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Original Article

# Redescription of *Paracobitis rhadinaea* (Regan, 1906) from Sistan Basin, Iran (Teleostei: Nemacheiliidae)

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**Abstract:** *Paracobitis rhadinaea*, a member of the family Nemacheiliidae, originally described by Regan in 1906 from Sistan basin, is poorely known by the rare materials. The inadequately studied species is redescribed on the base of freshly collected materials. The species differs from all other *Paracobitis* species by combination of the following characters: stout and elongated body; large size, up to 288 mm; a fully squamated body; slit like posterior nare; and midlateral series of large, irregular set and shaped dark, brown blotches. *P. rhadinaea* is endemic to Sistan, Iran.

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## Introduction

Nemacheilid loaches with a high dorsal adipose crest have been placed in the genus *Paracobitis* for many years, especially those from Central Asia (Banarescu and Nalbant, 1964), Vietnam (Nguyen, 2005), the Middle East (Prokofiev, 2009) and China (Min et al., 2010). *Paracobitis* is restricted to Near East and Middle Asia, and the species of *Paracobitis* from China should be assigned to the genera *Homatula* and *Schistura* (Nalbant and Bianco, 1998). Species of the genus *Paracobitis* (Bleeker 1863), are comparatively large-sized loaches inhabiting freshwaters of western Asia, from the eastern Mediterranean Sea drainages to the eastern Middle Asia in Afghanistan where it occurs only in the River Helmand (Banarescu and Nalbant, 1995; Nalbant and Bianco, 1998). There are 8 valid species in the world, with six valid species in Iran and the two others in the adjusted countries (Kottelat, 2012; Coad, 2014). From these valid species, *Paracobitis iranica* Nalbant and Bianco, 1998 is known from the Namak Lake basin, *Paracobitis longicauda* Kessler, 1872 is found in the Tedzhen and Murgab rivers of Afghanistan and Turkmenistan and in the Aral Sea basin, and in the Tedzhen (= Hari) River basin of Iran, *Paracobitis malapterura* Valenciennes, 1846 is found in the Namak Lake basin or in the southern Caspian Sea basin, *Paracobitis rhadinaea* Regan, 1906 is probably restricted to the Sistan basin of Iran and presumably Afghanistan, *Paracobitis smithi* Greenwood, 1976 is found only from a cave in Lorestan Province in the Tigris River basin, and *Paracobitis vignai* Nalbant and Bianco, 1998 is endemic to Sistan basin (Nalbant and Bianco, 1998; Coad, 2014). Also *Paracobitis boutanensis* McClelland, 1842 and *Paracobitis ghazniensis* Bănărescu and Nalbant, 1966 are described from the Helmand River drainage of Afghanistan, with no Iranian record (Coad, 2014).

The taxonomic history of Nemacheiline loaches from Iranian part of Sistan basin dates back to the early 19th century, when the fishes were collected by

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Figure 1. Map of Iranian part of the Sistan basin, and the study area Chahnime Reservoirs.

Colonel Sir A. Henry McMahon, the officer of the Sistan Arbitration Commission of 1901-1904. The collected fishes had been examined by Charles Tate Regan, former Director of the British Natural History Museum, in 1906, who described the *Nemacheilus rhadinaeus* [=*Paracobitis rhadinaea*] (Coad, 2014). From more than a hundred years ago, there is no taxonomic data about the fish. Therefore, a detailed re-description on the species is interesting for taxonomic studies on the loach family.

Some large specimens of *Paracobitis* were collected in 2012, in the Chahnime Reservoirs, Sistan basin, 30°76′97.17N, 61°68′46.28E, which were identified as *P. rhadinaea*. The present study aims to give a detailed description of this poorly documented species, because the data of the fresh deposited material enables a more precise definition of the species.

## Material and methods

Ten fish were collected by gillnetting from the Chahnime Reservoirs, Sistan basin, 30°76′97.17N, 61°68′46.28E (Fig. 1); all fishes were fixed in 5% buffered formaldehyde. Measurements were made with a digital calliper and recorded to 0.1 mm. All measurements are made point to point, never by projections. Methods for counts and measurements follow Kottelat and Freyhof (2007). 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". Terminology of head canals and pores is followed Kottelat (1990).

***Abbreviations used:*** SL, standard length; HL, lateral head length; VMFC, Vatandoust and Mousavi-Sabet Fish Collection, Tehran.

## Results

*Paracobitis rhadinaea* (Regan, 1906)

*Nemachilus rhadinaeus* Regan, 1906

(Figs. 2-5)

***Diagnosis:*** *Paracobitis rhadinaea* is distinguished from all other species of *Paracobitis* in Iran by having a stout and elongated body; large size, up to

Figure 2. *Paracobitis rhadinaea*, 166 mm TL (photo by Sahel Pakzad-Touchaei, Jun 2012).

Figure 3. *Paracobitis rhadinaea*, VMFC PC510AG, 181.5 mm SL, dorsal views.

Figure 4. *Paracobitis rhadinaea*, VMFC PC510AG, 193.8 mm SL, mouth and lips.

Figure 5. *Paracobitis rhadinaea*, VMFC PC510AG, 193.8 mm SL, nostril and flap.

288 mm; a fully squamated body; slit like posterior nare; mid-lateral series of large, irregular set and shaped dark, brown blotches.

***Description:*** The snout is longer than the postorbital distance, body depth is 8-10 times in body length, head length 5.1-5.5 times in body length, the mouth cleft extends to below the nostrils, lower lip interrupted medially, outer rostral barbel as long as maxillary barbel reaching back to or beyond nostrils, dorsal fin origin nearer tip of snout than caudal fin base, caudal fin slightly forked, caudal peduncle 2.1-2.8 as long as deep, 4.9-5.1 in length of fish. Dorsal fin with 2-4 unbranched (first two minute and not readily visible) and 7½, rarely 8½, branched rays, anal fin with 2-4 unbranched (first two minute) and 5½ branched rays, pectoral fin branched rays 9-10, usually 10, and pelvic fin branched rays 6-8, usually 7. The dorsal fin forked. There is a well-developed post-dorsal fin crest and a slight ventral crest on the caudal peduncle. The pelvic fin origin lies just in front of the mid-point of the dorsal fin base. The anterior nostril is a tube followed immediately by a

Table 1. Morphometric characters of *Paracobitis rhadinaea*.

| Character | Mean ± SD | Range |
|---|---|---|
| Total length mm | 162.18 ± 14·15 | 147.15 - 193.85 |
| Standard length mm | 140.52 ± 12.97 | 126.97 - 168.38 |
| In % Standard length | | |
| Total length | 115.46 ± 1.83 | 113.24 - 119.02 |
| Head length | 24.36 ± 1.05 | 22.49 - 25.64 |
| Head depth | 10.79 ± 0.75 | 9.23 - 11.60 |
| Pre dorsal distance | 49.68 ± 1.14 | 48.37 - 50.92 |
| Post dorsal distance | 57.64 ± 2.53 | 54.13 - 59.14 |
| Maximum body depth | 12.97 ± 1.03 | 11.87 - 14.92 |
| Pre anal length | 76.05 ± 1.33 | 73.30 - 77.51 |
| Caudal peduncle height | 8.14 ± 0.35 | 7.53 - 8.74 |
| Caudal peduncle length | 22.57 ± 3.23 | 19.3 – 28.99 |
| Caudal fin length | 16.89 ± 1.15 | 15.59 - 18.63 |
| Dorsal fin length | 18.80 ± 0.62 | 17.73 - 20.05 |
| Dorsal fin height | 5.62 ± 0.81 | 4.20 - 6.98 |
| Anal fin length | 15.12 ± 0.62 | 14.07 - 15.82 |
| Anal fin height | 4.09 ± 0.65 | 2.90 - 5.08 |
| Pectoral fin length | 15.86 ± 1.15 | 13.79 - 17.51 |
| Ventral fin length | 14.43 ± 0.63 | 13.72 - 15.41 |
| Pectoventral distance | 22.79 ± 2.56 | 18.86 - 24.07 |
| Ventral-anal distance | 12.97 ± 1.03 | 11.87 - 14.92 |
| Pectoanal distance | 31.48 ± 1.28 | 29.49 - 32.94 |
| Crest length | 30.11 ± 2.85 | 28.26 - 34.06 |
| Crest depth | 1.37 ± 0.59 | 0.86 - 2.76 |
| Head length % | | |
| Snout length | 44.87 ± 1.04 | 43.15 - 46.19 |
| Eye diameter | 9.57 ± 0.88 | 7.67 - 10.58 |
| Head depth | 44.28 ± 1.91 | 41.07 - 46.51 |
| Post orbital distance | 49.10 ± 3.43 | 44.29 - 54.67 |
| Inter orbital length | 22.56 ± 1.35 | 20.99 - 25.38 |
| Inter nasal length | 18.87 ± 2.40 | 16.68 - 20.81 |
| First barbel length | 18.35 ± 2.51 | 16.55 - 19.86 |

horizontal slit. Slightly developed axillary lobe. Mouth well arched. Maxillary barbels not reaching to eye origin. Outer mandibular barbels reaching to nostril origin. Inner mandibular barbels not reaching to maxillary barbels origin. Lips well furrowed, interrupted in their middle and pigmented by dark pigmentations. Mental lobes enlarged. Processus dentiformis slightly developed (Fig. 4). Lateral line complete, reaching to base of caudal fin, with 83-89 pores. Cephalic lateral line system with 8 supraorbital, 4+11 infraorbital, 12 preoperculo-mandibular and 3 supratemporal pores. Slit nostril, flap completely covered and passes the nostril (Fig. 5). Small scales, especially behind of dorsal fin rear (Fig. 6).

Morphometric characters of the specimens were measured (Table 1). Meristic values for the recently caught specimens are: dorsal fin unbranched rays 2-4, dorsal fin branched rays 7½ (2) or 8½ (8), anal fin unbranched ray 2, anal fin branched rays 5½ (3) or 6½ (7), pectoral fin branched rays 8(1), 9(4) or 10(5), pelvic fin branched rays 6(3), 7(4) or 8(3) , and caudal branched rays 9+9(6) or 10+9(4). The maximum size of the recent caught materials is 193.8

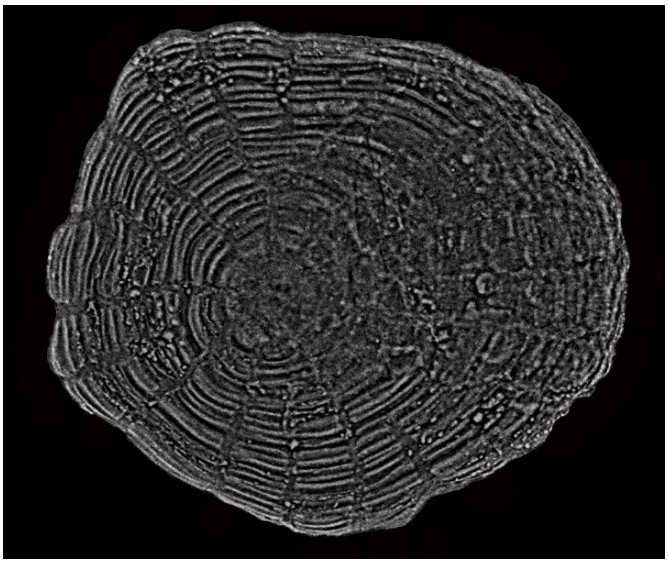

Figure 6. *Paracobitis rhadinaea*, VMFC PC510AG, 193.8 mm SL, scale.

mm in TL.

***Coloration:*** In preserved specimens body is yellowish-white with a row of dark-grey blotchs on middle of the back and on the midsides of the body. In live specimens the flanks are pale yellow with 9-15 dark grey blotches on dorsal and lateral, which are connected together by a row of dark streak (Figs. 2 and 3). The blotches extend onto the adipose crest. Blotches are irregularly arranged anteriorly but may line up in upper and mid flank rows posteriorly. The flank blotches extend onto the caudal peduncle crest. All over the head, opercula and snout covered by small dark grey blotches. The dorsal, caudal and pectoral fins are pigmented by dark spots on the rays. The anal and pelvic fins lack pigment. A single obvious black waved-shaped and relatively narrow bar at caudal-fin base. The belly is yellowish white. No distinct dark stripe from eye to snout. All fins are yellow to orange (in live specimens) or hyaline (in preserved specimens); dorsal, pectoral and caudal fins with 3-4 rows of dark spots on rays, except distally so the fin margin is white; pelvic and anal fins without dark pigmentation. When touching the dorsal margin of the crest, the reticulations make the crest there dark, otherwise the crest is a light creamy color along the margin. The lateral line is light, sometimes in marked contrast to the rest of the flank. The rostral barbels and their bases are dark pigmented, but the maxillary pair is almost immaculate.

***Remarks:*** This species is restricted to the Sistan basin of Iran and presumably Afghanistan. Banarescu and Nalbant (1995) and Nalbant and Bianco (1998) placed this species in *Paracobitis*. Banarescu and Nalbant (1966) place this species in the Atrak and Safid rivers of the Caspian Sea basin, the Abkhar River of central Iran, probably most of Iran, the Helmand drainage and the Tedzhen River, evidently confusing it with *P. malapterura* and *P. iranica*. Abdoli (2000) lists as questionably from the Bejestan, Kerman-Na'in and Dasht-e Lut basins, from the middle and lower Halil and Bampur rivers of the Hamun-e Jaz Murian basin, and from the Simish and the Mashkid rivers to its north in the Mashkid River basin.

***Distribution:*** This species is restricted to the Sistan basin of Iran and presumably Afghanistan.

***Habitat:*** *Paracobitis rhadinaea* was found from Chahnime Reserviours. The species was distributed in the Hamoun wetland (Sistan basin, in southeast of Iran), but since making some dams on Hirmand River (the water supply of the wetland) in Afghanistan, the wetland was dried from one decade ago. After the wetland dried the fish has remained in related reservoirs to the wetland (Mousavi-Sabet et al., 2013).

***Conservation:*** Urgent actions such as habitat protection, education of local fishermen and fishing management are needed to preserve this important species (Mousavi-Sabet et al., 2013).

***Examined materials:*** *Paracobitis iranica*: VMFC PC116SE, 6, 31.4 - 67.9 mm SL; Iran: Qom Province, Qom River, Namak Lake basin, 34°43'14"N; 50°26'96"E; VMFC PC122KA, 2, 35.4 - 65.1 mm SL; Iran: Qazvin Province, Khar-Rud River, Namak Lake basin, 35°47'48.00"N 49°22'46.11"E; VMFC PC133KA, 3, 45.4 - 68.5 mm SL; Iran: Hamedan Province, Zehtaran stream, Namak Lake basin, 35°14'17.31" N; 49°06'45.09" E, 1771m altitude. *Paracobitis longicauda*: VMFC PC213HM, 3, 31.4 - 88.6 mm SL; Iran: Khorasan-e-Razavi Province, Laiin Stream, Hari River basin,

36°59'38.72"N; 59°45'11.97"E. *Paracobitis malapterura*: VMFC PC414SV, 4, 66.0 - 127.1 mm SL; Iran: Markazi Province, Mazlaghan-Chay River, Namak Lake basin, 34°54'27"N; 50°11'09"E; VMFC PC4226SV, 26, 57.6 - 84.1 mm SL; Iran: Markazi province, Ghareh-Chay River, Namak Lake basin, 34°53'25"N; 50°02'25"E; VMFC PC4312SE, 12, 34.3 - 84.1 mm SL; Iran: Alborz Province, Kordan River, Namak Lake basin, 35°56'51.30"N; 50°49'46.76"E; VMFC PC443HM, 3, 79.3 - 88.0 mm SL; Iran: Alborz Province, Kordan River, Namak Lake basin, 35°56'51.30"N; 50°49'46.76"E. *Paracobitis rhadinaea*: VMFC PC510AG, 10, 147.8 - 193.8 mm SL; Iran: Sistan and Balouchestan province, Chahnime reservoirs, Sistan basin, 30°52’19"N 061°39’33"E; *Paracobitis vignai*: VMFC PC612KA, 2, 108.7 – 118.0 mm SL; Iran, Sistan and Balouchestan Province, Chahnime reservoir, Sistan basin, 30°53’47"N 061°40'31"E.

## References


Abdoli A. (2000). The inland water fishes of Iran. Iranian Museum of Nature and Wildlife, Tehran: 378 pp. (In Persian).

Banarescu P., Nalbant T. (1964). Süßwasserfische der Türkei. 2. Teil Cobitidae. Mitteilungen aus dem hamburgischen Zoologischen Museum und Institut, 61: 159-201.

Banarescu P., Nalbant T. (1966). The 3rd danish expedition to central Asia. Zoological Results, 34. Cobitidae (Pisces) from Afghanistan and Iran. Videnskabelige Meddelelser fra Dansk naturhistorisk Forening, 129: 149-186.

Banarescu P., Nalbant T. (1995). A generical classification of Nemacheilinae with description of two new genera (Teleostei: Cypriniformes: Cobitidae). Travaux du Muséum d'Histoire Naturelle Grigore Antipa, Bucurešti, 35: 429-496.

Bleeker P. (1863). Sur les genres de la famille des Cobitioïdes. Nederlands Tijdschrift van Dierkunde, 1: 361-368.

Coad B.W. (2014). Freshwater Fishes of Iran. Available from: www.briancoad.com. Retrieved 2/10/2004.

Kottelat M., Freyhof J. (2007). Handbook of European freshwater fishes. Kottelat, Cornol and Freyhof, Berlin, 646 p.

Kottelat M. (1990). Indochinese nemacheilines. A revision of nemacheiline loaches (Pisces: Cypriniformes) of Thailand, Burma, Laos, Cambodia and southern Viet Nam. Verlag Dr. Friedrich Pfeil, München: 262 p.

Kottelat M. (2012). Conspectus cobitidum: an inventory of the loaches of the world (Teleostei: Cypriniformes: Cobitoidei). The Raffles Bulletin of Zoology, 26: 1-199.

Min R., Chen X.-Y., Yang J.-X. (2010). *Paracobitis nanpanjiangensis*, a new loach (Balitoridae: Nemacheilinae) from Yunnan, China. Environmental Biology of Fishes, 87: 199-204.

Mousavi-Sabet H., Gharaei A., Ghaffari M. (2013) .Threatened fishes of the world: *Paracobitis rhadinaeus* (Regan, 1906) (Nemacheilidae). Croatian Journal of Fisheries, 71: 87-89.

Nalbant T.T., Bianco P.G. (1998). The loaches of Iran and adjacent regions with description of six new species (Cobitoidea). Italian Journal of Zoology, 65: 109-123.

Nguyen V.H. (2005). Freshwater fishes of Vietnam. v. 2: 760 p.

Prokofiev A.M. (2009). Problems of the classification and phylogeny of Nemacheiline loaches of the group lacking the preethmoid I (Cypriniformes: Balitoridae: Nemacheilinae). Journal of Ichthyology, 49 (10): 874-898.