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Rapid Communication

Dipterygonotus balteatus (Valenciennes, 1830) (Teleostei: Caesionidae), a new alien fish in the Mediterranean Sea

Michel Bariche[1,*] and Ronald Fricke[2]

[1]*Department of Biology, American University of Beirut, 11-0236 Beirut, Lebanon*
[2]*Im Ramstal 76, 97922 Lauda-Königshofen, Germany*
Author e-mails: michel.bariche@aub.edu.lb (MB), ronfricke@web.de (RF)
**Corresponding author*

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Abstract

The mottled fusilier *Dipterygonotus balteatus* is a midwater planktivorous fish, native to the tropical Indo-Pacific realm. Here we document the first record of five individuals of this species captured in the eastern Mediterranean, off Al Abdeh in Lebanon. Given its small size, inconspicuous appearance, behaviour and also the number of individuals caught, it is suggested that the species may already have been present in the Mediterranean Sea for some time. Because of the proximity to the Suez Canal, Lessepsian migration is a likely mode of entry but transport by ballast water is also another possible pathway.

Key words: Fusiliers, first record, non-indigenous, biological invasions, Lebanon

Introduction

Caesionidae constitutes a family of Indo-West Pacific fishes commonly known as fusiliers (Carpenter 1987; Nelson 2006). The family was first described by Bonaparte (1831) under the name Caesionini (see Van der Laan et al. 2014) and is composed of 23 species in four genera (Eschmeyer and Fong 2017; Eschmeyer et al. 2017). Their planktivorous diet and mode of life are associated with some notable morphological characteristics such as an elongate fusiform body with a deeply forked caudal fin and a small mouth with a protrusible upper jaw, the premaxillary process having a separate ossification and no ethmo-maxillary ligament (Carpenter 1987, 1990; Nelson 2006). Members of this family are generally found schooling near coral reefs, feeding on zooplankton and occurring from near the surface to depths of 60 m (Carpenter 1987).

Herein we document the first record of the mottled fusilier *Dipterygonotus balteatus* (Valenciennes, 1830) of the Caesionidae family in the eastern Mediterranean, and discuss the possible pathways for its introduction. The mottled fusilier is the only species known in this monotypic genus. It is easily distinguished from other fusiliers by its elongate body, its fin formulae, the tapered posterior end of the maxilla, and the shape of the dorsal fin. It primarily inhabits the nearshore pelagic environment, not necessarily near coral reefs (Carpenter 1987). The species has been previously recorded throughout most of the Indo-West Pacific, but has not been found in the Arabian Gulf and the Red Sea (Golani and Bogorodsky 2010; Akel and Karachle 2017; Froese and Pauly 2017).

Many fish species have entered the Mediterranean through the Suez Canal and established viable populations. The first were observed in the canal soon after its opening (Keller 1883; Norman 1927). Hubbs (1927) already discovered several species, mostly of Red Sea origin. The number of such alien species has significantly increased with the years and has currently exceeded 100 fish species (Golani 2010; Edelist et al. 2013; Samaha et al. 2016). Other species originate from more distant locations and have been introduced through other pathways of introduction, such as shipping, aquaculture, and aquarium trade (Zenetos et al. 2017; Galil et al. 2018).

Table 1. Meristic and morphometric characters of the Mediterranean specimens of *Dipterygonotus balteatus* (DB) caught off the coast of Lebanon (eastern Mediterranean). Measurements were made following Carpenter (1987). Pectoral fin counts were made on left pectoral only. LL (left-right sides). All lengths are in mm.

Characters	DB1	DB2	DB3	DB4	DB5
Total length	103.6	92.4	94.8	89.9	87.5
Standard length	84.3	76.9	72.2	73.1	69.5
Body Depth	17.17	14.84	15.83	16.07	15.41
Body Width	10.39	8.92	9.95	8.94	9.48
Head Length	23.42	20.72	21.72	20.77	20.78
Snout length	5.88	4.91	5.08	5.74	4.95
Pre-dorsal length	30.25	26.12	27.59	27.04	26.22
Orbit diameter	6.47	6.24	6.09	5.93	5.82
Pectoral-fin length	16.20	15.01	15.29	13.98	14.34
D	XIV-9	XIV-8	XIV-9	XIV-9	XIV-8
A	III-9	III-9	III-9	III-9	III-9
P	19	17	19	17	16
LL	73–74	80–79	81–80	70–71	77–79
Total circumpeduncular scales	27	27	29	28	27
Scales above lateral line to D	9	10	9	9	10
Scales below lateral line to A	16	15	16	17	17
Scales on cheek	7	6	7	7	7
Pre-dorsal scales	33	34	32	32	34

Methods

On 11 August 2017, five individuals of *Dipterygonotus balteatus* were captured from northern Lebanon, off the coast of Al Abdeh (34.521845ºN; 35.968446ºE) (Figure 1). All specimens were caught together using a fine-meshed trammel net set by fishermen to catch squids on a soft bottom, at an approximate depth of 15 m. The specimens were identified following Carpenter (1987) and were deposited in the marine collection of the American University of Beirut (AUBM OS3931). Measurements and descriptive methods also followed Carpenter (1987). The standard length is abbreviated SL, the head length HL.

Results

Short description of the specimens

Body slender, fusiform and elongate, its depth 4.5–5.2 in SL; body width 1.6–1.8 in depth; HL 3.3–3.7 in SL; snout 3.6–4.3 in HL; eye 3.3–3.6 in HL and pectoral-fin length 1.4–1.5 in HL. Dorsal fin deeply notched. The meristic and morphometric data of the five individuals (87.5–103.6 mm TL) are presented in Table 1.

Colour of fresh specimens: upper body brownish bronze; a straight, tan stripe about 1 scale wide from orbit to upper caudal-fin base, directly above lateral line for anterior half of its length, about 2 scales above lateral line on caudal peduncle; above and parallel to this stripe 2 thin, irregular, usually interrupted tan stripes; lower body silvery white, scales below lateral line with dark margins on anterior half of body; pectoral fins pink, caudal fin reddish.

Discussion

We report here the first record of the mottled fusilier *Dipterygonotus balteatus*, a new alien fish species in the Mediterranean Sea. It is also the first record of a member of Caesionidae in the Atlanto-Mediterranean realm (Nelson 2006).

Because of the proximity to the Suez Canal (circa 600 km), Lessepsian migration is a possible mode of entry. If this is the case, the presence of the species should be investigated in the Red Sea, since it was never recorded there (Golani and Bogorodsky 2010; Froese and Pauly 2017). However, the closest record of the species in its native habitat to the Mediterranean (i.e. through the Suez Canal) is the coast of Djibouti, in the north-western Indian Ocean and near the entrance of the Red Sea (Figure 2). If the species does not occur naturally in the Red Sea, its introduction to the Mediterranean could have been made by vessels coming from the Indo-Pacific via ballast water. In fact, the translocation of non-native fish through vessels can occur following several scenarios (reviewed in Schembri et al. 2010). While it is hard to prove it for fish species, this pathway is likely and could be valid for several records in the Mediterranean Sea. This is particularly probable in countries that are distant from the Suez Canal (e.g. Vella and Deidun 2008; Schembri et al. 2010; Schembri and Tonna 2011). Other known modes of introduction such as aquarium trade or aquaculture release, are less likely because *D. balteatus* is not known to be farmed or considered as an aquarium species.

Dipterygonotus balteatus is the only species in the family that is not strictly associated with coral reefs,

but displays a nearshore pelagic lifestyle (Allen and Erdmann 2012). In its natural habitat, it is known to form dense schools near reefs, at depths of 1–90 m, and often aggregates with other planktivorous fish species (Allen and Erdmann 2012). In the Mediterranean Sea, we expect that it would primarily aggregate with any of the two native Sparidae, *Boops boops* and *Centracanthus cirrus*, and possibly with some Clupeidae, Dussumieriidae and Engraulidae present in the Mediterranean. This behaviour could be another reason to have been overlooked in the Mediterranean.

Given its small size, inconspicuous appearance, behaviour and also the number of individuals captured, it is suggested that *D. balteatus* may have already been present in the Mediterranean Sea for some time but has been unnoticed so far. The characteristic straight tan stripe running above the lateral line from the eye to the caudal fin easily distinguishes macroscopically from all morphologically similar native species, particularly from the native *Boops boops* and from *Centracanthus cirrus* (Figure 1). A closer examination of Mediterranean planktivores may reveal the presence of *D. balteatus* in other parts of the Levantine coast or the eastern Mediterranean.

Figure 1. *Dipterygonotus balteatus* collected from Lebanon (AUBM OS3931). Scale bar = 2 cm. Photograph by: M. Bariche.

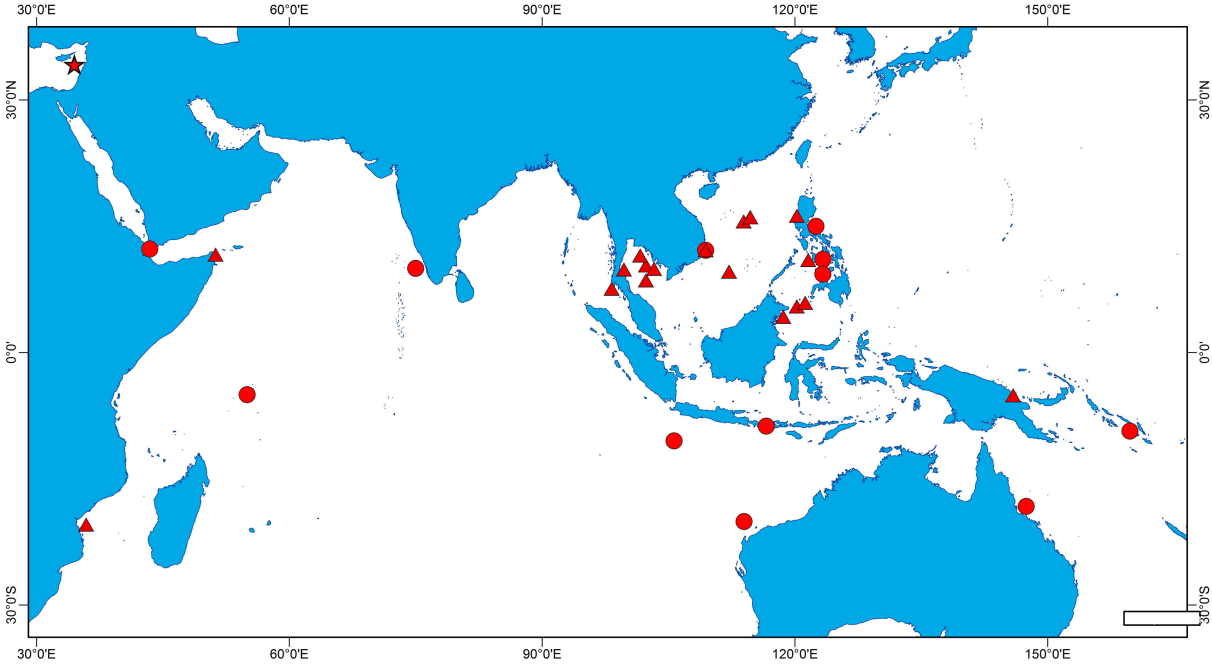

Figure 2. Distribution of *Dipterygonotus balteatus* in its native Indo-West Pacific range (star: first record from the Mediterranean Sea; circles: modified from Carpenter 1987; triangles: additional records from Yoshida et al. 2013, Iwatsuki and Satapoomin 2009, Fricke et al. 2014, Holleman et al. 2013, NMNH online Fish Collection). Scale bar = 1,000 km. For details see Supplementary material Table S1.

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Supplementary material

The following supplementary material is available for this article:

Table S1. Details of approximate localization of *Dipteryogonotus balteatus* in its native Indo-West Pacific range: location name and coordinates, date collected, primary reference.

This material is available as part of online article from:
http://www.reabic.net/journals/bir/2018/Supplements/BIR_2018_Bariche_Fricke_Table_S1.xlsx