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NEW RECORD OF THE RED SCORPIONFISH, *SCORPAENA SCROFA* (ACTINOPTERYGII: SCORPAENIFORMES: SCORPAENIDAE) FROM DEEP WATERS OFF ISRAEL, GULF OF AQABA, RED SEA

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Abstract. This study examines the distribution of the red scorpionfish, *Scorpaena scrofa* Linnaeus, 1758, in the Red Sea, in order to get a better picture of the distribution and dispersal of this species. The species is recorded for the first time from the Gulf of Aqaba, based on a specimen collected off Eilat, Israel at a depth of 400 m. This finding also confirms the occurrence of the species in the Red Sea and links up with a recent record from Saya de Malha Bank, western Indian Ocean.

Keywords: biodiversity, scorpionfishes, new record, Red Sea, distribution

INTRODUCTION

The scorpionfishes of the genus *Scorpaena* Linnaeus, 1758 are mostly distributed in warm temperate seas, occasionally also in tropical seas, around the world. They inhabit benthic habitats, mostly dwelling on rocky reefs. The genus includes a total of 61 valid species (Fricke et al. 2020). It is characterized within the family Scorpaenidae by the dorsal-fin rays normally XII, 9 (7–10, 8 or 10 normal for some species), anal-fin rays normally III, 5; pectoral-fin rays 16–21, some rays branched, the branching usually compound in larger specimens; swimbladder absent; vertebrae 24; scales on body cycloid or ctenoid; occipital pit usually present, never flat or convex; palatine teeth present; ventral margin of lacrimal bone usually with numerous spines; posterior lacrimal spine absent, if present not hooked forward; no slit behind fourth gill arch; scales on pectoral-fin base reduced or absent; lateral line normal, continuing onto or near base of caudal fin; lateral-line scales forming relatively complete tubes; peritoneum pale (Eschmeyer 1969, Poss 1999; modified).

The genus *Scorpaena* has been known since ancient times (i.e., Aristotle, 4th century BC; see Artedi 1738); in modern ichthyology, it was first described by Linnaeus (1758: 266) with *Scorpaena porcus* Linnaeus, 1758 and *Scorpaena scrofa* Linnaeus, 1758 as the only known species at the time. The genus *Scorpaena* has been placed on the Official List of Generic Names in Zoology in Opinion 77 (Anonymous 1922). The species description of *S. scrofa* by Linnaeus (1758) was based on multiple sources from localities in the Mediterranean Sea (see Artedi 1738, "Scorpaena tota rubens, cirris plurimis ad os"; Gronovius 1754, "Scorpaena capite cavernoso, cirris geminis in maxilla inferiore"). The species was revised by Eschmeyer (1969) as part of a review of Atlantic species of the family, based on specimens from the Mediterranean Sea and the eastern Atlantic.

When examining specimens of *Scorpaena* from the Gulf of Aqaba, our attention was drawn to the identity of a specimen collected from deep water which was identified as *S. scrofa*, and proved to represent a new record of this species from the Gulf of Aqaba and the Red Sea. This new record is reported and discussed in the present paper.

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MATERIALS AND METHODS

On 28 April 1993, a 149.3 mm SL specimen of *S. scrofa* was collected with a trammel net by A. Baranes at Eilat, Israel, Gulf of Aqaba, Red Sea, at 400 m depth of water. The specimen was deposited in the Hebrew University Fish Collection with the catalog number HUJ 17439. Abbreviations of fish collections follow Fricke and Eschmeyer (2020). Counts and measurements follow Hubbs and Lagler (1947); the classification follows Fricke et al. (2020), the head spine terminology follows Eschmeyer (1969), fin-ray counts follow Fricke (1983), and references are provided according to Fricke (2020).

Comparative material. *Scorpaena scrofa*: BMNH 1907.6.26.41-42 (2), Gibraltar; BMNH 1932.5.12.11 (1), Egypt, Alexandria; BMNH 1933.8.1.2 (1), Madeira; BMNH 2014.3.6.8 (1), UK, Devon; HUJ 180 (1), Israel, Haifa; HUJ 199 (3), Israel, Mediterranean Sea coast; HUJ 8217 (1), Cyprus, Larnaca; HUJ 8481 (1), Cyprus, Akrotiri; HUJ 8487 (1), Cyprus, Famagusta; HUJ 8896 (9), Greece, Rhodos; HUJ 10414 (1), Israel, Jaffa; HUJ 10941 (1), Israel, Tel-Aviv; HUJ 12589 (2), Israel, Mediterranean Sea coast; HUJ 13520 (3), Israel, Haifa; HUJ 13763 (16), Cyprus, Famagusta; HUJ 13936 (1), Cyprus, Famagusta; HUJ 14253 (1), Israel, Haifa; HUJ 14587 (2), Cyprus, Famagusta; HUJ 14589 (1), Israel, Tel-Aviv; HUJ 14623 (4), Israel, Askalon; HUJ 16582 (1), Israel, Ashdod; HUJ 18120 (2), Cyprus, Limassol; HUJ 18331 (2), Greece, Crete; HUJ 18962 (1), Israel, Akko; HUJ 19115 (1), Cyprus, Famagusta; HUJ 19123 (1), Cyprus, Famagusta; HUJ 19125 (1), Cyprus, Famagusta; HUJ 19128 (1), Cyprus, Baghaz; HUJ 19130 (1), Cyprus, Cape Dolos; HUJ 19132 (2), Cyprus, Famagusta; HUJ 19135 (1), Cyprus, Famagusta; HUJ 19138 (1), Cyprus, Famagusta; HUJ 19154 (1), Cyprus; HUJ 19360 (1), Cyprus, Famagusta; HUJ 20771 (1), Spain, Balearic Islands, Menorca; HUJ 20821 (1), Spain, Balearic Islands, Menorca; MNHN 2004-0005 (1), Madagascar, off Tôlanaro; MNHN 2004-0039 (1), Madagascar, north of Toliara; SMNS 663 (1), Mediterranean Sea; SMNS 734 (1), France, Nice; SMNS 1281 (1), Italy, Trieste; SMNS 4814 (1), France, Villefranche-sur-Mer; SMNS 9197 (2), Croatia, Pula; SMNS 9389 (1), Balearic Islands, SE of Menorca; SMNS 9615 (1), Greece, Varkisa; SMNS 10052 (1), Italy, Toscana, Porto Santo Stefano; SMNS 25512 (1), Italy, Venice; SMNS 25520 (1), Spain, Alicante; USNM 285597 (1), Somalia, Ras Binnah; USNM 330987 (1), South Africa, KwaZulu-Natal; ZIN 49838 (1), Saya de Malha Bank.

RESULTS

Family SCORPAENIDAE Risso, 1827

Genus *Scorpaena* Linnaeus, 1758

***Scorpaena scrofa* Linnaeus, 1758**

(Fig. 1, Table 1)

Description. Dorsal-fin spines XII, dorsal-fin soft rays 9, anal-fin spines III, anal-fin soft rays 5, pectoral-fin rays 19, with 2nd to 6th rays branched. Gill rakers 5 + 10 (total 15). Lateral-line scales 24. Preorbital with 3 spinous points over maxillary; suborbital ridge with 3 spinous points; upper posttemporal spine present; second preopercular spine normal. Scales on sides of body ctenoid; vertical scale rows 42. Most of head, pectoral-fin base and chest naked. Occipital pit moderate. Interorbital area with 2 ridges which end at the bases of the tympanic spines. Pores at symphysis of lower jaw small and separate. Three tentacles present on lower jaw, large skin flap associated with posterior preorbital spine, and flaps on fourth and fifth preopercular spines. Additional morphometric characters are presented in Table 1.

Color of preserved specimen. Head and body pale yellowish (Fig. 1), head with scattered dark brown spots, eyes dark grey, back with traces of grey blotches, lower half of caudal peduncle with a large grey blotch. Fins yellowish, base of dorsal fin with a few dark brown spots, upper half of pectoral fin spotted with brown, caudal fin distally grey.

DISCUSSION

Scorpaena scrofa was revised by Eschmeyer (1969: 69–71), who reported the species based on specimens from the Mediterranean Sea (Italy), Madeira and off Guinea Bissau in the eastern Atlantic; he also assigned literature records from Israel, France, UK, Ireland, Portugal, Azores, Morocco, Canary Islands, Western Sahara, Mauritania, Senegal, Cape Verde Islands, and South Africa to that species. Literature records were summarized by Blanc and Hureau (1973), Hureau and Litvinenko (1986), and Eschmeyer and Dempster (1990). Additional records include Machado (1857) from Spain (Atlantic coast), Guichenot (1850) from Algeria, de Buen (1919) from Spain (Mediterranean Sea), Cadenat (1937) from Guinea, and Šoljan (1948) from Croatia. Eschmeyer (1986: 461) confirmed the record of *S. scrofa* from South Africa. Maugé (1967) and Fricke et al. (2018) recorded the species from Madagascar, Mouneimne (1977) from Lebanon, Ahnelt (1983) from Greece, Bradai and Bouain (1988) from Tunisia, Bilecenoglu et al. (2002) and Fricke et al. (2007) from Turkey, Saad (2005) from Syria, Shahrani and Shakman (2015) from Libya, Poss (2016) from Somalia, and Fricke and Zhukov (2019) from Saya de Malha Bank. The known distribution of *S. scrofa* is illustrated in Fig. 2.

Dor (1984) and Goren and Dor (1994) listed a record of *S. scrofa* from the Gulf of Aqaba, Red Sea, based on an unpublished PhD dissertation (Frøiland, unpublished*: 22–23). Frøiland (unpublished) reported the specimen SMNHTAU P5164 from Eilat, Israel; Golani and Bogorodsky (2010: 65) concluded that this was based on a misidentification of *Scorpaenopsis* sp., and removed *S. scrofa* from the checklist of Red Sea fishes.

Several records in online databases seem to record *S. scrofa* from the Red Sea. The map in FishBase (Froese and Pauly 2019) shows a distribution of the species in Egypt, Israel, and Yemen. A close examination of the records, however, shows that the records from Egypt and Israel were based on Mediterranean literature (Whitehead

* Frøiland Ø. 1972. The scorpaenids of the Red Sea (Pisces: Scorpaenidae), a taxonomical and zoogeographical study. PhD thesis, University of Bergen, Norway.

Fig. 1. *Scorpaena scrofa*, lateral view, HUJ 17439, 149.3 mm SL, 28 April 1993, off Eilat, Israel, Gulf of Aqaba, Red Sea, 400 m depth; photograph by Daniel Golani

et al. 1986) and specimens, while the record from Yemen was based on a record from the Gulf of Aden, probably a misidentification of *Scorpaena nasicornua* Fricke et Zhukov, 2020. A search in another database, GBIF (Anonymous 2020), results in 9 records of *S. scrofa* from the Red Sea, two from the Gulf of Aqaba, and seven from the Egyptian coast of the Red Sea. Checking the sources, we found that all those records were based on "human observation" without any further specification. This seems impossible as Red Sea populations of the species occur in deep water below diving depths. These human observations are most likely misidentifications of *Scorpaenopsis barbata* (Rüppell, 1838), a species that is common in shallow water in the Red Sea. We concluded that we are not aware of any reliable, published information on the occurrence of *Scorpaena scrofa* in the Red Sea.

During the examination of scorpaenid fishes in the HUJ collection, the authors of the present paper found a specimen from Eilat, Israel collected in 1993 which they identified as *S. scrofa*. The Red Sea record of that species can therefore now be confirmed; this also confirms the records from Israel and the Gulf of Aqaba.

The new distribution record of *S. scrofa* suggests a circum-African distribution, with a big gap in the eastern Atlantic between Guinea and Namibia (Fig. 2). In most of that region, the species is apparently replaced by *Scorpaena stephanica* Cadenat, 1943 (see Poss 2016), a large scorpaenid species that is occurring in habitats similar to those of *S. scrofa*. As *S. scrofa* was also recorded in some other areas of the western Indian Ocean, it is unlikely that the species migrated to the northern Red Sea (Gulf of Aqaba) via the Suez Canal, in contrast to some other species (e.g., *Muraena helena* Linnaeus, 1758).

The presently reported specimen of *S. scrofa* was collected with a trammel net off Eilat, at a depth of 400 m. That depth record is not unusual for the species, which was previously reported from shallow water to 500 m depth, though in most regions it is most common at depths of 0–150 m (Poss 2016). The preferred depth may be related to the water temperature; possibly, the species prefers deeper water where the maximum temperature in shallow water is too high. The hydrographic conditions in the Gulf of Aqaba are characterized by elevated temperatures of 20.5–27.6°C and increased salinities of 40.3‰–41.6‰ throughout the water column, which is similar to the conditions found in the main Red Sea basin (Reiss and Hottinger 1984). Temperatures in the northern Gulf of Aqaba at 400 m depth vary between 20.5°C and 22°C, while in the summer months they may raise to 27°C in shallow waters (Gertman and Brenner 2004). These high shallow water temperatures may be the reason why *S. scrofa* is restricted to deep waters in the Gulf of Aqaba. The species has not yet been recorded from the coast of Jordan (Khalaf and Zajonz 2007).

The presently reported specimen measures 149.3 mm SL. This large size is not unusual for the species; the largest examined specimen has 200 mm SL (ZIN 49838), and Boutière (1958) reported a specimen of 490 mm total length (equaling approximately 395 mm SL).

Table 1
Morphometric characters of the Gulf of Aqaba specimen of *Scorpaena scrofa* Linnaeus, 1758 (HUJ 17439, 149.3 mm SL)

Character	Value	
	Absolute [mm]	Relative [% of SL]
Head length	57.7	38.6
Body depth	46.5	31.1
Orbit diameter	14.9	10.0
Pupil diameter	5.0	3.3
Preorbital length	11.6	7.8
Upper jaw length	25.3	16.9
Predorsal-fin length	48.5	32.5
Preanal-fin length	92.5	62.0
Prepectoral-fin length	49.0	32.8
Prepelvic-fin length	54.4	36.4
Length of first dorsal-fin spine	8.7	5.8
Length of second dorsal-fin spine	15.8	10.6
Length of third dorsal-fin spine	21.2	14.2
Length of fourth dorsal-fin spine	20.8	13.9
Length of first dorsal-fin ray	19.1	12.8
Length of first anal-fin spine	8.7	5.8
Length of second anal-fin spine	19.1	12.8
Length of third anal-fin spine	16.2	10.8
Length of first anal-fin ray	20.7	13.9
Pectoral-fin length	34.6	23.2
Dorsal-fin base length	72.2	48.4
Anal-fin base length	17.4	11.6
Pectoral-fin base length	17.4	11.6
Caudal-fin length	32.4	21.7

In the Red Sea, other suitable habitats for this species may be found throughout the area in the deeper water of 300–500 m depth, probably on hard substrate. The species is not present though in the collections of German deep-sea expeditions to the Red Sea, MESEDA I–III and MINDIK (Türkay 1996, Zajonz 2006, unpublished faunal account by Uwe Zajonz), but may be expected to be reported in future studies.

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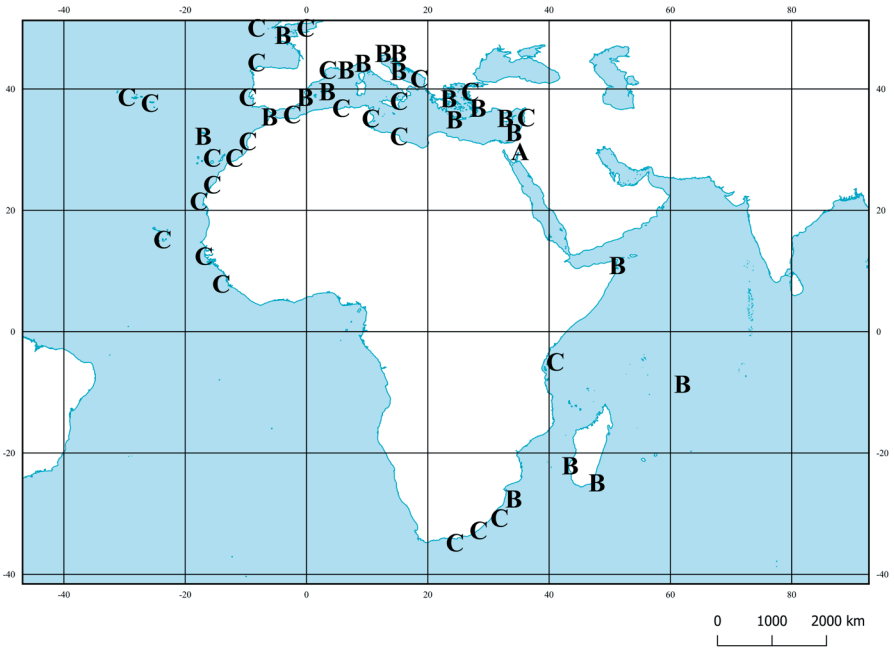

Fig. 2. *Scorpaena scrofa*, eastern Atlantic, Indian Ocean, and Red Sea map with the distribution of the species; new record from Gulf of Aqaba (**A**); records based on examined specimens (**B**); records based on literature (**C**)

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