

SHORT COMMUNICATION

## THREATENED FISHES OF THE WORLD: *Aphanius farsicus* Teimori, Esmaili and Reichenbacher, 2011 (Cyprinodontidae)

Yazdan Keivany<sup>1\*</sup> and Hamid Reza Esmaili<sup>2</sup>

<sup>1</sup> Department of Natural Resources (Fisheries Division), Isfahan University of Technology, Isfahan 84156-83111, Iran

<sup>2</sup> Department of Biology, College of Science, Shiraz University, Shiraz, Fars, Iran

\* Corresponding Author, E-mail: keivany@cc.iut.ac.ir

### ARTICLE INFO

Received: 10 July 2013

Received in revised form: 11 October 2013

Accepted: 16 October 2013

Available online: 23 October 2013

#### Keywords:

*Aphanius farsicus*

Cyprinodontidae

Fars Basin

Conservation

Iran

Threatened fish

### ABSTRACT

Tooth-carp *Aphanius farsicus* Teimori, Esmaili and Reichenbacher, 2011 (Cyprinodontidae), or Farsi endemic tooth-carp, was once common in the Maharloo Lake Basin (Fars), but is disappearing now from its native region. This fish has not been listed in IUCN Red Data Book even though it should be due to criteria such as restricted distribution, destruction of spawning grounds and environmental pollution and drought. This vulnerable species has considerable ecological importance, but there are little data on its biology. The limited available data on its systematics, distribution, ecology, reproduction and threats are summarized and discussed.

### COMMON NAMES

Mahi-ye gor-e khari (Persian), meaning striped fish or zebra fish, refers to the stripes on the fish flanks. Kapour dandan-e-Fars (Persian), meaning Farsi tooth-carp. Mahi-ye parchami (Persian), meaning flag fish. Farsi killifish or tooth-carp (English) (Figure 1).



Fig 1. Photos of a female (top) and a male (below) *Aphanius farsicus* in the Maharloo Lake Basin (Fars)

### CONSERVATION STATUS

IUCN Red List: not evaluated; Iran: unknown (Coad, 2006, 2013; Keivany et al., 2013). Not protected.

### IDENTIFICATION

*Aphanius farsicus* is distinguished at the genetic level from all other species of *Aphanius* by molecular apomorphies which show fixed-character state differences to homologous characters analyzed in other species from Iran (Hrbek et al., 2006). Counts of male flank bars are significantly fewer than in *A. sophiae*, the species in nearby water bodies. The bars are broad with interspaces about equal or slightly narrower. The bars extend from behind the head to the tail. Anterior bars fade on the belly, whereas posteriorly on the caudal peduncle, they encircle the body. The eye is bounded ventrally and postero-ventrally by a thin line of black pigment. The anal fin has a broad, blackish margin with the rest of the fin light cream-coloured. The caudal fin rays and membranes are sparsely pigmented and the whole margin may be blackish, but, in most fish, pigment is restricted to the upper and lower margins.

Females of this species are barred, where females of all other *Aphanius* species in this area of Iran are spotted (Figure 1). The chromosome number of this species is  $2n=48$ , including 11 pairs of submetacentric and 13 pairs of subtelocentric chromosomes. The fundamental number is  $FN = 70$ . Sex chromosomes are cytologically indistinguishable (Esmaili et al., 2007).

## DISTRIBUTION

This species is restricted to the Maharloo Lake Basin in the Fars Province, southwestern Iran (Figure 2). So far, it has been recorded only from a few localities, including springs around the lake (Coad, 2000; Keivany et al., 2013).



Fig 2. Map of Iranian water basins and distribution of *Aphanius farsicus* in the Fars basin

## ABUNDANCE

Sporadic, local medium sized populations.

## HABITAT AND ECOLOGY

*Aphanius farsicus* is commonly found in the springs and pools draining into Maharloo Lake. The bottom of these bodies is generally muddy with clear and slow water. *Phragmites sp.* and *Juncus sp.* were the dominant aquatic plants. Caspian turtle, *Mauremys caspica ventrimaculata*, and marsh frog, *Pelophylax ridibundus*, were the other vertebrate species found in these springs. Water temperature in October was 17-19°C with a pH of 6.7,  $O_2$  4-6 mg/l., nitrate 0.9-1.6 mg/l, nitrite 0.03-0.06 mg/l, phosphate 0.35-0.65 mg/l and ammonium 1.5-2.6 mg/l. (Esmaili and Shiva, 2006).

The typical habitat consists of slow-running waters with rich aquatic vegetation where the fish re-

main among aquatic vegetation during most of the day. It feeds mainly on aquatic insect larvae and associated algae. Maximum recorded age is 3+ years; total length is 60 mm and total weight is 5 g.

Spawning occurs mainly between May and August, with a peak in June, indicating a prolonged reproductive period. The absolute fecundity ranges between 45-250 eggs (116 in average), and the relative fecundity between 22-244 eggs per 1 gram of body weight (90 in average) with a diameter of up to 1.7 mm (0.5 in average). The sex ratio is about 2F:1M (Esmaili and Shiva, 2006). Alavi-Yeganeh et al. (2011) gave the length-weight relationship for Iranian tooth-carps, including this species.

## THREATS

The lake and surrounding springs are experiencing drought for much of the year, especially in recent years, and are subject to pollution. Some of the springs which were the major habitat of this species have been totally destroyed or turned into concrete canals. It is endangered by anthropogenic effects which lower the quality of its limited habitats. Introduction of exotic Chinese carps, *Pseudorasbora parva* and *Gambusia holbrooki*, is another threat to this endemic fish.

## CONSERVATION ACTION

Not protected.

## CONSERVATION RECOMMENDATION

Urgent habitat protection is suggested. A detailed study of current population status, biology and ecology of the fish is required in order to design a captive breeding protocol and management of the fish. Unfortunately, the published data on different aspects of *A. farsicus* is limited. Therefore, effort on the part of scientists and governments should be made in understanding the biology, ecology and behaviour of this vulnerable species. One key objective in working with endangered species is to increase the number of individuals of the species concerned by artificial/controlled reproduction in captivity. Unfortunately, there is no policy for preserving this species. The introduction of the species to suitable nearby water bodies and education of local communities is also recommended. More basic ecological information is needed for this species, including habitat requirements, life history and reproduction behaviour, and surveys of existing populations. This fish has not been listed in IUCN Red Data Book (2013), but should be due to criteria such

as restricted distribution and destruction of habitats and environmental pollution.

## REMARKS

Gaudant (2011) has shown that *Brachylebias* Priem, 1908 is a junior synonym of *Aphanius* Nardo, 1827 and that therefore a new name for the Late Miocene species *Brachylebias persicus* Priem, 1908 is *Aphanius persicus* (Priem, 1908). In addition, he stated that a new name has to be assigned to the extant *A. persicus* (Jenkins, 1910). Teimori et al. (2011) showed that slight differences are present in the meristic characters between the fossil *A. persicus* (Priem, 1908) and the extant *A. persicus* (Jenkins, 1910), and that clear differences are present with regard to the size and morphology of the scales and also with regard to the shape of the jaw teeth. They demonstrate that the epithets *blanfordii* and *pluristriatus*, both introduced for *Aphanius* species by Jenkins (1910), do not represent alternative names, and they introduce *A. farsicus* as a replacement name for *A. persicus* (Jenkins, 1910).

## ACKNOWLEDGMENTS

We would like to thank Mr. Saeed Asadollah for his help during the fieldwork. This study was financially supported by the Isfahan University of Technology and Shiraz University.

## Sažetak

### UGROŽENE VRSTE RIBA U SVIJETU: *Aphanius farsicus* Teimori, Esmaili i Reichenbacher, 2011 (Cyprinodontidae)

Vrsta šaranozupke *Aphanius farsicus* Teimori (Esmaili i Reichenbacher, 2011) iz porodice Cyprinodontidae ili endemična farska vrsta nekoć je bila česta u slivu jezera Maharloo, a danas nestaje iz autohtonog staništa. Ova vrsta šaranozupke još se ne nalazi na popisu IUCN-ove Crvene knjige ugroženih vrsta, iako zadovoljava sve kriterije za svrstavanje na spomenuti popis – ograničena joj je distribucija, mrijestilišna područja se razaraju, zagađuje se okoliš i javlja se suša. Ova osjetljiva vrsta ima veliku ekološku važnost, ali postoji malo podataka o njezinoj biologiji. U ovom članku iznose se i analiziraju ograničeni dostupni podaci o njezinoj sistematici, distribuciji, ekologiji, reprodukciji i prijetnjama koje joj ugrožavaju stanište.

**Ključne riječi:** *Aphanius farsicus*, Cyprinodontidae, farski sliv, očuvanje, Iran, ugrožena riba

## REFERENCES

- Alavi-Yeganeh, M. S., Seifabadi, S. J., Keivany, Y., Kazemi, B., Wallis, G. P. (2011): Comparison of length-weight relationships in different populations and sexes of Iranian toothcarps. *Journal of Applied Ichthyology*, 27, 1401-1403.
- Coad, B. W. (1996): Systematics of the tooth-carp genus *Aphanius* Nardo, 1827 (Actinopterygii: Cyprinodontidae) in Fars Province, southern Iran. *Biologia Bratislava*, 51, 163-172.
- Coad, B. W. (2000): Distribution of *Aphanius* species in Iran. *Journal of the American Killifish Association*, 33, 183-191.
- Coad, B. W. (2013): Freshwater Fishes of Iran. (Accessed on 11 July 2013). Available at: <http://www.briancoad.com>
- Esmaili, H. R. and Shiva, A. H. (2006): Reproductive biology of the Persian Tooth-carp, *Aphanius persicus* (Jenkins, 1910) (Cyprinodontidae) in southern Iran. *Zoology in the Middle East*, 37, 39-46.
- Esmaili, H. R., Piravar, Z. and Shiva, A. H. (2007): Karyological Analysis of Two Endemic Tooth-Carps, *Aphanius persicus* and *Aphanius sophiae* (Pisces: Cyprinodontidae), from Southwest Iran. *Turkish Journal of Zoology*, 31, 69-74.
- Gaudant, J. (2011): *Aphanius persicus* (Priem, 1908) (Pisces, Teleostei, Cyprinodontidae): une nouvelle combinaison pour *Brachylebias persicus* Priem, 1908, du Miocène supérieur des environs de Tabriz (Iran). *Geodiversitas*, 33, 2, 347-356.
- Hrbek, T., Keivany, Y., Coad, B. W. (2006): New species of *Aphanius* (Teleostei, Cyprinodontidae) from Isfahan province of Iran and a reanalysis of other Iranian species. *Copeia*, 2006, 244-255.
- IUCN (2013): IUCN Red List of Threatened Species. (Accessed on 11 July 2013). Available at: [www.iucnredlist.org](http://www.iucnredlist.org)
- Jenkins, J. T. (1910): Notes on fish from India and Persia, with descriptions of new species. 1. On a collection of fishes made by W. T. Blanford in 1872 in Persia and Baluchistan. *Records of the Indian Museum*, 5, 123-128.
- Keivany, Y., Nasri, M., Abbasi, K. (2013): Atlas of inland water fishes of Iran. Iran Department of Environment, Tehran, Iran (In press).
- Teimori, A., Esmaili, H. R., Reichenbacher, B. (2011): *Aphanius farsicus*, A Replacement Name For *A. persicus* (Jenkins, 1910) (Teleostei, Cyprinodontidae). *Zootaxa*, 3096, 53-58.