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Occurrence of the arrow Bulleye *Priacanthus sagittarius* (Teleostei: Priacanthidae) in the Egyptian coast of the Mediterranean Sea

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Abstract

Background: *Priacanthus sagittarius* and *P.* arenatus are the only two priacanthid species recorded from the Mediterranean Sea.

Results: The Arrow Bulleye *Priacanthus sagittarius* is reported for the first time from Egyptian waters of the Mediterranean Sea. On 19 May 2015, a single juvenile specimen (129 mm total length) of *P. sagittarius* was captured at a depth of 35 m in a trawl in the waters around Alexandria, on the north coast of Egypt.

Conclusions: The current specimen represents the first record of the lessepsian *P. sagittarius* from Egyptian waters and the third from the Mediterranean Sea.

Keywords: New record, Alexandria, Priacanthidae, Lessepsian species

Background

The family Priacanthidae comprises four genera and 19 species. The genus *Priacanthus* represents the largest of these genera which includes 13 species (Eschmeyer 2014). Apart from *P. sagittarius* (Starnes 1988), only one other species of *Priacanthus* has been recorded from the Mediterranean Sea: *P. arenatus* (Froese & Pauly 2015). However, three species are known to occur in the Red Sea: *P. blochii* Bleeker, 1853, *P. hamrur* (Forsskål, 1775), and *P. sagittarius*.

In the present paper, we report the presence of an Arrow Bulleye *P. sagittarius* in coastal Egyptian waters of the Mediterranean Sea at Alexandria.

Results and discussion

Body rectangular in shape with big eyes. Dorsal fin with soft portion higher than the spinous part. Rounded caudal fin. The anterior edge of the dorsal, anal and pectoral spines poorly serrated. Scales on operculum and preoperculum. Tenth dorsal spine longer than 2nd spine. Pectoral fin reaches to above the anus. Upper margin of dorsal fin with black strip (clearly visible in the fresh specimen but disappearing or becoming faint after preservation). Pelvic fin with black blotch at its base and with dark colouration anteriorly and becoming yellowish posteriorly (Fig. 1). Anal and caudal fins with dark colour on their lower and posterior margins respectively. The description of the present specimen agrees with the description given by (Starnes 1988; Goren et al. 2010; Golani et al. 2011). Morphometric and meristic characters are summarised in Table 1.

The Arrow Bulleye differs from the three related species, *P. arenatus*, *P. blochii* and *P. hamrur* which occur in adjacent waters in the Red Sea, in having a black spot at the base of the pelvic fin (Fig. 1), and a long 10th dorsal spine. The number of gill rakers in *P. sagittarius* is smaller than in *P. arenatus* (28–31) and *P. hamrur* (24–26) (Starnes 1988).

The standard length of the current specimen (108 mm) lies within the maximum size range given for this species by (Allen & Erdmann 2012) and (Froese & Pauly 2015) (285 mm), but is smaller than the two specimens recorded by (Goren et al. 2010) (TL 136 mm) and (Golani et al. 2011) (SL 181 mm) from coast of Tel Aviv and south of Haifa Cities, Israel respectively. More ichthyological investigations of Egyptian waters of the Mediterranean Sea are necessary in order to confirm whether or not

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Fig. 1 *Priacanthus Sagittarius*, 129 mm total length with black patch on pelvic fin

P. sagittarius has actually established a sustainable population in this region.

P. sagittarius is distributed from the Red Sea to Japan, including Australia and Samoa (Starnes 1988). The species prefers sheltered reef areas and is often found in caves or under rocks or coral plates (Froese & Pauly 2015). Although Starnes (Starnes 1988) suggested that the species lives at depths ranging from the surface down to 440 m, (Goren et al. 2010) and Khalaf (Khalaf 2004) suggested that it may be found in deeper water. It is interesting to note that the current specimen was captured at a depth of 35 m a result that agrees with Starnes (Starnes 1988) in having individuals of this species in layer near the surface.

Prior to the current record from Egypt, there were only two previous reports of *P. sagittarius* from the Mediterranean Sea, both from the Israeli coast (Goren et al. 2010) recorded the first specimen from the coast of Tel Aviv City, and Golani (Golani et al. 2011) recorded the second specimen from the south edge of Haifa, Although the current specimen represents the third record of *P. sagittarius* from south eastern Mediterranean, its presence in Egyptian waters suggests that the species may be extending its distribution range westwards.

Many of the invasive species have small length and unknown and the fishermen throw it back in water or putted in trash category that did not receive sufficient attention as they are caught from trash and discards. Generally, the lack of previous records of *P. Sagittarius* from Egyptian waters of the Mediterranean Sea may be considered an indication to the recent occurrence of such species for first time.

The circulation of the Atlantic water masses in the eastern Mediterranean Sea has received great attention and can be divided into two schools, the historical (Nielsen 1912; Robinson & Golnaraghi 1993; Malanotte-Rizzoli et al. 1997) supports a counterclockwise movement of water masses, and the recent (Millot et al. 1997; Taupier-Letage et al. 2003) favors a clockwise circulation.

Table 1 Morphometric and meristic characters of *Priacanthis Sagittarius* collected from the Egyptian coast of the Mediterranean Sea

Morphometric characters (mm)	
Total length (TL)	129
Standard length (SL) (% in TL)	108(83.7)
Pre-dorsal fin length (% in SL)	32(29.6)
Post-dorsal fin length (% in SL)	89(82.4)
Pre-pelvic fin length (% in SL)	33(30.6)
Pre-Pectoral fin length (% in SL)	40(37)
Pre-anal fin length (% in SL)	61(56.5)
Maximum body depth (% in SL)	44(40.7)
Minimum body depth (% in SL)	9(8.3)
Eye diameter (% in HL)	18(45)
Inter-orbital length (% in HL)	10(25)
Head length (% in SL)	40(37)
Head depth (% in HL)	37(92.5)
Distance between orbit and upper lip (% in SL)	8(7.4)
Distance between upper lip and dorsal fin (% in SL)	33(30.6)
Length of the longest pectoral fin ray (% in SL)	21(19.4)
Length of 1st dorsal spine of dorsal fin (% in SL)	11(10.2)
Length of 2nd dorsal spine of dorsal fin (% in SL)	15(13.9)
Length of 10th dorsal spine of dorsal fin (% in SL)	22(20.4)
Length of 1st spine of anal fin (% in SL)	15(13.9)
Length of 2nd spine of anal fin (% in SL)	19(17.6)
Length of 3rd spine of anal fin (% in SL)	2(1.9)
Meristic characters	
Total number of gill rakers on 1st gill arch	22
Number of dorsal fin spines	10
Number of dorsal fin rays	13
Number of anal spines	3
Number of anal rays	14
Number of pelvic spines	1
Number of pelvic rays	5
Number of pectoral rays	19-18

HL head length, *SL* standard length

More recently (Hamad et al. 2005), an improved version of the historical view was introduced. It implies a counterwise in the whole eastern basin of the Mediterranean Sea, but it is more constrained along slopes, unstable and generating mesoscale eddies (Hamad et al. 2005). The water masses circulation opposite the Nile River delta was affected by the completion of Aswan High Dam in 1964 (Sharaf El-Din 1977). The general oceanographic conditions in the offshore region did not change notably, but the circulation pattern and hydrographic conditions over the continental shelf opposite the Nile delta have extremely affected. In addition, an imbalance has been

produced in the near-coast sediment budget with possible increased alongshore shifting of sediments (Aleem 1972).

Since the opening of Suez Canal in 1869, it has provided a significant pathway for the invasion of many Lessepsian marine organisms into the Mediterranean Sea (Zenetos et al. 2012; Katsanevakis et al. 2014) and in the Egyptian waters where several species were reported (Golani 1998). This invasion route may well have facilitated recent immigration of the Arrow Bulleye from the Red Sea into Egyptian waters.

Conclusions

The result of the present study showed that the invasion of fish species to the Mediterranean Sea from the Red Sea and through the Suez Canal is a continuous process and species like *P. sagittarius* can directed to the west as well as to the east of the southern Mediterranean Sea as shown in the previous literature. This record is considered the first for the Egyptian waters of the Mediterranean Sea.

Methods

One specimen of *Priacanthus sagittarius* 129 mm in total length was collected from Alexandria coast of Egypt, Mediterranean Sea, 31° 13′ 46.01′′N 29° 50′ 09.53′′E on 19 May 2015 The specimen was caught using trawl net at 35 m depth (Fig. 1). The standard length, measured from tip of snout to base of caudal fin, was used for proportional measurements. The specimen was fixed in 10 % formalin and stored in 70 % ethanol. Measurements were made with dial callipers to the nearest 0.1 mm following the method of Starnes (Starnes 1988). Nomenclature follows that of Eschmeyer (Eschmeyer 2014) and (Fricke 2014). The specimen was deposited in the ichthyological collections of the Zoology Department, Faculty of Science, Al-Azhar University (Assuit), Egypt (MZSA0001).

Availability of supporting data

The dataset supporting the conclusions of this article are included in the text of the article and there are no more dataset to deposit anywhere.

Abbreviations

HL: head length; SL: standard length; TL: total length.

Competing interests

The authors are declaring that there are no competing interests.

Authors' contributions

MMSF: 1. Obtained the fish from the fisherman. 2. measured the fish. 3. Photograph the fish, LAJ: 1. Identify the fish. 2. Analyze the data. 3. Wrote the manuscript. 4. Done all the correspondence. 5. Corrected the manuscript and the proof, AEAKE: 1. Arrange for the availability of the fish specimen. 2. Make available laboratory place for measurement AND FOR IMAGING. 3. Review the manuscript. 4. Give valuable advice and suggestions for the introduction. All authors read and approved the final manuscript.

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