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Short communication

First record of the Far East chameleon goby *Tridentiger trigonocephalus* (Gill, 1859) in the Mediterranean Sea

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Abstract

The chameleon goby *Tridentiger trigonocephalus* (Gill, 1859) was found in Ashdod Harbor (Israel). This is the first record of this species in the Mediterranean. *T. trigonocephalus* is the third fish species directly human-mediated introduction (via ballast water in vessels) of a fish species into the Eastern Mediterranean and the sixth alien goby in this region.

Key words: Mediterranean Sea, alien species, *Tridentiger trigonocephalus*, ballast water

Since the opening of the Suez Canal a massive invasion of marine biota from the Red Sea into the Mediterranean has been taking place. Among the non indigenous species (NIS), ca. 75 are fish species (Galil 2009) that now occupy a variety of habitats in the Eastern Mediterranean. Two of these NIS, *Omobranchus punctatus* (Valenciennes, 1836) and *Bregmaceros atlanticus* Goode and Bean, 1886 are suspected to have arrived in ships ballast water since they have never been found in the Red Sea (Bath 1980; Golani 2004; Goren and Galil 2006). Herein we report the finding of the third alien fish species, most likely introduced in the Eastern Mediterranean with ballast water.

In September 2006, a group of unknown fish was observed hovering around the chain that anchors fish cages in Ashdod Harbor (southern Israeli Mediterranean coast). We were able to catch and examine one of them and identified it as the Far East chameleon goby *Tridentiger trigonocephalus* (Gill, 1859). Since this species is not found any where in the entire Indian Ocean or the Red Sea we suggest that its occurrence in Ashdod Harbor is the result of an introduction via ballast water of ships.

Abbreviations: TAU – fish collection of Tel Aviv University; TL - total length.

Tridentiger trigonocephalus (Gill, 1859)
(Figures 1, 2)

Triaenophorus trigonocephalus Gill, 1859. Type locality Hong Kong (China).

Material examined: TAU – P. 13143, Ashdod Harbor (Israel) at a depth of ca. 4-5 m (N 31°49'55.03"; E 34°38'13.12"). One specimen TL 71.9 mm. Collected on 27 September, 2006.

Brief description of the specimen: A *Tridentiger* species with two dark brown interrupted stripes on body. The lower stripe runs from snout through eyes along mid-body to caudal fin. The upper stripe runs from above eyes backward to below posterior end of second dorsal fin, and continues as a saddle on peduncle. A black spot on upper posterior peduncle. A pale-yellow vertical stripe along the base of pectoral fine (Figure 2). Narrow yellowish stripes along the bases of dorsal and anal fins.

Number of scales along lateral line: 56. Nineteen scales in transverse row. Median predorsal scales 23, do not reach eyes (end about half eye diameter behind eye). No scales on opercle and preopercle. Dorsal fins: VI, I 13. Anal fin: I 11. Pectoral fine: 20. Pelvic fin: I 5, fraenum developed. Gill opening restricted, about the height of pectoral base. Shoulder girdle under gill cover smooth. Teeth tricuspid.

Selected proportions: standard length of total length: 85.5%; head length of standard length: 25.9%; body depth of standard length: 18.9%; distance: snout – first dorsal fin of standard length: 36.3%; distance: snout – second dorsal fin of standard length: 55.8%; distance: snout – anal fin of standard length: 55.0%; eye diameter of head length: 23.9%; interorbital space of head length: 18.2%;

Anterior nostril on short tube. Posterior nostril is oval. Anterior interorbital pores paired.

Sensory pores as shown in Figure 2.

Remarks: We distinguished *T. trigonocephalus* from the closely-related *Tridentiger bifasciatus* Steindachner, 1881 following the diagnostics provided by Akihito and Sakamoto (1989): large cephalic sensory pores, coloration of head, distal part of upper pectoral fin ray partly free and higher number of dorsal and anal rays. These two species can easily be distinguished from all other species of *Tridentiger* which are characterized by considerably fewer scales along the lateral line (fewer than 45, Akihito et al. 1984).

Although most NIS in the Eastern Mediterranean are Red Sea species that have self propelled through the water passage of the Suez Canal, direct human-mediated introduction (via vessels) also contributes significantly to the changes in local biodiversity (Galil 2009). To date, including the present finding, three alien fish species that have been introduced in ballast water of ships are known from the vicinity of Ashdod Harbor. One of them, *B. atlanticus*, reached the third phase of invasion (sensu Wonham et al. 2000) and has become common along the Israeli coast, southern Turkey and the Aegean Sea (Yilmaz et al. 2004; Goren and Galil 2006; Filiz et al. 2007). The status of the second fish species, *O. punctatus*, is still not clear. Although a single individual was reported from Lake Timsah (Suez Canal) in 1980 (Bath 1980), no additional sighting was reported until 2004, when Golani collected another specimen in Ashdod Harbor (Golani 2004). There is no indication whether the specimen found in

Figure 1. *Tridentiger trigonocephalus* from Ashdod Harbor (Israel) TAU – P. 13143 (Photograph by Kfir Gayer)

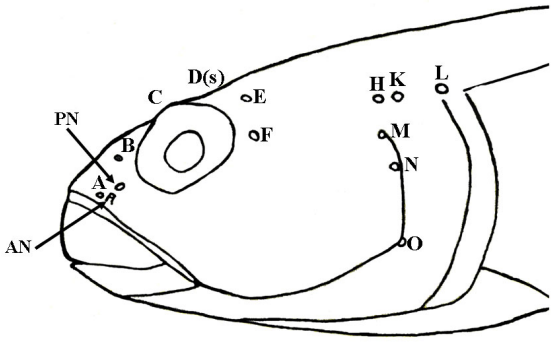

Figure 2. Sensory pores of *Tridentiger trigonocephalus* from Israel TAU – P. 13143 (pore numbering after Akihito 1986). AN-anterior nostrils; PN-posterior nostrils; pores A-H anterior oculoscapular canal; K-L posterior oculoscapular canal; M-O preopercular canal

Ashdod represents a population spread from the Suez Canal (in which case this fish has reached the third phase) or whether it represents an additional human-mediated introduction. The present observation of a group of *T. trigonocephalus* may indicate that this species can be assigned to phase three.

Whereas the finding of *B. atlanticus* in the Mediterranean was the first report of this species as an NIS, the other two are notorious NIS: *O. punctatus* is known as an NIS from Mozambique, Venezuela, Trinidad and Atlantic Panama (Wonham et al. 2000), and *T. trigonocephalus* is known from New South Wales (Australia), California (USA), and Sevastopol Bay (Black Sea, Ukraine) (Wonham et al. 2000; Boltachev et al. 2007).

Tridentiger trigonocephalus is the sixth gobiid NIS reported from the Eastern Mediterranean. Two species, *Coryogalops ochetica* (Norman, 1927) and *Papillogobius melanobranchus* (Fowler, 1934) are known from a single specimen each: *C. ochetica* was reported from Port Said, the beginning of the Suez

Canal, and *P. melanobranchus* from Bardawil Lagoon, northern Sinai (Golani et al. 2006; Kovačić and Golani 2007). *Oxyurichthys petersi* (Klunzinger, 1871), which was first reported from Ashdod in 1983 (Ben Tuvia 1983), is common in shallow (down to 50 m) soft bottom all over the Eastern Mediterranean from Israel to Aegean Sea (Golani et al. 2006; Akyol et al. 2006). *Silhouetta aegyptia* (Chabanaud, 1933), which was first reported from Bardawil Lagoon in 1986, has developed a population in this semi-isolated shallow water lagoon and is occasionally found along the Israeli coast (Golani 2006). *Vanderhorstia mertensi* Klausewitz, 1974, which lives in association with an alpheid shrimp, was reported for the first time from southern Turkey, where it has established a population (Bilecenoglu et al. 2008). Whereas these five species live exclusively in sea water, mainly on soft substrate, the newly-reported goby lives in a variety of habitats and salinities. In the Far East the species inhabits brackish water and sea water with stony bottom (Akihito and Sakamoto 1989). Boltachev et al. (2008) collected the fish at a depth of 4-5 m. in brackish water (salinity of 14.96 psu) on silt sandy ground partly covered with aquatic vegetation. According to Froese and Pauly (2009) this species is also found in oyster shells and crevices among barnacles and other fouling organisms. In Ashdod the fish was observed hovering around the chain that anchors fish cages in sea water.

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