

Aquatic Invasions Records

First record of the Emperor angelfish, *Pomacanthus imperator* (Teleostei: Pomacanthidae) and the second record of the spotbase burrfish *Cyclichthys spilostylus* (Teleostei: Diodontidae) in the MediterraneanDaniel Golani^{1*}, Pierre Salameh² and Oren Sonin²¹Department of Evolution, Systematics and Ecology, The Hebrew University of Jerusalem, 91904 Jerusalem, Israel²Department of Fisheries, Ministry of Agriculture, P.O. Box 1213, Kiryat Haim, 26105, IsraelE-mail: dgolani@cc.huji.ac.il (DG), pierres@moag.gov.il (PS), orens@moag.gov.il (OS)

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Abstract

The Emperor angelfish *Pomacanthus imperator* (Bloch, 1787) was recorded for the first time from the Mediterranean. Its occurrence there is due to either migration from the Red Sea (Lessepsian migration) or as an escapee from the aquarium trade. The spotbase burrfish *Cyclichthys spilostylus* (Leis and Randall, 1982) was recorded for the second time in the Mediterranean, almost two decades after the first record.

Key words: *Pomacanthus imperator*, *Cyclichthys spilostylus*, Mediterranean, Lessepsian migration**Introduction**

The opening of the Suez Canal in 1869 connecting the Red Sea with the Mediterranean Sea enabled many tropical organisms originating in the Red Sea to invade and colonize the Mediterranean. The influx of Red Sea biota into the Mediterranean, termed Lessepsian migration, encompasses many taxa (Por 1978; Galil 2009). Concerning fish, Golani (2010) presents a thorough discussion of Lessepsian migrant fish, including updated information.

Materials and methods

On 30 November 2009 a 268 mm standard length (320 mm total length) weight 1114.4 g specimen of *Pomacanthus imperator* (Bloch, 1787) was speared at a depth of 5 m off the Mediterranean coast of Shiqmona just south of Haifa, Israel (32°49'N, 34°56'E) (Figure 1). This record constitutes the first record of this species in the Mediterranean. The specimen was deposited in the Fish Collection of the Hebrew University (HUJ) and received the catalogue number HUJ 19889.

On 7 December 2009 the trawler F/V Or ha'Shachar captured a 291 mm standard length (335 mm total length) specimen of *Cyclichthys spilostylus* (Leis and Randall, 1982) at a vicinity of Haifa Bay; the depth was not recorded (Figure 2). This record constitutes the second record of this species in the Mediterranean. This specimen was also deposited in the Fish Collection of the Hebrew University Fish Collection and received the catalogue number HUJ 19899.

Results and discussion*Pomacanthus imperator* (Bloch, 1787)Description of the Mediterranean specimen:

Body oval-shaped, deep (61.1% of SL) and compressed, small head (25.9% of SL) slightly concave in its dorsal profile, predorsal 36.6% , preanal 70.9% and preventral 38.0% of SL. Small protractile and slanted mouth, its gape close to half the distance of vertical of eye. Small eye (20.7% of head length) and wide interorbital (37.4% of head length). Rows of tightly-packed unicuspid depressible teeth forming brush-like surface. The anterior teeth in both jaws are the longest, progressively decrea-

sing in length. No teeth on the vomer or palatine. Short gill rakers, six on the upper limb of the first arch and 13 on the lower limb. Posterior edge of preoperculum very finely serrated. A long and stout spine at the lower angle of the preoperculum, its length 41.2% of head length.

Continuous dorsal fin with 13 spines and 19 rays. Clear incisions between the first spines progressively decrease toward the soft ray portion. Anal fin with three spines with deep incisions between them and 19 rays. The posterior edge of dorsal, anal and caudal fins are rounded. Pectoral fin with 19 rays the upper 2nd and 3rd are the longest. Pelvic fin with one spine and five rays, the first is elongated. Body and head covered with small ctenoid scales extending to the membrane of the median and pectoral fin.

Color of fresh specimen (after being frozen for two days): Body and most of the dorsal fin with slightly diagonal alternating stripes of yellow and grey-purple, the yellow strips much narrower. Greenish-grey with light blue margin forehead extending to the preopercular spine base. Black mask with bluish margin on the eye. Rear of head and chest black. Snout and cheek pale grey. Anal fin brown-reddish with curved blue stripes. Caudal fin yellow. Pectoral fin dark grey to black. Pelvic fin with bluish-grey membrane and orange rays.

Remarks: *Pomacanthus imperator* has a wide Indo-Pacific distribution from the Red Sea and eastern Africa to Japan, its type locality, and Tuamotu Island and a single record from Hawaii (Randall 2007). The Emperor Angelfish inhabit outer coral reef or rocky habitat at depths of 5-60 m. They live solitary or in pairs, the male defending aggressively its territory against conspecific males. Young specimens, up to 14 cm, have distinctly different color pattern of deep blue with white and blue stripes on the anterior part of the body, curving progressively and forming circles on the posterior part of the body (Fricke 1980; Heemstra and Heemstra 2004). This pattern enables the juvenile to avoid male aggression and settle in either reef or rocky habitat (Fricke 1980). The source of this specimen could be a possible escapee from an aquarium, since *P. imperator* is a popular species in the aquarium trade. Alternatively, it could be a Lessepsian migrant that reached the eastern Mediterranean from the Red Sea via the Suez Canal. There are other cases such as *Pterois miles* (Bennett, 1828) reported by Golani and Sonin (1992), *Heniochus intermedius* Steidachner, 1893 (by Gökoglu et al. 2003) and



Figure 1. *Pomacanthus imperator*, 268 mm Standard Length, from Shiqmona, south of Haifa Bay, Mediterranean coast of Israel, HUI 19889. Photograph by D. Golani.



Figure 2. *Cyclichthys spilostylus*, 291 mm Standard Length, vicinity of Haifa Bay, the Mediterranean coast of Israel, HUI 19899. Photograph by D. Golani.

Iniistius pavo (Valenciennes, 1840) (by Corsini et al. 2006) where species associated with coral reefs were recorded as a single specimens in the Mediterranean.

Cyclichthys spilostylus (Leis and Randall, 1982)

Description of the (inflated) Mediterranean specimen: Round body covered with short fixed spines. Most of the spines have three subdermal bases, only a few spines located dorsally on the head have four bases. The spines are arranged in irregular rows, 11 on the dorsal surface to the origin of dorsal fin, 16 on the ventral to the origin of anal fin and 14 transverse rows. No spines on the caudal peduncle. Short (31.1% of SL) and deep head. Dorsal and anal fins located

posteriorly. Long predorsal distance (78.0% in SL) and preanal distance (78.6% in SL), narrow caudal peduncle (5.7% in SL). Small mouth and relatively wide (22.0% in head length) with a large single dental plate, one in the upper jaw and one in the lower jaw. Short snout (38.0% of head length), moderated eye (29.7% of head length) and wide interorbital (60.4% of head length). Dorsal fin with 11 rays, anal fin with 9 rays and caudal fin with 7 rays. The posterior edges of all these fins are rounded. Wide base pectoral fin with 18 rays. Ventral fin absent. Vertical, slightly curved, gill opening just in front of pectoral fin base.

Color of fresh specimen (after one week in a freezer): Grey dorsal surface with a white belly. The spines are white. Some of the spines on grey area have a yellowish dot at the base and some in the white area have a black spot at the base. The median fins are dark grey and the pectoral fin light grey.

Remarks: *Cyclichthys spilostylus* has a wide Indo-Pacific distribution including the Red Sea, its type locality, eastern Africa, India, Indonesia, Japan and Australia (Randall 1995) with a surprising record from the Galapagos Islands (Humann 1993). Golani (1993) reported a single record from the Mediterranean coast of Israel (under the generic name of *Chilomycterus*), collected by a trawl at depths of 20-30 m. The fact that close to two decades elapsed between the first and the second record could be due to the first record representing a case of an abortive colonization event or that this species has established a small population in the Mediterranean and therefore was not captured or not brought to the attention of the scientific community.

Cyclichthys spilostylus is a demersal, solitary species found at depths of 3-90 m. It inhabits a variety of habitats in the vicinity of coral and rocky substrate as well as sea grass and open areas, including trawl grounds (Leis and Randall 1982) in which both Mediterranean specimens were collected.

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