

The shoemaker spinefoot *Siganus sutor* (Valenciennes, 1835) in the marine waters of Iraq: second appearance and the northernmost record in the northern Indian Ocean

by

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Abstract

A new record of *Siganus sutor* from inland artificial marine extension Shatt al-Basrah canal, south of Iraq, is reported. Two specimens were collected during an ichthyologic survey on 2 November 2021. The specimens are 127 and 129 mm in total length. This record from Iraqi waters represents the species' second and northernmost appearance in the northern Indian Ocean.

Key words: Siganidae, *Siganus*, Basrah, Iraq, Range extension, Indian Ocean

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1. Introduction

The Shatt Al-Basrah waterway (located in the south of Iraq) is an artificial canal opened in 1983 to assist in passing the flood water from the Al-Hammar Marshes into Khor Al-Zubair and then to the marine waters of Iraq (Al-Aesawi 2010). The canal is connected to a third water body, the so-called Third River, which is also an artificial canal built to drain the agricultural lands located in the middle and southern region of Iraq (Abbas 2015). Shatt Al-Basrah' Canal extends for 38 km and is located between 47°45'00" & 47°49'00" E and 30°18'00" & 30°39'00" N at Hareer, near Qarmat-Ali, north of Basrah, and runs southeast to connect with Khor Al-Zubair (Al-Aesawi 2010). A barrage to regulate the water at both sides of the canal is built near the merging point of the channel with Khor Al-Zubair (Al-Khayat 2007). The water drainage ability of this canal is about 325 SI during the flood and 1050 SI during the ebb tides to Khor Al-Zubair (Al-Badran et al. 1995). The width of the canal is 59 m, and the depth at neap tide is 3.5 m (Al-Katib 1972).

The living species of the family Siganidae are morphologically a very uniform group of coral-reef fishes of the order Acanthuriformes and are also known as rabbitfishes or spinefoots. They exhibit uniformity in these phenotypical characteristics (i.e., dorsal fins with 13 spines and ten rays and anal fins with seven spines and nine rays) (Woodland & Anderson 2014). They are considered essential entities as primary consumers in coral reef communities because they are active herbivores.

The shoemaker spinefoot *S. sutor* is a marine species observed entering brackish water areas. Individuals of this species prefer living in association with the reef at a depth range of 1–50 m (Al Sakaff & Esseen 1999) but usually at a depth of 1–12 m (Allen & Erdmann 2012). The maximum standard length reported for this species is 450 mm, with a common length of 300 mm (Woodland 1990). Individuals of this species can live up to 2.5 years (Grandcourt 2002).

This species is distributed in the Indian Ocean from East Africa, Seychelles, Comoro Islands, Madagascar, Reunion, Mauritius, and Rodriguez Island; in the East Andaman Sea off Thailand and Myanmar; and in the waters around Bali, Indonesia (Froese & Pauly 2021).

The present study reports the presence of *Siganus sutor* from a brackish water area located about 57 km north of the marine waters of Iraq. This represents the northernmost extension of this species in the northern Indian Ocean and the second record for the Arabian Gulf area.

2. Materials and methods

Two specimens of *S. sutor* were from a commercial catch obtained using a gill net on 2 November 2021 along Shatt al-Basrah Canal, southwest of the city of Basrah (N: 30. 43 89 28 E: 47. 76 25 27) (Fig. 1). The fish specimens were kept on ice in a portable ice box and made available for a complete examination and taxonomy study after having been deposited in the laboratory at the Department of Fisheries and Marine Resources, College of Agriculture, University of Basrah, Basrah, Iraq. After identification, the specimens were formalin-fixed and preserved in 70% ethanol for long-term storage in the fish collection at the Department of Fisheries and Marine Resources, College of Agriculture, University of Basrah. Specimens were categorised systematically based on the taxonomic characteristics given by Woodland (1990). Fricke et al. (2021) and Fricke (2021) were used for the taxonomic status of the species, spelling of species names, and taxonomic references respectively. Measurements were made with dial calipers to the nearest 0.1 mm according to Woodland (1990).

3. Results

Morphometric and meristic characters were measured and counted for the two specimens of *S. sutor* (Fig. 2) collected from the Shatt al-Basrah Canal, Basrah, in the south of Iraq (Table 1).

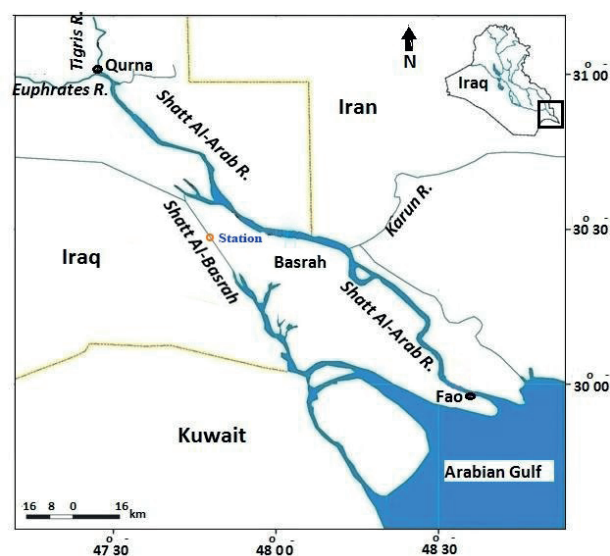


Figure 1

Sampling location of *Siganus sutor* at Shatt al-Basrah Canal, southern of Iraq

**Figure 2**

Siganus sutor, 129 mm TL collected from Shatt al-Basrah Canal, southern Iraq

Table 1

Morphometric and meristic characteristics of *Siganus sutor* collected from Shatt al-Basrah Canal, Basrah, southern Iraq

Morphometric characters (mm)	Present study		Barik et al. (2020)	Woodland (1990)
	Specimen no. 1	Specimen no. 2		
Total length (TL)	127	129	170	150
Standard length (% in TL) (SL)	103 (81.1),	105 (81.4)	145	134
Head length (% in SL)	28.4 (27.6)	28.3 (27.0)	25.5	23.9
Head depth (% in SL)	30.5 (29.6)	30.7 (29.2)	–	–
Interorbital width (% in HL)	8.0 (28.2)	8.1 (28.6)	–	–
Preorbital length (% in HL)	10.6 (37.3)	10.8 (38.2)	43.4	–
Eye diameter (% in HL)	10.8 (38.0)	10.6 (37.5)	32.4	31.3
Postorbital length (% in HL)	8.0 (28.2)	9.2 (32.5)	–	30.5
Pre-dorsal fin length (% in SL)	31.5 (30.6)	32.6 (31.1)	28.3	22.4
Pre-pectoral fin length (% in SL)	24.1 (23.4)	24.8 (23.6)	24.8	24.6
Pre-pelvic fin length (% in SL)	33.2 (32.3)	32.8 (31.2)	31.7	30.6
Pre-anal fin length (% in SL)	54.7 (53.1)	51.7 (49.2)	51.7	47.8
Dorsal fin base length (% in SL)	68.4 (66.4)	68.4 (65.1)	66.2	–
Anal fin base length (% SL)	41.5 (40.3),	43.4 (41.3)	–	–
Caudal peduncle length (% in SL)	12.6 (12.2)	13.1 (12.7)	–	–
Caudal peduncle depth (% in SL)	6.1 (5.9)	6.5 (6.2)	–	–
Meristic characters				
Number of spines of dorsal fin	XIII	XIII	XIII	XIII
Number of dorsal fin rays	10	10	10	10
Number of anal fin ray spines	VII	VII	VII	VII
Number of anal fin rays	9	9	9	10
Number of pectoral fin rays	17	16	15	–
Number of pelvic fin rays	II, 3	II, 3	II, 3	–
Number of caudal fin rays	17	17	18	–

The body oval is in shape, laterally compressed, relatively slender, with a small terminal mouth. The dorsal profile of the head is almost a straight line.

There is no scale on the midline of the thorax. The dorsal fin has slender spines; the fourth to eighth is the longest. The body generally is greenish to



sandy brown dorsally, paler on the ventral side, with dispersed small pale blue spots, some about three-fourths to equal orbit diameter. The opercular membrane is dark brown. The dorsal and anal fins are dark grey or yellowish-grey, mottled with brown.

4. Discussion

In the Arabian Gulf area, *S. sutor* was reported from the Coast of Lavan Island, Iran by Assadi & Dehghani (1997). Further confirmations of the presence of this species from Lavan Island only are given by Fouroughifard et al. (2009, 2020) and Shirinabadi et al. (2013). Therefore, the present record of *S. sutor* from a marine environment about 57 km away from the marine waters of Iraq is considered the second report of this species from the Arabian Gulf and the northernmost record in the northern Indian Ocean.

The size of the two specimens of *S. sutor* collected (127 and 129 mm TL) is smaller than the size reported by previous studies, Bianchi (1985) (common total length, 300 mm), Woodland (1990) (134 mm SL), Fouroughifard et al. (2009) (220–350 mm FL) and Shirinabadi et al. (2013) (306.4 mm TL) and they seem to be smaller in size in relation to the common size given by Bianchi (1985). On the other hand, the meristic characters agreed with those reported by Woodland (1990), Allen & Erdmann (2012), and Bogorodsky et al. (2020). Some morphometric characteristics such as fork length and postorbital length are shown to be different from those given for this species by Woodland (1990). Such differences might be due to geographical variation.

The straight head profile is a character that is shared between *S. sutor*, but the deeply forked caudal fin of the latter can easily individuate it from *S. sutor*. The distinctive body colouration distinguishes this species from the remaining species of the genus *Siganus*. Also, the presence of widely scattered and relatively large (compared to *S. argenteus*, *S. margaritifer*, and *S. canaliculatus*) bluish to bluish-white spots on the body is a distinct characteristic of *S. sutor* (Allen & Erdmann 2012).

The distance between Lavan Island, Iran, where *Siganus sutor* was first reported, and the Shatt al-Basrah Canal is 677 km. It is impossible for two small fish specimens to swim such a long distance to reach the south of Iraq, where they were recorded in the present study. Therefore, one possible explanation for the presence of these two specimens in Iraqi waters is that they were picked up in the ballast water of a ship visiting Lavan Island and bound for the marine waters of Iraq. The Arabian Gulf, in general, and the marine water of Iraq are considered one of the busiest

waterways in the world. Ballast water from ships may have provided a means for introducing juveniles of *S. sutor*.

From the distribution mentioned above and considering that the presence of the two specimens of *S. sutor* mentioned in this study was never before recorded in the literature of fish faunae of the Arabian Gulf and Iraqi (Jawad et al. 2018, Eagderi et al. 2019, Al-Faisal & Mutlak 2018), this first documentation of their occurrence in the study area indicates a significant range extension of their previously known distribution. It is premature to assess whether the two specimens represent single occurrences of stray individuals or whether a well-established population was hitherto undetected. Thus, to study the frequency of occurrence and to study the biological characteristics of this species, studies must be done to determine whether it has established a sustainable population in its new region.

Ethical approval and consent to participate

The fish material was obtained from a commercial catch. Therefore, no ethical approval is needed.

Human and animal ethics

N/A

Consent for publication

All authors of this manuscript agreed to submit it for publication in *Oceanologica and Hydrobiological Studies*.

Availability of supporting data

There are no supporting data to make available.

Competing interests

The authors declare that they have no conflict of interest.

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