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ETRUMEUS GOLANII (ACTINOPTERYGII: CLUPEIFORMES: DUSSUMIERIIDAE) A NEW LESSEPSIAN MIGRANT RECORDED IN MOROCCO, ALBORAN SEA (SOUTH-WEST MEDITERRANEAN)

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Abstract. The occurrence of a Lessepsian migrant, the Golani round herring, *Etrumeus golanii* DiBattista, Randall et Bowen, 2012, is reported here for the first time from the Alboran Sea (south-west Mediterranean). On May 2018, twenty individuals were caught by a commercial purse-seiner off Fnideq (Morocco), but five females and two males, were kept by the fisherman for further analyses. This new finding confirms the expansion of this Lessepsian migrant throughout the Mediterranean Sea.

Keywords: round herring, *Etrumeus golanii*, new record, morphometry, Alboran Sea, Morocco

INTRODUCTION

The opening of the Suez Canal in 1869 connected the Red Sea to the Mediterranean Sea and allowed a large number of tropical/subtropical marine species to enter the Mediterranean basin. This migration phenomenon has been called Lessepsian migration (DiBattista et al. 2012, Galil et al. 2015). To date, many Lessepsian species have established thriving populations along the eastern Mediterranean coastlines (Galil et al. 2017).

According to a recent study by Zenetos et al. (2017), a total of 821 alien species have been reported in the Mediterranean Sea with the Lessepsian fishes accounting for approximately 100 (Giovos et al. 2018), including the Golani round herring, *Etrumeus golanii* DiBattista, Randall et Bowen, 2012.

Etrumeus golanii is an inshore pelagic fish originally known from the northern region of the Red Sea and now expanding towards the Mediterranean. It is established in the Mediterranean Sea, especially in its eastern part and was widely reported in the literature as "*Etrumeus teres*". Those erroneously labelled findings later turned out to be a species that is new to science (Zenetos et al. 2017). The above-mentioned misidentification was exposed by DiBattista et al. (2012).

Etrumeus golanii is not restricted to the eastern Mediterranean Sea but it is also present in its central (Italy, Libya and Tunisia) and western (Algeria) parts (Falautano et al. 2006, Boussellaa et al. 2016, Shakman et al. 2017, Stamouli et al. 2017).

This paper reports the first occurrence of *Etrumeus golanii* for Morocco and the Alboran Sea and the second record of this fish from the western Mediterranean Sea.

MATERIAL AND METHODS

Several specimens of the Golani round herring, *Etrumeus golanii*, were caught off Fnideq, Morocco (35°50.366′ N, 005°16.578′W–35°49.998′N, 005°16.388′W) (Fig. 1) from depths ranging from 67 to 80 m, at nights of 7 and 8 May 2018, by a commercial purse-seiner. The catch included also other small pelagic fishes such as *Trachurus mediterraneus* (Steindachner, 1868), *Scomber colias* Gmelin, 1789, and *Sardina pilchardus* (Walbaum, 1792). Seven specimens of the round herring were provided by the fisherman for our study.

All specimens were measured, weighed, and photographed. Morphometric and meristic measurements are presented in Table 1. The specimens were preserved in ethanol and deposited at the Laboratory of Fisheries of the National Institute of Fisheries Research (INRH), Tanger, Morocco, with voucher number LP-18/01.

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RESULTS

According to the description given by DiBattista et al. (2012) and comparison of the morphometric and metric characters of *Etrumeus golanii* from other areas of the central and eastern Mediterranean Sea (Golani 2000, Falautano et al. 2006, Akyol and Ulaş 2016, Boussellaa et al. 2016) (Table 1), we have identified our specimens as *Etrumeus golanii*. All studied specimens were adults with a total length (TL) varying from 252 to 283 mm and net weight varying from 148.66 to 217.39 g (Fig. 2). These specimens were dissected and sexed. Thus, five were identified as females with gonad weighing from 2.57 to 4.48 g and two were males with gonad weight from 1.86 to 6.57 g.

Fig. 1. The capture site of *Etrumeus golanii* specimens (star); off Fnideq, Morocco (Alboran Sea)

DISCUSSION

To date, there is no evidence of any negative impact of *Etrumeus golanii* on local fisheries resources. On the contrary, the presence of *E. golani* received positive comments (Stamouli et al. 2017). In the eastern Mediterranean Sea, an important population of the Golani round herring is already established (Corsini et al. 2005, Akyol and Ulaş 2016) and represents an important commercial resource (DiBattista et al. 2012). The currently known distribution of the species in the Mediterranean is shown in Fig. 3 and listed in Table 2. With this finding, the number of Lessepsian species present in Morocco increases to two (see below).

In general, there has been a limited number of studies on non-indigenous species, conducted along the Mediterranean coasts of Morocco (Bazairi et al. 2016, Selfati et al. 2017, El Aamri et al. 2018) and Lessepsian species, in particular. Selfati et al. (2017) reported the

Table 1

Morphometric measurements and counts of *Etrumeus golanii*, captured from Findeq Bay, Morocco (Alboran Sea) compared with other published records

	Cyprus 2000	Italy 2006	Turkey 2016	Tunisia 2016	Morocco 2018
n	2	1	1	7	7
Measurements [mm]					
Total length	—	231	180	225–265	252–283
Fork length	—	211	159	200–243	228–260
Standard length	138–213	202	153	165–225	215–243
Body depth	20.6–42.4	35.6	28	34.5–41.3	43–50
Predorsal fin length	—	88	66	87–102	92–107
Prepectoral fin length	—	—	38	—	46.5–56
Preanal fin length	—	—	127	—	175–203
Head length	31–53.5	45	34	39.2–49.3	45–52
Eye diameter	9.3–18.6	12.44	11	10.2–12.5	13–15
Preorbitary length	—	—	12	—	13–16
Dorsal fin base length	—	26.6	—	24.2–26.1	31–35
Anal fin base length	—	9.4	—	9–9.5	9–12
Pelvic fin length	—	14.3	—	14–22	14–16
Meristic counts					
Dorsal fin rays	17–20	18	17	18	18
Pectoral fin rays	15–17	15	16	16	15–16
Pelvic fin rays	8–10	8	8	8	8
Anal fin rays	9–10	12	9	9	9–10

n = number of specimens examined, Cyprus 2000 = Golani 2000, Italy 2006 = Falautano et al. 2006, Turkey 2016 = Akyol and Ulaş 2016, Tunisia 2016 = Boussellaa et al. 2016, Morocco 2018 = presently reported study.

Table 2

Records of *Etrumeus golanii* in the Mediterranean Sea

Record date	Location	Reference
1961	Haifa Bay, Israel	Whitehead 1963
1994	Egypt	El Sayed 1994
1996	Iskenderun, Turkey	Başusta et al. 1997
1997	Antalya Gulf, Turkey	Yılmaz and Hoşsucu 2003
1999	Limassol, Cyprus	Golani 2000
2003	Rhodes, Greece	Corsini et al. 2005
2004	Cyclades, Greece	Kallianiotis and Lekkas 2005
2005	Hydra Island, Greece	Zenetos et al. 2008
2004–2005	Crete, Greece	Kasapidis et al. 2007
2005	Lampedusa, Italy	Falautano et al. 2006
2009	Dikili Coast, Turkey	Yarmaz et al. 2010
2015	Gulf of Izmir, Turkey	Akyol and Ulaş 2016
2014	Gulf of Gabes, Tunisia	Boussellaa et al. 2016
2017	Misrata, Libya	Shakman et al. 2017
2017	Cherchell, Algeria	Stamouli et al. 2017
2018	Fnideq Bay, Morocco	Presently reported study

Fig. 2. *Etrumeus golanii* captured off Fnideq Bay, Morocco; scale bar: 20 mm

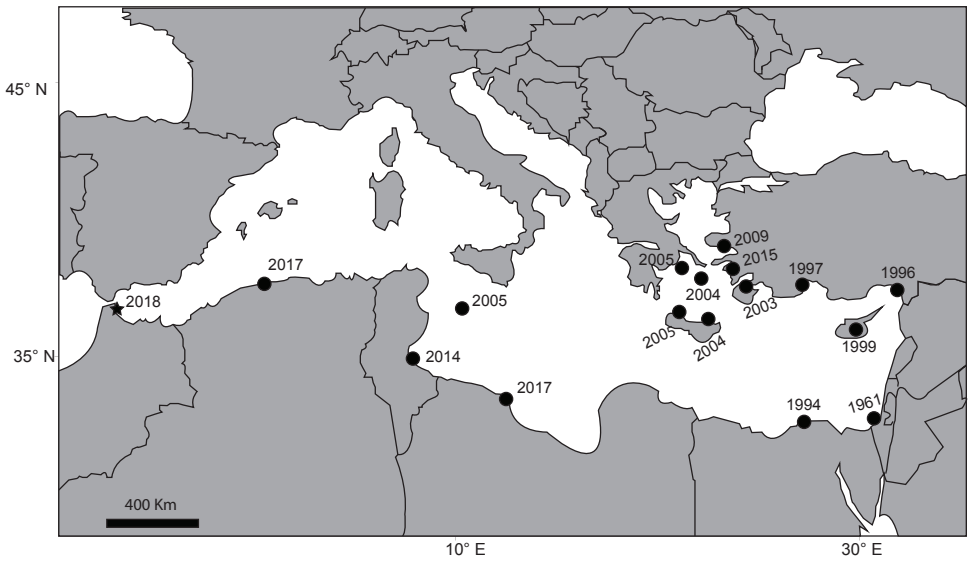

Fig. 3. Published records of *Etrumeus golanii* in the Mediterranean Sea (black dots: as listed in Table 2) and the new record, determined in this study (star)

first presumed Lessepsian species namely, the gastropod *Bursatella leachii* from Mar-Chica (Nador).

In conclusion, the recent occurrence of the Golani round herring, *Etrumeus golanii*, in Tunisian, Algerian, and Moroccan waters, may be linked to the altering environmental conditions which are gradually becoming more favourable for those fish. In this case, it could be assumed that the establishment of a sustainable population in near future could be expected. Furthermore, the presently reported record confirms, also, the occurrence of this fish species in the Alboran Sea and its expansion throughout the Mediterranean Sea.

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