

Article

Threatened fishes of the world: *Paracobitis persa* Freyhof, Esmaeili, Sayyadzadeh & Geiger, 2014 (Teleostei: Nemacheilidae)

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Abstract

Paracobitis persa is an endemic nemacheilid fish from the endorheic Kor River basin, southern Iran. Its populations have declined due to various ecological changes in its habitats, leading to increased concern and the need for conservation. This paper reviews the available data on taxonomy and distribution of *P. persa* and recommends actions for the sustainable conservation of its remaining isolated population.

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Systematics

Order Cypriniformes

Superfamily Cobitoidea

Family Nemacheilidae

Genus *Paracobitis*: Most nemacheilid loaches with a high dorsal adipose crest, especially those occurring in Central Asia (Bănărescu and Nalbant 1964), Vietnam (Nguyen 2005), the Middle East (Prokofiev 2009), and China (Min et al. 2010) have been placed in the genus *Paracobitis*. The genus *Paracobitis* was established by Bleeker (1863: 37) for *Cobitis malapterura*. Prokofiev (2009) rediagnosed the genus, and recognized 13 valid species. As of date, four species recognized by Prokofiev (2009) are placed in the genus *Oxyoemacheilus* (Freyhof et al. 2012), and *P. macmahoni* is treated as synonym of *P. rhadinaea* (Bănărescu and Nalbant 1966; Kottelat 2012). There are currently 13 recognized species in this genus: *Paracobitis atrakensis* Esmaeili, Mousavi-Sabet, Sayyadzadeh, Vatandoust & Freyhof, 2014; *Paracobitis basharensis* Freyhof, Esmaeili, Sayyadzadeh & Geiger, 2014; *Paracobitis ghazniensis* Bănărescu & Nalbant, 1966; *Paracobitis hircanica* Mousavi-Sabet, Sayyadzadeh, Esmaeili, Eagderi, Patimar & Freyhof, 2015; *Paracobitis iranica* Nalbant & Bianco, 1998; *Paracobitis longicauda* Kessler, 1872 (Eastern crested loach); *Paracobitis malapterura* Valenciennes, 1846 (Western crested loach); *Paracobitis molavii* Freyhof, Esmaeili, Sayyadzadeh & Geiger, 2014; *Paracobitis persa* Freyhof, Esmaeili, Sayyadzadeh & Geiger, 2014; *Paracobitis rhadinaea* Regan, 1906; *Paracobitis smithi* Greenwood, 1976 (Blind loach); *Paracobitis vignai* Nalbant & Bianco, 1998; *Paracobitis zabgawraensis* Freyhof, Esmaeili, Sayyadzadeh & Geiger, 2014.

Species *Paracobitis persa* Freyhof, Esmaeili, Sayyadzadeh & Geiger, 2014, 29, figs. 19-22 [Ichthyological Exploration of Freshwaters v. 25 (no. 1)] Fars Province, Malosjan Spring, East of Beiza, Kor River basin, 29°52'23"N, 52°27'37"E, Iran. Holotype: ZM-CBSU J2659.

Common name: Persian crested loach, Kor crested loach, (Persian: لوچ ماهی تاج دار پارسی).

Morphology: *Paracobitis persa* is superficially similar to *P. malapterura* from which it is distinguished by having a very shallow caudal adipose crest, its depth at the highest point being 2.1-3.2% SL (vs. 3.3-3.8 in *P. malapterura* of same size), the tube of the anterior nostril not reaching beyond the posterior tip of the posterior nostril when folded back (vs. fully overlapping posterior nostril when folded back in *P. malapterura*) and the mid-lateral stripe being always disconnected from the blotches and saddles on the caudal adipose crest (vs. connected in individuals



Figure 1. Live specimen of *Paracobitis persa* from Malosjan Spring, Kor River Basin.



Figure 2. *Paracobitis persa* from Sivand (Pulvar) River, Kor River basin.

larger than 50 mm SL) (Freyhof et al. 2014).

Medium-sized, elongate and laterally compressed species with short head. Pre-dorsal contour convex, pre-pelvic contour straight. Body deepest at about dorsal-fin origin or slightly anterior to it, depth decreasing towards caudal-fin base. No hump at nape. Greatest body width at pectoral-fin base, body almost equally wide until dorsal fin-origin. Section of head roundish, flattened on ventral surface. Caudal peduncle strongly compressed laterally, without crest 1.4-1.5 times longer than deep. A small, often indistinct axillary lobe at base of pelvic fin, completely attached to body. Pelvic-fin origin below last unbranched dorsal-fin ray. Pectoral fin reaching approximately 50% of distance from pectoral-fin origin to pelvic-fin origin. Pelvic fin not reaching anus. Moderately high adipose crest and a very shallow ventral adipose crest on caudal peduncle. Dorsal fin reaching anteriormost tip of adipose crest when folded down. Anus about one eye diameter behind anal-fin origin. Margin of dorsal fin straight or convex. Caudal fin emarginated. Dorsal fin with 7 1/2 branched rays. Anal fin with 5 1/2 branched rays. Caudal fin with 9 + 8 branched rays. Pectoral fin with 9-11, and pelvic fin with 7-8 branched rays. Flank behind dorsal-fin origin covered with small, deeply embedded scales. Back and anterior flank naked. Lateral line complete, with 85-91 pores, often irregularly set and in some individuals slit-shaped on caudal peduncle. Anterior nostril opening as pointed and flap-like tube. Posterior nostril oval, posterior tip of anterior nostril not reaching to posterior nostril when folded down. One central and lateral pore in supratemporal canal. A second, much smaller lateral pore in supratemporal canal in some individuals. 9-13 pores in anterior infraorbital canal, three pores in posterior infraorbital canal, 6-8 pores in supraorbital canal and eight pores in preoperculo-mandibular canal. No suborbital flap or groove in males. Mouth small, arched. Lips moderately thick with prominent furrows. A median interruption in lower lip. Upper lip without median incision. Processus dentiformis

large and blunt. No median notch in lower jaw. Barbels moderately long, inner rostral barbel reaching to about 2/3 of distance to base of maxillary barbel; outer one reaching vertical of or slightly beyond posterior base of maxillary barbel. Maxillary barbel reaching vertical of posterior half of eye (Freyhof et al. 2014). No external sexual dimorphism (Figs. 1, 2).

Coloration: Background colour on head and body beige with brown pattern. Dorsal surface of head pale-brown with an irregular net of narrow beige lines or pale-brown background or beige and brown marbled. Predorsal back with a coarse brown marbled pattern. A midlateral series of irregularly shaped dark brown blotches fused into a stripe. A series of 3-6 dark-brown irregularly shaped saddles or marmorate pattern on dorsal adipose crest extending ventrally to upper part of caudal peduncle. Midlateral stripe and marbled dorsal pattern confluent on anterior flank in individuals larger than 40 mm SL. Midlateral stripe always disconnected from blotches and saddles on caudal adipose crest. Bold dark-brown, irregularly shaped bar at caudal-fin base, wider in middle. A dark brown spot at uppermost caudal-fin base, confluent with bar at caudal-fin base in some individuals. Anterior dorsal fin with dark-brown blotch at base and a second dark-brown blotch at middle of dorsal-fin base, both blotches confluent with blotches below dorsal-fin base. Rays in dorsal and caudal fin hyaline at base and at tip, dark-brown in middle; a dark-brown bar on distal part of caudal rays in some individuals. Anal, pectoral and pelvic fins hyaline, dusty brown membranes in some individuals (Freyhof et al. 2014).

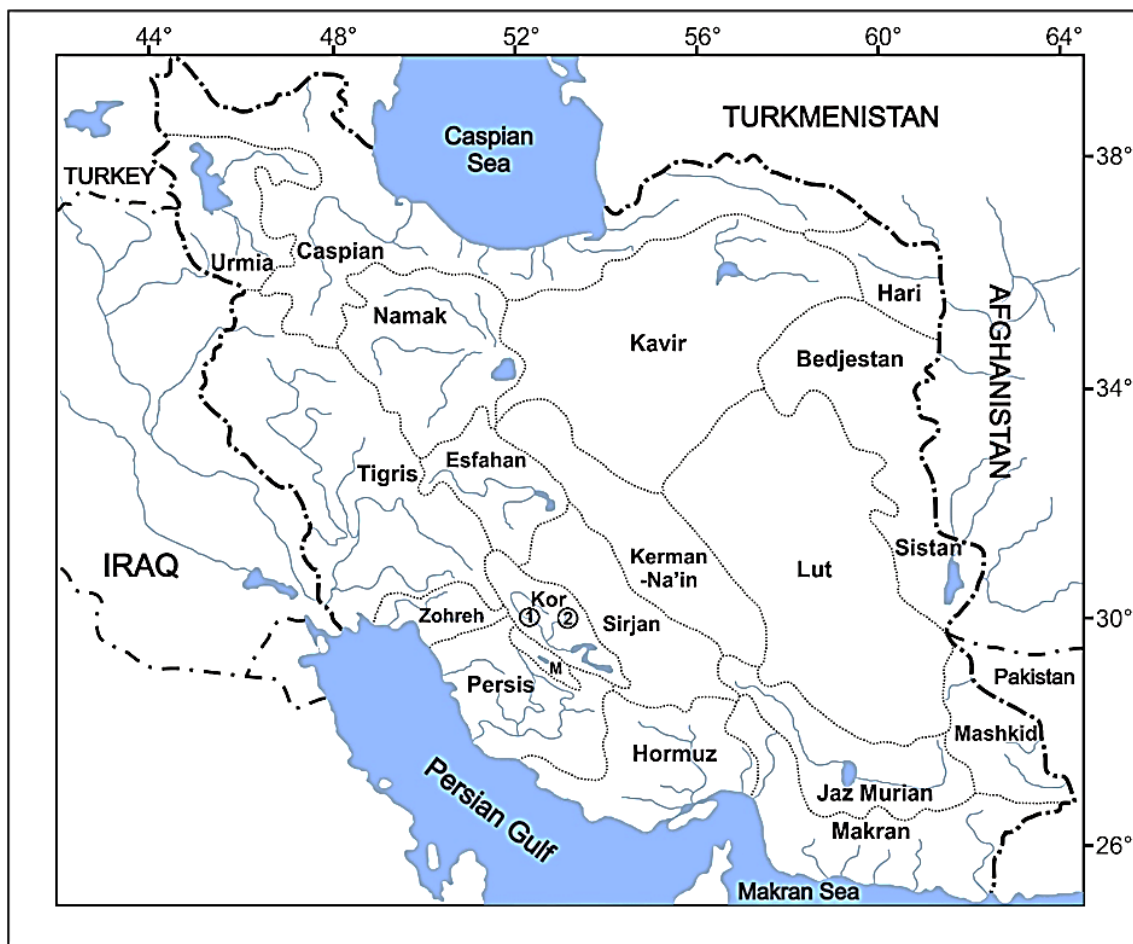


Figure 3. Geographic distribution map of *Paracobitis persa* in Kor River basin 1: Malosjan Spring; 2: Sivand River.

Size: Largest known specimen 81 mm SL.

Distribution: *Paracobitis persa* were reported from the Malosjan Spring and the Sivand River, which are both situated in the endorheic Kor River basin in southern Iran (Fig. 3), but an extensive survey failed to find specimens



Figure 4. Natural habitat of *Paracobitis persa* Malosjan Spring, Kor River basin.

from the Sivan River during the last few years.

Individual abundance: Low.

Habitat and ecology: At the sampling site, Malosjan Spring is a very small stream, about 1 m wide (Fig. 4) draining to a large pool. The substrate consists of mud, gravel and plant debris and the water is calm-running and almost transparent.

Reproduction: No data is available.

Co-existing species: *Acanthobrama persidis*, *Alburnoides qanati*, *Alburnus mossulensis*, *Capoeta saadii* (Cyprinidae), *Oxynoemacheilus persa* (Nemacheilidae) *Aphanius sophiae* (Cyprinodontidae), *Gambusia holbrooki* (Poeciliidae) and *Oncorhynchus mykiss* (Salmonidae) are co-existing fishes with *P. persa* in the Malosjan Spring. A native freshwater shrimp, *Caridina fossarum* Heller, 1862 (Decapoda: Caridea: Atyidae) also co-exists with *P. persa*.

Threats:

(I) Human-induced disturbance.

Introduction of exotic species: *Oncorhynchus mykiss* (Salmonidae) and *Gambusia holbrooki* (Poeciliidae) are two exotic species introduced to the type locality of the Fars crested loach for aquaculture and mosquito control purposes.

Water pollution: Agricultural and industrial activities in the region near the type locality are currently the main sources of water pollution in this small basin. They have also added a high nutrient load.

Hydrological alteration: Dams (Dorodzan and Sivand) and pumping water from the aquifer which feeds the systems of the Kor River basin, are the main hydrological alterations which have affected *P. persa* populations, especially during the last decade. These factors have led to the habitat fragmentation of Fars crested loach.

Intensive aquaculture industry: During the last few years, several fish farms were developed to culture exotic Chinese carps (*Cyprinus carpio*, *Hypophthalmichthys molitrix*, *H. nobilis* and *Ctenopharyngodon idella*) and



Figure 5. Human-induced disturbance at the type locality of *Paracobitis persa* (Malosjan Spring).

O. mykiss in the Kor River basin. However, *C. gibelio* and *P. parva* were introduced accidentally along with the Chinese carps.

These farmed exotics species (and previously introduced *G. holbrooki*) could have major effects on *P. persa* populations through competition, habitat changes and introduction of parasites. Moreover, due to changing water regimes of springs and pools caused by a trout fish farm at the type locality of the Fars crested loach (Fig. 5), severe habitat modifications have occurred, causing a decline in the last population of *P. persa*.

(II) Natural disturbance.

Drought can be considered as the most important natural disturbance of freshwater fishes of Iran, and it has recently become a critical problem for freshwater ecosystems, particularly in the Kor endorheic basin. Due to severe drought many small springs and pools located in this basin dried out periodically and led to the loss of *P. persa* populations.

Conservation actions: No conservation actions have been taken although a report on the unsuitable conditions of the Malosjan spring-stream system was submitted to the Department of Environment with recommendations for habitat protection which is going to be considered.

Conservation recommendations: May come under more threat. Developing a conservation strategy for the species, estimation of extinction rate, habitat monitoring, conducting ecological studies, captive breeding, investigation on the possibility of translocation (moving fish to a special reserve where they will have greater protection), engaging the local communities, NGO and media in a conservation program, working with local communities and NGOs, and sharing the conservation knowledge with them, could conserve this endemic crested loach having their future generations.

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