

Second records of the Lessepsian fish migrants *Priacanthus sagittarius* and *Platax teira* and distribution extension of *Tylerius spinosissimus* in the Mediterranean

Daniel Golani^{1*}, Oren Sonin² and Dor Edelist³

¹Department of Evolution, Systematics and Ecology, The Hebrew University of Jerusalem, 91904, Jerusalem, Israel

²Department of Fisheries, Ministry of Agriculture, P.O. Box 1213, Kiryat Haim, 26105, Israel

³The Leon Recanati Institute for Maritime Studies, University of Haifa, Haifa 31905, Israel

E-mail: dgolani@cc.huji.ac.il (DG), orens@moag.gov.il (OS), blackreefs@gmail.com (DE)

*Corresponding author

Received: 19 November 2011 / Accepted: 24 January 2011 / Published online: 29 January 2011

Abstract

The Red Sea (Lessepsian) migrant fish, the arrow bulleye, *Priacanthus sagittarius*, and the spotbelly batfish, *Platax teira*, are recorded for the second time from the Mediterranean, suggesting the establishment of new populations. The record of another Lessepsian migrant, the spiny blaassop, *Tylerius spinosissimus* from Israel, constitutes a considerable extension of its distribution range in the Mediterranean.

Key words: *Priacanthus sagittarius*, *Platax teira*, *Tylerius spinosissimus*, Lessepsian migration, Mediterranean

Introduction

The ongoing influx of Red Sea biota into the Mediterranean Sea since the opening of the Suez Canal has drawn the attention of the scientific community (Ben-Tuvia 1966; Por 1978; Galil 2009; Golani 2010). This phenomenon incorporates almost all marine taxonomic groups. Close to 80 species of Lessepsian fish have been recorded to date in the Mediterranean. While it is universally accepted that the immediate publication of the first record of an invasive species in the Mediterranean is essential, it is no less important to publish second and subsequent records of the same invasive species, in order to verify establishment and distribution extension in its new habitat.

In the present paper we report the collection of the arrow bulleye, *Priacanthus sagittarius* and the spotbelly batfish, *Platax teira* from the Mediterranean coast of Israel. For both species this report constitutes the second record from the Mediterranean. In addition, this record of spiny blaassop, *Tylerius spinosissimus* greatly extends its known distribution that together with *P. teira*, was hitherto recorded only from the southwest Aegean Sea.

Materials and methods

The specimens of *Priacanthus sagittarius* and *Tylerius spinosissimus* were collected by commercial bottom otter trawl with a low opening, and a mesh size of 42 mm in the cod end. The former specimen was collected at a depth of 50 m while the latter at a depth of 120–140 m. The specimen of *Platax teira* was collected at a depth of 8 m by a three walled bottom trammel net; the mesh size of the outer walls was 150 mm, while the middle net wall was 70 mm. The exact coordinates were not provided by the fishermen. All specimens were deposited in the Hebrew University Fish Collection (HUJ). Counts and measurements followed Hubbs and Lagler (1947).

Results and discussion

PRIACANTHIDAE

Priacanthus sagittarius Starnes, 1988

Material examined: HJ 20015, 181 mm SL, 22 October, 2010, from the southern edge of Haifa Bay, Trawl at 50 m. (Figure 1).

Figure 1. *Priacanthus sagittarius* HUJ 20015, 181 mm SL, 22 October, 2010, Haifa Bay, Israel. (Photograph: D. Golani).



Description of the Mediterranean specimen:

Body ovate, deep (33.2% of SL) and compressed. Head 40.4% of SL with straight upper profile. Mouth oblique with projecting lower jaw. Upper jaw 31.9% in SL, reaching back to the vertical of the anterior on-third of eye; its posterior depth 53.1% of head length. Upper jaw with two rows of small, slightly backward recurved teeth in its anterior third. The two rows merge into a single band. A wide gap at the symphysis. Two short rows of teeth at the lower jaw merge into a single row. A narrow toothless gap at the symphysis. A few small teeth at the vomer apex and its extensions and on the palatine. Elliptical anterior nostril just in front of large elongated posterior nostril, starting at the upper edge of eye and reaching the horizontal line of the upper third of eye. First gill arch with 5 gill rakers on the upper limb and 18 on the lower limb. The first three rakers on the upper limb and the last three rakers on the lower limb are reduced. Dorsal fin continuous with 10 spines increasing in size (the tenth 2.3 times the second) and 14 rays. The second dorsal ray, the longest (24.2% of SL). Anal fin with 3 spines and 15 rays. Caudal fin emarginated with 21 rays, the upper and lower two rays much smaller. Pectoral fin with 18 rays. Pelvic fin with one spine and five rays connected to the abdomen by a membrane.

The first ray the longest (34.8% of SL). Preoperculum serrated with a stout spine at its lower edge, reaching slightly beyond operculum margin. Lower margin of suborbital bone serrated. Entire body and head covered with small ctenoid scales, 72 in the lateral line.

Color: Body red, becoming slightly pinkish in posterior part. All fins red. Dusky patch on the upper margin of the first dorsal margin. Posterior end of soft dorsal ray portion and caudal fin with light grey zone and dusky margin. Membrane between 1-3 pelvic rays orange-brown with black dot at base. Membrane between third ray to abdomen with whitish spots. Iris red with black pupil.

Remarks

Priacanthus sagittarius has a wide Indo-west Pacific distribution from the Red Sea to Japan, Australia to Samoa (Starnes 1988, 1999). Prior to this report it was recorded from the Mediterranean by a single specimen collected by trawl at a depth of 40 m on November 2009 in the vicinity of Tel Aviv (Goren et al. 2010). The finding of a second specimen in the Mediterranean in less than a year from its previous record suggests that this species is establishing a population in its new region.

P. sagittarius is a nocturnal species occurring in its original distribution range between surface to 400 m. It reaches a length of 34 cm SL. It can be distinguished from its two cogenetic species in the Red Sea, *P. blockii* Bleeker, 1853 and *P. hamrus* (Forsskål in Niebuhr, 1775) (see: Golani and Bogorodsky 2010) by having black marks on the pelvic fin base, a dusky mark on the upper margin of the membrane between 1-2 dorsal spines, in addition to the long 10th dorsal spine (more than twice the length of the 2nd dorsal spine). The low number of gill rakers (23) can distinguish it from its Atlantic cogenetic *P. arenatus* Cuvier, 1829.

EPHIPPIDAE

Platax teira (Forsskål in Niebuhr, 1775)

Material examined: HUI 20014, 242 mm SL, 12 October, 2010, Ashdod, Trammel net at 8 m. (Figure 2).

Description of the Mediterranean specimen:

Body very deep and strongly compressed, its depth from origin of dorsal fin to origin of anal fin 1.1 times SL. Head 31.0% of SL, its profile very steep. Small mouth, cleft not reaching the vertical of eye. Bands of tricuspid teeth; the middle cusp on each tooth slightly longer than the lateral cusps. Blunt snout (40.7%), small eye (19.7%) and wide interorbital (44.2%) all as percentages of head length. Anterior nostril round, located above center of upper jaw. Posterior nostril elongated ellipsoid, almost slit-like, located above and closer to eye at its lower margin. Preoperculum smooth. Dorsal fin with 5 concealed spines, the first minute, the last one the longest, almost 5 times the penultimate. Very long triangular soft ray portion, with 30 rays, the first ray longest, 72.3% in SL.

Anal fin with 3 concealed spines, the first two very small, the third nearly 5 times longer. Soft ray portion triangular with 23 rays, the third ray longest, 60.3% of SL. Caudal fin slightly double emarginated with 15 rays. Four small spines on the upper and lower surface of the caudal peduncle. Pectoral fin round with 16 rays, the fourth the longest, 20.7% of SL. Pelvic fin very elongated with 1 spine and 5 soft rays, the first, the longest, 68.2% of SL. The body covered with finely ctenoid scales, 58 in lateral line. Scales in a band from the snout around the eyes and on the nape to nearly two thirds the distance from snout to origin of dorsal fin.

Color: Body grey with two dusky vertical bars, the first runs from nape through the eye to the origin of pelvic fin, the second is wider and runs from dorsal fin origin through the pectoral fin to the posterior of the pelvic fin. Pectoral fin light grey, all other fins dusky.

Remarks

Platax teira has a wide Indo-Pacific distribution, from the Red Sea, South Africa to Japan and northern Australia (Heemstra 2001). It was first recorded from the Mediterranean by a single specimen from Bodrum, Turkey at the southern Aegean Sea by Bilecenoglu and Kaya (2006), who assumed that its occurrence in the Mediterranean resulted from an aquarium escapee. However, the finding of a second specimen in the Levant indicates that the most likely origin is from the Red Sea (Lessepsian migrant), that has established a small population in its new region. It is interesting to note that recently other Red Sea species with a similar habitat, such as *Pomacanthus imperator* (Bloch, 1787) and *Pomacanthus maculates* (Forsskål in Niebuhr, 1775), were reported in the Levant (Golani et al. 2010; Bariche 2010, respectively).

Two species of the family Ephippidae occur in the Red Sea: *Platax teira* and *P. orbicularis* (see Golani and Bogorodsky 2010). The former differs from the later by having 29-34 dorsal soft rays as compared to 34-29 and less anal rays 21-26, as compared to 25-30 in *P. orbicularis*.

Tylerius spinosissimus (Regan, 1908)

Material examined: HUI 19946, 27.4 mm SL, 5 May, 2010, Ashdod- Tel Aviv, Trawl at 120-140 m between 07:30 to 12:15 (Figure 3).

Description of the Mediterranean specimen:

Round body, head round with blunt snout, head 45.6% of SL, predorsal 71.1%, preanal 73.7%, least caudal peduncle 7.3%, all in SL. Small mouth, not reaching the anterior vertical of eye. Two large teeth in each jaw with a median suture. Anterior tip upper teeth curved downward and the anterior tip of lower teeth curved upwards. Large eye (30.6%) and narrow interorbital (15.3%), all in head length. Small slit-like gill opening in front of pectoral fin.

Dorsal fin with 9 rays, anal fin with 7 rays, both posterior in position. Small wide-based

Figure 2. *Platax teira* HUI
20014, 242 mm SL, 12
October, 2010, Ashdod, Israel.
(Photograph: D. Golani).



Figure 3. *Tylerius
spinosissimus*, HUI 19946,
27.4 mm SL, 5 May, 2010,
Ashdod- Tel Aviv, Israel.
(Photograph: D. Golani).



pectoral fin with 13 rays. Relatively long and truncated to slightly rounded caudal fin. Body covered with delicate spines extending to the middle of the dorsal fin base.

A single spine at the midpoint between tip of snout and eye origin. A small spinulate in front of left eye only. The first spinulate on top of the head slightly in front of eye; 3 - 4 lines of spinules between the eyes.

Color: Dorsal surface to mid-body dark grey with small light grey patches. Belly and ventral surface of caudal peduncle white. Dorsal and anal fins transparent while caudal fin with grey rays and transparent membrane.

Remarks

The present report represents the first record from the Levant and the third record in the

Mediterranean of *Tylerius spinosissimus*. Corsini et al. (2005) and Corsini-Foka (2010) reported two specimens from deep water (90 m and 50–80 m, respectively) in Rhodes.

Tylerius spinosissimus was first mentioned in the Red Sea under the generic name of *Amblyrhynchotes* by Budker and Fourmanoir (1954); this report was part of a list and no specimen was saved for confirmation. Another mention of this species from the Red Sea was by Edwards and Rosenwell (1981) but was evidently a misidentification of *Arothron diadematus* (Rüppell, 1829) (see: Goren and Dor 1994). Therefore, Hardy (1984) and Golani and Bogorodsky (2010) did not include it in their list of Red Sea species. However, Golani and Bogorodsky (2010) did mention the first Mediterranean record from Rhodes and considered the possibility that it was a Lessepsian migrant.

Tylerius spinosissimus has a wide Indo-Pacific distribution. Although there is no confirmed record from the Red Sea, it is probable that it occurs there; however, due to its typical deep-water habitat which is rarely sampled in the Red Sea, it may have gone undetected until now. Therefore, it should now be considered a Lessepsian migrant established in the Mediterranean.

The finding of a single specimen of *Trypauchen vagina* (Block and Schneider, 1801) at a depth of 90 m in the Israeli coast of the Mediterranean (Salameh et al. 2010) constitutes a similar case of an Indo-Pacific fish becoming a Lessepsian migrant.

Acknowledgements

We would like to thank Mr. M. Zamel captain of F/V Aliya and Mr. U. Sharon captain of the F/V Yasur for providing the specimens of *Priacanthus sagittarius* and *Tylerius spinosissimus* and Mr. Yaniv Malki for collecting the *Platax teira*. Our gratitude goes to B. Appelbaum-Golani for editorial assistance.

References

- Bariche M (2010) First record of the angelfish *Pomacanthus maculosus* (Teleostei: Pomacanthidae) in the Mediterranean. *Aqua - International Journal of Ichthyology* 16(1): 31–33
- Ben-Tuvia A (1966) Red Sea fishes recently found in the Mediterranean. *Copeia* 1966: 254–275, <http://dx.doi.org/10.2307/1441133>
- Bilecenoglu M, Kaya M (2006) A new alien fish in the Mediterranean Sea – *Platax teira* (Forsskål, 1775) (Osteichthyes: Ehippidae). *Aquatic Invasions* 1(2): 80–83, <http://dx.doi.org/10.3391/ai.2006.1.2.5>
- Budker P, Fourmanoir P (1954) Poissons de la mer Rouge et du Golfe de Tadjoura (Missions Budker: 1938–39 et Chédeville: 1953. *Bulletin du Muséum national d'Histoire naturelle, Paris* 26 (2): 322–325
- Corsini M, Margies P, Kondilatos G, Economidis PS (2005) Lessepsian migration of fishes to the Aegean Sea: First record of *Tylerius spinosissimus* (Tetraodontidae) from the Mediterranean, and six more fish records from Rhodes. *Cybio* 29: 347–354
- Corsini M, Margies P, Kondilatos G, Economidis PS (2010) Tetraodontid colonization in the Aegean Sea; second record of the spiny blaasop, *Tylerius spinosissimus* (Actinopterygii: Tetraodontiformes: Tetraodontidae). *Acta Ichthyologica et Piscatoria* 40(1): 71–74
- Edwards A, Rosenwell J (1981) Vertical zonation of coral reef fishes in the Sudanese Red Sea. *Hydrobiologia* 79(1): 21–31, <http://dx.doi.org/10.1007/BF00005817>
- Galil BS (2009) Taking stock: inventory of alien species in the Mediterranean Sea. *Biological Invasions* 11: 359–372, <http://dx.doi.org/10.1007/s10530-008-9253-y>
- Golani D (2010) Colonization of the Mediterranean by Red Sea Fishes via the Suez Canal – Lessepsian Migration. In: Golani D, Appelbaum–Golani B (eds) Fish Invasions of the Mediterranean – Change and Renewal. Sofia: Pensoft, pp 145–188
- Golani D, Bogorodsky SV (2010) The fishes of the Red Sea – reappraisal and updated checklist. *Zootaxa* 2463, Magmolia Press, Auckland, New Zealand, 135 pp
- Goren M, Dor M (1994) An Updated Checklist of the Fishes of the Red Sea – CLOFRES II. The Israel Academy of Sciences and Humanities, Jerusalem and Interuniversity Institute for Marine Sciences, Eilat, 120 pp
- Goren M, Stern N, Galil BS, Diamant A (2010) First record of the Indo-Pacific arrow bulleye *Priacanthus sagittarius* Starnes, 1988 in the Mediterranean. *Aquatic Invasions* 5 (Supplement 1): S45–S47, <http://dx.doi.org/10.3391/ai.2010.5.S1.011>
- Hardy GS (1984) *Tylerius*, a new generic name for the Indo-Pacific pufferfish, *Sphoeroides spinosissimus* Regan, 1908 (Tetraodontiformes: Tetraodontidae) and comparisons with *Amblyrhynchotes* (Bibron) Duméril. *Bulletin of Marine Sciences* 35: 32–37
- Heemstra PC (2001) Ehippidae, Spadefishes (batfishes). In: Carpenter KE, Niem VH (eds), FAO species identification guide for fisheries purposes. The living marine resources of the western central Pacific. Vol. 6, pp 3611–3622
- Hubbs CL, Lagler KF (1947) Fishes of the Great Lakes Region. *Bulletin, Cranbrook Institute of Science* (Bloomfield Hills, Michigan) 26: VI + 186 pp
- Por FD (1978) Lessepsian migration: the influx of Red Sea biota into the Mediterranean by way of the Suez Canal. *Ecological Studies*, vol 23. Springer–Verlag, Berlin, Germany, 228 pp
- Salameh P, Sonin O, Golani D (2010) First record of the Burrowing goby, *Trypauchen vagina* (Bloch and Schneider, 1801) (Teleostei: Gobiidae: Amblyopinae) in the Mediterranean. *Acta Ichthyologica et Piscatoria* 40(2): 109–111, <http://dx.doi.org/10.3750/AIP2010.40.2.03>
- Starnes WC (1988) Revision, phylogeny and biogeographic comments on the circumtropical marine percoid fish family Priacanthidae. *Bulletin of Marine Science* 43(2): 117–203
- Starnes WC (1999) Priacanthidae, Bigeyes. In: FAO species identification guide for fisheries purposes. The living marine resources of the western central Pacific. Vol.4. Carpenter KE, Niem VH (eds), pp 2590–2601