

## Aquatic Invasions Records

## First record of the Indo-Pacific arrow bulleye *Priacanthus sagittarius* Starnes, 1988 in the Mediterranean Sea

Menachem Goren<sup>1\*</sup>, Nir Stern<sup>1</sup>, Bella S. Galil<sup>2</sup> and Ariel Diamant<sup>3</sup>

<sup>1</sup>Department of Zoology, George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv 69978, Israel

<sup>2</sup>National Institute of Oceanography, Israel Oceanographic and Limnological Research P.O.B. 8030, Haifa 31080, Israel

<sup>3</sup>National Center for Mariculture, Israel Oceanographic and Limnological Research P.O.B. 1212, Eilat 88112, Israel

E-mail: [gorenm@post.tau.ac.il](mailto:gorenm@post.tau.ac.il) (MG), [nirstern@post.tau.ac.il](mailto:nirstern@post.tau.ac.il) (NS), [bella@ocean.org.il](mailto:bella@ocean.org.il) (BSG), [diamant@ocean.org.il](mailto:diamant@ocean.org.il) (AD)

\* Corresponding author

Received: 9 December 2009 / Accepted: 4 January 2010 / Published online: 10 January 2010

### Abstract

A single specimen of *Priacanthus sagittarius* was captured by a commercial trawler off the Mediterranean coast of Israel on 28<sup>th</sup> November 2009. This is the first record of the species, and possibly the first alien member of the Priacanthidae from the Mediterranean Sea.

**Key words:** Mediterranean Sea, alien species, *Priacanthus sagittarius*

### Introduction

The continuous invasion of Erythrean fish species from the Red Sea into the Mediterranean seems to have accelerated recently. Of the 75 Erythrean fish species reported from the Levantine basin, more than 20 were found during the last decade (Galil 2008, 2009; Golani et al. 2008; Bilecenoglu et al. 2008; Goren et al. 2009). An additional alien species, *Priacanthus sagittarius* Starnes, 1988, is reported here.

Of the twelve species assigned to the genus *Priacanthus* Oken, 1817 (Starnes 1988; Froese and Pauly 2009), four are found in adjacent regions and are potentially able to migrate into the eastern Mediterranean: *P. arenatus* Cuvier, 1829 is known from the western and northern Mediterranean (Froese and Pauly 2009), whereas *P. blochii* Bleeker, 1853, *P. hamrur* (Forsskål, 1775), and *P. sagittarius* Starnes, 1988 occur in the Red Sea (Goren and Dor 1994; Randall 1994; Starnes 1988).

### Materials and methods

On the 28<sup>th</sup> November, 2009, a single specimen of *P. sagittarius* was collected by Mr. Levi Ornoy, captain of the commercial trawler *Moty*, off the Israeli coast. This is the first record of

this species from the Mediterranean and the first member of the Priacanthidae collected in the Levantine basin.

**Abbreviations:** TAU – fish collection of Tel Aviv University; SL – Standard length; TL – Total length.

### Results and discussion

*Priacanthus sagittarius* Starnes, 1988 (Figure 1)

*Priacanthus sagittarius* Starnes, 1988: Plates IIIe-g; Figures 3f, h, 5a-d, f, 8b, 12c, 18b. Type locality: Sumatra, Indonesia.

**Material examined:** TAU – P. 13670, off Tel-Aviv, Israel, (N 32°09'55", E 34°47'09") 40 m depth, 28 November, 2009. TL 136 mm.

**Brief description of the specimens:** A *Priacanthus* species with a black blotch on the upper half of the membrane between the first two dorsal spines that gradually turns into a black strip along the upper margin of the fin. Length of second spine is nearly half the length of the tenth spine. A black blotch occurs at the base of the pelvic fin. The membrane of the pelvic fin is dark anteriorly and gradually turns yellowish posteriorly (Figure 2). Lower margin of the anal fin and the posterior part of caudal fin are blackish. Anterior margin of the dorsal, anal and pectoral spines are serrated or partly serrated.

Opercle and preopercle are entirely scaled. Preopercular spine nearly reaches margin of the opercle. Pectoral fin reaches to above the anus. Pelvic fin reaches third anal spine.

**Meristic counts:** Number of scales along midline of body: 75; twelve series of scales between lateral line and dorsal fin; 34 series of scales between lateral line and anus. Dorsal fin with ten spines and 13 rays (last one splits into 2); anal fin with 3 spines and 14 rays (last one splits); pectoral fin with 19 rays; pelvic fin with a spine and five rays; caudal fin with 16 branched rays. Total number of gill rakers on anterior gill arch 18, three on upper limb and 15 on lower limb.

**Body proportions:** SL is 84% of TL; head length is 32% of SL; body depth is 38% of SL; eye diameter is 48% of head length; interorbital width is 26% of head length; Distance between orbit and upper lip is 9% of head length; distance between upper lip to origin of dorsal fin is 28% of SL; distance between upper lip to origin of anal fin is 53% of SL; longest pectoral ray is 15% of SL; longest pelvic ray is 32% of SL; first dorsal spine is 10% of SL; second dorsal spine is 11% of SL and 56% of tenth spine; tenth spine is 21% of SL; first anal spine 13% of SL; second anal spine is 15% of SL; third spine is 20% of SL.

**Remarks:** *Priacanthus sagittarius* occurs in the Indo West Pacific ocean, from the Red Sea to Japan, Australia and Samoa (Starnes 1988). It is found "in sheltered reefs in moderate depths, usually in caves or under coral plates...in rocky and open areas" (Froese and Pauly 2009). Its depth range is stated as "60 to 100 m", though Starnes (1988) lists material collected between surface and 440 m, including the specimen captured off Eilat, on the Red Sea coast of Israel, at 250-300 m. Khalaf (2004) implies that his specimens too were collected in the deep waters of the Gulf.

The specimen of *P. sagittarius* found in the Mediterranean is distinguished from its three congeners occurring in adjoining regions - *P. arenatus*, *P. blochii*, *P. hamrur* - by the black blotch at the base of the pelvic fin (shown in Figure 2) and by the long tenth dorsal spine, which is almost double the length of the second spine. In addition, *P. sagittarius* differs from *P. arenatus* and *P. hamrur* in the smaller number of gill rakers (28-31 in *P. arenatus*; 24-26 in *P. hamrur*; Starnes 1988).

In 1980 a specimen identified as *P. hamrur* was collected off Mahdia, Tunisia (Abdelmoleh



**Figure 1.** *Priacanthus sagittarius* Starnes, 1988 collected off Ashdod, Israel (TAU – P. 13670). Photo by M. Goren.



**Figure 2.** Pelvic fin of *Priacanthus sagittarius* Starnes, 1988 collected off Ashdod, Israel (TAU – P. 13670). Photo by M. Goren.

1981). However, the inadequate description and the poor quality of the photograph preclude confirmation of its identity: Starnes (1988) and Golani et al. (2002) concluded that the "identity of specimen has not been confirmed". Thus, the present record is the first confirmed alien member of the Priacanthidae reported from the Mediterranean Sea.

The Suez Canal, the most prolific invasion pathway into the Mediterranean (Galil 2009), is undergoing yet further enlargement in order to maintain its market share. The current expansion will increase its depth to allow passage of vessels up to a draught of 66 ft by the end of 2009, and already the Suez Canal Authority is conducting feasibility studies with the aim to increase the draught to 72 feet to allow passage of fully loaded VLCC and ULCC tanker classes

(<http://www.suezcanal.gov.eg>). The deepening of the Canal may allow transit of biota formerly precluded due to its shallow depth.

### Acknowledgements

We are grateful to Mr. Levi Ornoy, captain of the trawler Moty, for retaining the specimen of *P. sagittarius* for us. We thank Ms. N. Paz for editing the manuscript. This research was supported by the Porter School of Environmental Studies at Tel Aviv University with funding from the Italian Ministry of the Environment, Land and Sea.

### References

- Abdelmoleh A (1981) Capture d'un priacanthé: *Priacanthus hamrur* (Forsk., 1775), poissons Indo-Pacifique, dans les eaux Tunisiennes. *Bulletin de l'Institut National Scientifique et Technique d'Océanographie et de Pêche Salammbô* 8: 111-114
- Bilecenoglu M, Yokeş MB, Eryiğit A (2008) Underwater observations on an established population of the Red Sea migrant *Vanderhorstia mertensi* Klausewitz, 1974 (Pisces, Gobiidae) in the Mediterranean Sea. *Aquatic Invasions* 3: 475-478, doi:10.3391/ai.2008.3.4.21
- Khalaf M (2004) Fish fauna of the Jordanian Coast, Gulf of Aqaba, Red Sea. *Journal of King Abdul Aziz University, Marine Sciences* 15: 23-50
- Froese R, Pauly D (eds) (2009) FishBase. World Wide Web electronic publication. <http://www.fishbase.org>, version (09/2009)
- Galil BS (2008) Alien species in the Mediterranean Sea— which, when, where, why? *Hydrobiologia* 606: 105-116, doi:10.1007/s10750-008-9342-z
- Galil BS (2009) Taking stock: inventory of alien species in the Mediterranean Sea. *Biological Invasions* 11:359-372, doi:10.1007/s10530-008-9253-y
- Golani D, Appelbaum-Golani B, Gon O (2008) *Apogon smithi* (Kotthaus, 1970) (Teleostei: Apogonidae), a Red Sea cardinalfish colonizing the Mediterranean Sea. *Journal of Fish Biology* 72 (6): 1534-1538, doi:10.1111/j.1095-8649.2008.01812.x
- Golani D, Massiti E, Orsi-Relini L, Quignard JP (2002) CIESM Atlas of Exotic Vol. 1, Fishes in the Mediterranean. <http://www.ciesm.org/atlas/appendix1bis.html> (Accessed 12 December 2009)
- Goren M, Dor M (1994) An updated checklist of the fishes of the Red Sea - CLOFRES II. Israel Academy for Sciences and Humanities. Jerusalem, 120 pp
- Goren M, Galil BS, Diamant A, Gayer K, Stern N (2009) First record of the Indo-Pacific cardinal fish *Apogon fasciatus* (White, 1790) in the Mediterranean Sea. *Aquatic Invasions* 4: 311-313, doi:10.3391/ai.2009.4.2.21
- Randall J (1994) Twenty-two new records of fishes from the Red Sea. *Fauna of Saudi Arabia* 14: 259-275
- Starnes WC (1988) Revision, phylogeny and biogeographic comments on the circumtropical marine percoid fish family Priacanthidae. *Bulletin of Marine Science* 43(2): 117-203