalayan) and Afrotropical (Ethiopian)), (III) presence of extensive system of mountains, and (IV) presence of the endorheic and exorheic basins, Iran harbors very diverse, rich and interesting freshwater ichthyofauna (Nalbant and Bianco 1998; Coad 1998; Esmaeili et al. 2010, 2014; Jouladeh et al. 2015; Zareian et al. 2016) especially 10 of 25 described species of *Capoeta*: *C. aculeata*, *C. capoeta*, *C. buhsei*, *C. cf. damascina*, *C. fusca*, *C. heratensis*, *C. mandica*, *C. anamisensis*, *C. saadii* and *C. trutta*, which are distributed almost in all Iranian basins except Sistan and Mashkid. They are classified in three main groups: the Mesopotamian group (*Capoeta trutta* group), the Aralo-Caspian group (*Capoeta capoeta* group) and the Anatolian–Iranian group (*Capoeta damascina* group) (see Levin et al. 2012).

Based on the results stated above, it is clearly obvious that *C. umbla* is a distinct species and not a synonym of *C. damascina*. The combination of morphological characters sets it apart from its other congeners. *Capoeta umbla* is distinguished from *C. damascina* by the number of scales between dorsal-fin origin and lateral line (18–24, modally 19 and 20 vs. 11–20, modally 14 and 15 in *C. damascina*, by the number of scales between lateral line and anal-fin origin (11.5–15.5, modally 12.5 vs. 7.5–14.5, modally 9.5 and 10.5 in *C. damascina*, by the number of scales encircling least circumference of caudal peduncle 32–39 vs. 23–34 in *C. damascina*, and by the number of scales in the lateral-line series (86–104 vs. 61–91) (Alwan 2011).

According to Alwan (2011), *C. umbla* belongs to the *Capoeta damascina* species complex. Two main lineages were recognized within this complex: A western lineage represented by *C. caelestis*, *C. damascina* and *C. umbla* and an eastern lineage represented by *C. buhsei*, and *C. saadii*. *Capoeta umbla* is found in the Tigris-Euphrates river system.

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