

Capoeta raghazensis, a new species of algae-scraping cyprinid from the Raghaz Canyon in Hormuz basin, southern Iran (Teleostei: Cyprinidae)

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Abstract

Capoeta raghazensis, new species, is described from the Raghaz Canyon, Hormuz basin, southern Iran. It is distinguished from its congeners in Iran by having one pair of barbels, a moderately ossified last unbranched dorsal-fin ray which smaller than head length; no black spots on head, body and dorsal fin; 69–77 lateral line scales; 11–13 scales between dorsal-fin origin and lateral line; 9–10 scales between anal-fin origin and lateral line; 11–14 total gill rakers, small barbels (7–13% HL), short head (20–24% SL), and short pectoral fin (10–15% SL).

Keywords: Hormuz basin, Freshwater, Iran, Taxonomy, Middle East.

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Introduction

There are 34 valid species in the genus *Capoeta* with 20 recorded one from Iranian inland waters (Alwan et al. 2011, 2016; Zareian et al. 2016; Esmaeili et al. 2018; Çiçek et al. 2021a, b, c; van der Laan, 2021). Ghanavi et al. (2016) analysed the phylogeny of the genus *Capoeta* in Iran based on the Cytochrome *b* gene showing *C. buhsei*, *C. coadi*, *C. damascina* and *C. saadi* are closely related by having small scales, known as *C. damascina* species group. Later, *C. birunii*, *C. ferdowsii*, *C. pyragyi* and *C. shajariani* were described and *C. umbra* was recorded from this group in Iranian freshwaters (Esmaeili et al. 2016; Jouladeh et al. 2017; Zareian and Esmaeili 2017). Traditionally, *C. damascina* is recorded from most of Iranian inland waters, but Ghanavi et al. (2016) showed *C. damascina* is restricted to Iranian part of the Sirvan River drainage. In the present study, we examined a *Capoeta* population collected from the Raghaz Canyon, Kol River drainage, Hormuz basin in southern Iran, which shown an undescribed taxon based on morphological differences with its congeners, here we described it as a new member of the *C. damascina* species group.

Material and Methods

Fish samples were collected from the Raghaz Canyon, Hormuz basin using backpack electrofishing device. After anaesthesia, fishes were fixed in 10% formaldehyde and stored in 70% ethanol. Measurements were made with a dial calliper and recorded to 0.1 mm. All measurements were made point-to-point, never by projections. Methods for counts and measurements followed Armbruster (2012). Standard length (SL) was measured from the tip of the snout to the posterior extremity of the hypural complex. The length of the caudal peduncle was measured from behind the base of the last anal-fin ray to the posterior extremity 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 were counted as “1½”.



Figure 2. *Capoeta raghazensis* sp. n., IMNRF-UT-1105-4, holotype, 112 mm SL. Iran: Hormuzgan prov., Darab City, Raghaz Canyon, Hormuz basin.

Abbreviations used. SL, standard length; HL, lateral head length. Collection codes: IMNRF-UT, Ichthyological Museum of the Natural Resources Faculty, University of Tehran; VMFC, Vatandoust & Mousavi-Sabet Fish Collection, Tehran.

Results

Capoeta raghazensis, new species

(Figs. 1-3, Tables 1-2)

Holotype: IMNRF-UT-1105-4, holotype, 111.8 mm SL. Iran: Hormuzgan prov., Hormuz basin, near Darab City, Raghaz Canyon, 28°49'32"N 54°18'02"E, July 2017.

Paratypes: IMNRF-UT-1105, 4, 67.7–231.3 mm SL; VMFC CR22006, 2, 71.2–113.0 mm SL; data same as holotype.

Diagnosis: *Capoeta raghazensis* sp. n. is a member of *C. damascina* species group. It is distinguished from *C. capoeta* species group (*C. aculeate*, *C. alborzensis*, *C. capoeta*, *C. fusca*, *C. gracilis*, *C. heratensis*, *C. macrolepis* and *C. razii*) by having smaller scales, including 69–77 total lateral line scales (vs. 32–58), 11–13 scales between dorsal-fin origin and lateral line (vs. 6–10), and 9–10 scales between anal-fin origin and lateral line (vs. 5–7). *Capoeta raghazensis* sp. n. is further distinguished from *C. capoeta* by having 11–14 total gill rakers (vs. 17–29), and from *C. heratensis* by having one set (vs. two) barbel.

Capoeta raghazensis sp. n. is distinguished from *C. buhsei* and *C. umbla* by having 69–77 lateral line scales (vs. 80–102) and 9–10 scales between anal-fin origin and lateral line (vs. 11–14). *Capoeta raghazensis* sp. n. is further distinguished from *C. umbla* by 11–14 total gill rakers (vs. 18–20). It is distinguished from *C. saadi* by having shorter barbels (7–13 vs. 13–24% HL), shorter head (20–24 vs. 24–30% SL), smaller pectoral fin (10–15 vs. 16–19% SL), and 25–29 circum-pendicular scales (vs. 23–24). *Capoeta raghazensis* sp. n. is distinguished from *C. coadi*, *C. damascina*, *C. ferdowsii*, *C. pyragyi*, *C. shajariani* and *C. umbla* by having 11–14 total gill rakers (vs. 15–20). It is further distinguished from *C. coadi* by having shorter pectoral fin (10–15 vs. 17–20% SL) and shallow dorsal fin depth (9–15 vs. 18–21% SL). It is distinguished from *C. biruni*, *C. ferdowsii*, *C. pyragyi* and *C. shajariani* by having 7–10 gill rakers on lower limb of first gill arch (vs. 10–13, 12–14, 13–15 and 12–14, respectively),

Capoeta raghazensis sp. n. is distinguished from the members of *C. trutta* species group (*C. anamisensis*, *C. mandica* and *C. trutta*) by having a moderately ossified last unbranched dorsal-fin ray which usually smaller than head length (vs. strongly ossified and thick) and having 11–14 total gill rakers (vs. 17–29).

Description: See Figures 1-4 for general appearance and Tables 1-2 for morphometric and meristic data. Body moderately deep and compressed laterally. Greatest body depth at middle of pectoral-pelvic distance. Head dorsal profile slightly convex. Predorsal length slightly longer than post-dorsal length. Dorsal profile of body



Figure 2. *Capoeta raghazensis* sp. n., paratypes; A, IMNRF-UT-1105-7; 231 mm SL; B, IMNRF-UT-1105-6; 200 mm SL; C, IMNRF-UT-1105-4; 114 mm SL.

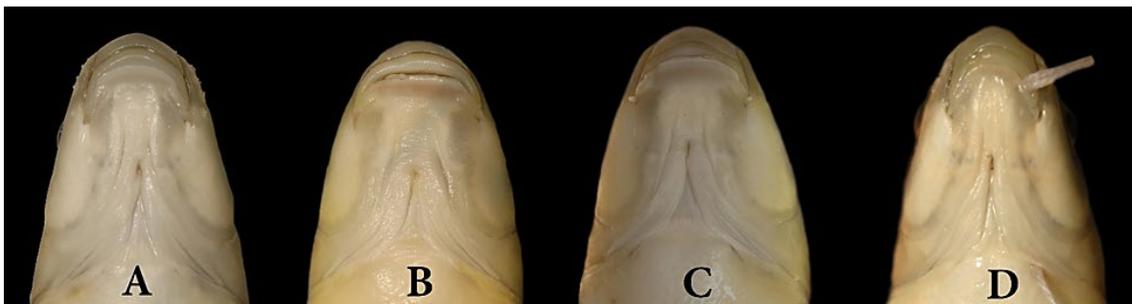


Figure 3. Ventral view of Head. *Capoeta raghazensis* sp. n. (A: IMNRF-UT-1105-4, 114 mm SL, male; B: IMNRF-UT-1105-7, 231 mm SL, female; C: IMNRF-UT-1105-6, 200 mm SL, female; D: IMNRF-UT-1105-4, 111.8 mm SL, male).

convex without any keel in front of dorsal-fin origin. Snout rounded with a semi-circular view in ventral. Mouth arcuate in males and straight in females (Fig. 3). Upper and lower lips adnate to jaws. Lower jaw with a strong keratinized edge. Rostral cap well-developed in semi-circular form and overlapping with upper lip. One set of maxillary barbels, short, smaller than eye's horizontal diameter and never reaching to posterior margin of orbit. Intranasal length slightly shorter than snout length. Pelvic axillary well-developed, pointed, triangular in shape covering by scales.

Table 1. Meristic data of *Capoeta raghazensis* sp. n. species (Holotype, IMNRF-UT-1105-4; paratypes, IMNRF-1105, 6 specimens).

Characters	Holotype	Paratypes		
		Range	Mean	SD
Standard length (mm)	113	68-231		
In percent of standard length				
Body depth maximal	22.9	22.8-25.5	24.0	1.0
Caudal peduncle depth	10.8	10.5-11.4	10.9	0.3
Predorsal length	54.2	53.6-56.6	55.0	1.1
Postdorsal length	52.5	48.7-53.7	50.2	1.8
Prepelvic length	50.5	51.8-55.1	53.3	1.1
Preanal length	72.2	72.8-78.5	75.9	1.9
Caudal peduncle length	19.2	15.8-19.1	16.7	1.3
Dorsal-fin base length	14.8	13.3-16.2	14.8	1.1
Dorsal-fin depth	13.4	9.2-15.2	13.3	2.2
Anal-fin base length	10.1	8.0-11.7	9.9	1.4
Anal-fin depth	10.7	10.0-15.6	13.1	2.2
Pectoral fin length	13.3	10.5-15.3	12.5	1.6
Pelvic fin length	11.8	11.5-15.5	12.9	1.5
Pectoral – pelvic-fin origin distance	30.4	30.7-34.4	32.2	1.3
Pelvic – anal-fin origin distance	21.2	21.0-24.4	22.6	1.2
Body width	18.6	16.2-20.7	18.3	1.8
Caudal peduncle width	4.4	3.2-6.4	4.4	1.2
Head length (HL)	21.3	19.9-23.7	22.1	1.3
In percent of Head length				
Snout length	32.3	23.2-30.3	26.9	3.3
Eye horizontal diameter	22.0	14.5-25.5	19.9	4.1
Postorbital distance	56.5	52.7-63.2	57.4	4.1
Head depth at nape	79.7	70.4-81.5	76.6	3.6
Head depth at eye	50.4	48.3-53.4	51.3	1.8
Head length at nape	85.4	90.2-96.1	92.1	2.1
Head width	76.8	63.9-83.4	72.9	7.2
Inter orbital	45.8	37.1-47.2	42.0	4.5
Inter nasal	26.5	22.8-28.4	26.2	2.6
Mouth width	34.8	23.2-39.0	29.4	7.0
Maxillary barbel	16.8	7.6-13.8	11.2	2.2

Dorsal fin depth (9–15% SL) with 4 unbranched and 7–8 branched rays, its outer margin straight in sinuate shape. Last unbranched dorsal-fin ray thickened and serrated, distally flexible, with 16–20 serrae on its posterior margin, with serrations along 60–70% of its posterior margin, denticles in moderate size and narrowly spaced. Last unbranched dorsal-fin ray slightly shorter than first branched ray, and its tip soft. Pelvic fin inserted below a vertical of posterior margin of first branched dorsal-fin. Caudal fin short, emarginate with round and equal size of lobes. Pectoral fin depth short (10–15% SL) with 15–17 branched rays. Pelvic fin with 1 unbranched and 8 branched rays. Anal fin with 3 unbranched rays, 5 branched rays and its outer margin rounded. 11–14 gill rakers on outer side of first arch. 25–29 circum-peduncular scales. Lateral line complete with 69–77 scales. 11–13 scales between dorsal-fin origin and lateral line and 9–10 between anal-fin origin and lateral line.

Coloration: In live specimens, dorsum olive, a dark pigmentation present on scales above lateral line giving impression of stripes in males but faded in female. A mid-flank stripe is evident, darkest on the anterior part of the body. Below the lateral line and belly beige. Dorsal and caudal fins with melanophores on the membranes,

Table 2. Morphometric data of *Capoeta raghazensis* sp. n. (holotype, IMNRF-UT-1105-4; paratypes, IMNRF-1105, 6 specimens).

Characters	Holotype	Paratypes		
		Range	Mean	SD
Total lateral-line scales	69	69-77	71.7	2.8
Scales between dorsal-fin origin and lateral line	12	11-13	12.3	0.8
Scales between anal-fin origin and lateral line	9	9-10	9.7	0.5
Dorsal unbranched Rays	4	4-4	4.0	0.0
Dorsal branched Rays	7	8-8	8.0	0.0
Anal unbranched Rays	3	3-3	3.0	0.0
Anal branched Rays	5	5-5	5.0	0.0
Pectoral Rays	16	15-17	15.8	1.0
Pelvic Rays	8	8-8	8.0	0.0
Caudal fin rays	10+9	-	10+9	-
Circum-pendicular scales	28	25-29	27.2	1.8
Total gill rakers	12	11-14	13.3	1.2
Gill rakers on the lower limb	8	7-10	9.3	1.2
Gill rakers on the upper limb	4	4-4	4.0	0.0

fade in margins. Pectoral and pelvic fins orange-cream with melanophores on the membranes. Anal fin beige. In preserved specimens, dorsum, upper side of mid-flank and head brown. Below the lateral line and belly beige. Peritoneum black.

Distribution and habitat: Based on our knowledge, *Capoeta raghazensis* sp. n. is only found in the Raghaz Canyon, Hormuz basin, Iran. The Raghaz Canyon, with an approximate length of four kilometres, 64 cascade and more than 100 natural ponds *Capoeta raghazensis* sp. n. was captured in a pond with about 2 m depth, 6 m² surface area. Water was clear with low current (Fig. 4).

Etymology: The species name *raghazensis* refers to Raghaz Canyon, the type locality of *Capoeta raghazensis* sp. n. An adjective.

Remark: Based on our unpublished data, *Capoeta raghazensis* sp. n. is distinguished from *C. saadi*, its closest relative, by an uncorrected-pairwise distance of 6.0% based on the Cytochrome *b* sequences.

Comparative Materials: — *Capoeta anamisensis*: ZM-CBSU Z126-130, 5, 134–139 mm SL; Iran: Hormuzgan prov.: Minab River drainage, Moradabad River at Ziarat Ali, 27°45'47.6"N 57°14'31.8"E.

Capoeta birunii: ZM-CBSU Z651-660, 10, 90-165 mm SL; Iran: Esfahan prov.: Zayandeh River basin, Daran River near Daran, 32°49'25.8"N 50°25'47.4"E. 16 Aug 201.

Capoeta alborzensis: IMNRF-1063, 7, 50-153 mm SL, Iran: Tehran prov.: Nam River, tributary of Hableh River, near Arjomand village, 35°48'00"N 52°30'57"E. — IMNRF-UT-2063, 23, 46-163 mm SL, Iran: Tehran prov.: Dasht-e Kavir basin, Nam River, tributary of Hableh River, near Harandeh village, 35°42'41"N 52°40'19"E, September 2014.

Capoeta buhsei: IMNRF-UT-1075, 12, 103.9-211.8 mm SL, Iran: Markazi prov.: Namak Lake basin, Tafresh Town, at Khalife Kandy village, Mazlaghan-Chay River, 34°45'34"N 49°56'50"E, Novembre 2016.

Capoeta capoeta: IMNRF-UT-1067, 15, 66-157 mm SL, Iran: Eastern Azarbaijan prov.: Urmia Lake basin, Near Ajab Shir City, Ghale-Chay River, 37°29'25"N 45°59'57"E, Novembre 2016.

Capoeta coadi: IMNRF-UT-1108, 18, 91-163 mm SL, Iran: Kohgiluyeh and Boyer-Ahmad prov.: Tigris basin, near Ghalat village, Beshar River, 30°27'47"N 51°45'10"E, July 2017.

Capoeta damascina: NUIC-1519. 20. 104.8–218.1 mm SL; Turkey: Malatya prov.: Persian Gulf basin, Sürgü Stream, 38°02'34"N 37°51'21"E.



Figure 4. Raghaz Canyon, near Darab City, Hormuz basin, type locality of *Capoeta raghazensis*, sp. n..

Capoeta ferdowsii: IMNRF-UT-1111 61, 121.6 mm SL; Iran: Fars prov.: Persian Gulf basin, Tang-e Shiv River at Bekr Sofla village, Zohre River drainage, 30°25'26"N 51°21'55"E. July 2017. — IMNRF-UT-1111, 8, 63.8-138.4 mm SL; data same as IMNRF-UT-1111 61.

Capoeta fusca: IMNRF-UT-1065, 8, 46-121 mm SL, Iran: North Khorasan prov.: Hari River basin, near Farooj Town, at Segonbadan village, Qanat-e Segonbadan, 37°14'46"N 58°08'01"E.

Capoeta heratensis: IMNRF-UT-1064, 15, 116-161 mm SL, Iran: Khorasan-e Razavi prov.: Hari River basin, near Sarakhs, at Pole-e Khaton, Hari River, 35°56'51"N 61°08'51"E, June 2016.

Capoeta pyragyi: IMNRF-UT-1109 141, 118.1 mm SL; Iran: Lorestan prov.: Tigris River drainage, Tire River at Kaghe village (Fig. 13), Sezar River drainage, 33°37'06"N 48°58'13"E. July 2017. — IMNRF-UT-1109, 16, 79.6–155.8 mm SL; data same as IMNRF-UT-1109 141.

Capoeta macrolepis: IMNRF-UT-1058, 9, 53–116 mm SL, Iran: Fars prov.: Kor River basin, Tange Boragh village, Kor River, 37°14'46"N 58°08'01"E.

Capoeta mandica: ZM-CBSU Z212-217, 6, 83–118 mm SL; Iran: Fars prov.: Qareh Aghaj River at Kavar, 29°10'55.10"N 52°41'32.80"E.—ZM-CBSU Z235-245, 11, 82–130 mm SL; Iran: Fars prov.: Qareh Aghaj River at Kuohmareh Sorkhi, 29°23'39.8"N 52°09'49.1"E.

Capoeta saadii: ZM-CBSU 2524-2528, 5, 113–231mm SL; Iran: Fars prov.: Ghadamgah spring, Doroodzan, 30°15'11"N 54°25'32"E.

Capoeta razii: IMNRF-UT-1072, 14 specimens, 90.7–184.2 mm SL; Iran: Mazandaran prov.: Caspian Sea basin, Chalus City, Kheyroud River, 36°36'35"N, 51°33'45"E

Capoeta shajariani: IMNRF-UT-1107 21, 162.4 mm SL; Iran: Hamedan prov.: Tigris River drainage, Gamasiab River near Doab Village, 34°22'13"N 47°54'26"E, S. July 2017. — IMNRF-UT-1107, 10, 93.5–173.0 mm SL; data same as IMNRF-UT-1109 141. — IMNRF-UT-1106, 10, 93.9–203.2 mm SL; Iran: Hamedan prov.: Gamasiab River at Saad-e Vaghas Village, Tigris River drainage, 34°16'54"N 48°14'29"E. July 2017.

Capoeta trutta: IMNRF-UT- 1073, 15, 54.1–165.2 mm SL, Iran: Kermanshah prov.: Tigris basin, Songhor to Satar road, Tape-Esmail village, Gaveh River, 34°56'01"N 47°12'49"E, August 2016.

Capoeta umbla: IMNRF-UT-1077, 15, 107.3–175.9 mm SL, Iran: Kurdistan prov.: Tigris River basin, Little Zab River, near Sardasht Town, Barisu village, 36°08'48"N 45°32'17"E, May 2016.

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