

**NEOTROPICAL PIRANHA, *SERRASALMUS MACULATUS* (ACTINOPTERYGII: CHARACIFORMES: SERRASALMIDAE), IN THE TIGRIS RIVER, BAGHDAD, IRAQ—A CASE OF DELIBERATE INTRODUCTION BY THE AQUARIUM TRADE**

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**Abstract.** Fifteen specimens (four females and eleven males) of the speckled piranha, *Serrasalmus maculatus* Kner, 1858, native to South America, were captured in the Tigris River at Al-Taji, 17 km north of the City of Baghdad, Iraq. They represent the first record for this species in Iraq and were captured on 1 February 2018 by anglers, using a hook and line. We suspect that the aquarium trade is accountable for the introduction of this species into Iraq. Moreover, a new maximum size was also recorded based on the specimens examined. The gonads were dissected for a microscopic examination to determine the gender and the state of maturity. The reproductive state suggests that the population of *S. maculatus* has established itself in the area and is reproducing. An efficient system needs to be put in place to screen the introduction of fishes in order to identify potentially harmful species before their release to the aquarium market.

**Keywords:** speckled piranha, Iraq, Tigris River, new record, new maximum length

## INTRODUCTION

The family Serrasalmidae is one of the largest families in the order Characiformes. It contains 97 species belonging to 16 genera, with *Serrasalmus* being the most numerous genus with 31 species (Fricke et al. 2018). Piranhas are dangerous to humans, injuring bathers and swimmers, but truly serious attacks have also been reported (Haddad Junior and Sazima 2010). The members of this family are endemic to the Neotropical realm and are widely distributed in all the major river systems of South America. The subject of this paper, the speckled piranha, *Serrasalmus maculatus* Kner, 1858, is a freshwater species confined to the Amazon and Paraguay–Paraná River basins in South America (Kner 1858, Jégu 2003). We report, however, the presence of this ornamental aquarium species in the open waters of the Tigris River near the capital city of Baghdad in Iraq. This appearance implies an introduction of a potentially harmful species into the inland waters of Iraq. Moreover, it seems to be well established in its new habitat, so that it can be considered an invasive species.

The speckled piranha has the following set of characters: body deep and compressed; dorsal profile of head slightly steep; snout short; eye large, with large pupil and vertical dark bar; mouth short; upper jaw shorter than

lower; teeth on premaxilla and dentary high and pointy; posterior dorsal edge of 1st dorsal fin rounded; caudal fin slightly forked; abdominal scales modified to sharp serrated; ventral side of operculum and pectoral fins red-orange; anterior ventral part of body red-orange to yellow at posterior part of pelvic fin; large black spots on body extending from posterior edge of operculum to base of caudal fin; no spots on dorsal part of body; pectoral and pelvic fins red-orange colour; dorsal fin black; anterior ventral side of anal fin dark red-black.

## MATERIAL AND METHODS

Fifteen specimens (four females and eleven males) were captured on 1 February 2018 in the Tigris River at Al-Taji, 17 km north of the City of Baghdad, Iraq (33°32'03.2"N, 44°18'01.43"E). The fish specimens were captured by anglers, using a hook and line. The specimens of *S. maculatus* is identical to the description of this species given by Jégu (2003). The identification was based on Jégu and Dos Santos (2001). The nomenclature follows Fricke et al. (2018). They were caught in the winter when the water temperature is 6–10°C. Some specimens appeared moribund at the surface of the water because of the low temperature, but they became active again once placed in warm water.

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## RESULTS

The sample contained four adults (three females and one male, whose gonads were dissected to determine the gender and the state of maturity. The adults proved to be sexually mature with large ovaries and readily visible oocytes. Such a reproductive state suggests that individuals are actively reproducing and have, therefore, probably established a sustainable population.

A series of morphometric measurements were made with a ruler to the nearest mm following the methods of Jégu and Dos Santos (2001) (Table 1). The total length of the specimens ranged from 95.0 to 296.2 mm, which is larger than the lectotype NMW 17995 (162 mm), the paralectotype NMW 16230 (154 mm) (Jégu and Dos Santos 2001), the three specimens examined by Jégu (2003) (122, 154, and 162 mm), or the maximum total length given by Marques et al. (2016). Therefore, a new maximum total length has been recorded for this species in the present study.

## DISCUSSION

The speckled piranha differs from its congener, *Serrasalmus spilopleura* Kner, 1858, in the following characteristics: the predorsal and the preanal distances are longer in *S. maculatus* than in *S. spilopleura*; number of the lateral line scales is lower than that in *S. spilopleura*; the black spots and flanks, are much larger and less numerous than in *S. spilopleura*.

The only Neotropical fish species that has been recorded from the natural waters in the Middle East is the red-bellied pacu, *Piaractus brachypomus* (Cuvier, 1818). One specimen of this species has been collected from the freshwater system in Iran (Esmaeili et al. 2017). No other records of piranha have been reported from the neighbouring areas. Therefore, the possibility of the speckled piranha to invade the inland waters of Iraq in a natural way is nil.

The speckled piranha may be harmful in several ways to both humans and the freshwater environment of Iraq, especially because it is now established in this new habitat as can be judged from the fertility and the number and size of specimens. The observation of the speckled piranha in Iraq should lead to strong measures to regulate the importation of species in the aquarium trade, which is responsible for the access to new habitats for many fishes, plants and invertebrate species worldwide (Rixon et al. 2005). Recently, the aquarium trade in Iraq attracts a large number of people and, therefore, a large number of native South American freshwater fish species are imported to big cities such as Baghdad and Basrah. A release of potentially harmful species, e.g., piranhas, in the numerous rivers and streams of Iraq will have an impact on the biodiversity. Regulations to prevent the introduction of unwanted aquarium species, as well as the education of all participants in the aquarium trade industry, should be besought with

**Table 1**  
Morphometric measure and meristic characters of *Serrasalmus maculatus* from the Tigris River, Baghdad, Iraq

| Character                           | Presently reported study |            |           |           | Jégu et al. 2001 |                    |
|-------------------------------------|--------------------------|------------|-----------|-----------|------------------|--------------------|
|                                     | [mm]                     | [%TL]      | [%HL]     | [%SL]     | Lectotype [mm]   | Paralectotype [mm] |
| Total length                        | 95.0–269.2               |            |           |           | —                | —                  |
| Standard length                     |                          | 87.0–153.8 |           | 51.6–57.1 | 162              | 122                |
| Fork length                         |                          | 92.0–207.7 |           | 19.2–21.1 | —                | —                  |
| Head length                         | 21.0–39.2                |            |           | 24.1–25.5 | 55.4             | 57.2               |
| Preorbital length                   |                          |            | 3.6–10.8  | 17.1–27.6 | —                | —                  |
| Postorbital length                  |                          |            | 13.0–17.7 | 44.2–61.9 | 17.5             | 17.3               |
| Eye diameter                        |                          |            | 2.1–9.2   | 10.0–97.8 | 7.0              | 8.3                |
| Pre-1st dorsal fin length           | 31.0–78.5                |            |           | 35.6–51.0 | 60.9             | 60.0               |
| Post-1st dorsal fin length          | 34.0–105.4               |            |           | 39.1–68.5 | —                | —                  |
| Pre-2nd dorsal fin length           | 72.0–134.6               |            |           | 82.8–87.5 | —                | —                  |
| Post-2nd dorsal fin length          | 73.0–143.1               |            |           | 83.9–93.0 | —                | —                  |
| Prepectoral fin length              | 23.0–43.8                |            |           | 26.4–81.4 | 30.2             | 32.6               |
| Prepelvic fin length                | 32.0–86.9                |            |           | 36.8–56.5 | 51.6             | 50.4               |
| Preanal fin length                  | 37.0–126.9               |            |           | 44.1–82.5 | 69.1             | 67.4               |
| Postanal fin length                 | 74.0–145.4               |            |           | 85.1–94.5 | —                | —                  |
| Caudal peduncle length              | 5.1–11.5                 |            |           | 5.9–7.5   | —                | —                  |
| Caudal peduncle depth               | 10.2–17.7                |            |           | 11.7–12.6 | 10.7             | 9.1                |
| Body depth                          | 26.4–86.2                |            |           | 30.3–56.1 | —                | —                  |
| Dorsal fin ray count                | 15–16                    |            |           |           | 14               | 14                 |
| Anal fin ray count                  | 33–35                    |            |           |           | 32               | 30                 |
| Pelvic fin ray count                | 6–7                      |            |           |           | —                | —                  |
| Pectoral fin ray count              | 14                       |            |           |           | —                | —                  |
| Total number of abdominal serration | 34–36                    |            |           |           | 34               | 36                 |
| Number of the lateral line scales   | 70–80                    |            |           |           | 78               | 84                 |

HL = head length, SL = standard length, TL = total length

better authority (Knight 2010). An efficient system needs to be put in place to screen the introduction of fishes in order to identify potentially harmful species before their release to the aquarium market (Rixon et al. 2005).

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