

ADDITIONAL RECORD OF GOLANI ROUND HERRING, *ETRUMEUS GOLANII* (OSTEICHTHYES: DUSSUMIERIIDAE) FROM TUNISIAN WATERS WITH COMMENTS ON ITS DISTRIBUTION IN THE MEDITERRANEAN SEA

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ABSTRACT

*The occurrence of the Lessepsian migrant Golani round herring *Etrumeus golanii* (Dussumieriidae) was confirmed off the Tunisian coast with the record of a specimen captured by a commercial purse-seiner on 13 March 2020, in the Gulf of Hammamet. The specimen, a mature female, measured 262 mm in total length and weighed 178.22 g. Morphometric and meristic characteristics of the specimen caught are given. This new finding of *E. golanii* confirms the rapid expansion of this Lessepsian migrant's range in the Mediterranean Sea.*

Key words: Round herring, *Etrumeus golanii*, Lessepsian migration, Gulf of Hammamet, expansion range, Mediterranean Sea

NUOVE SEGNALAZIONI DELLA SARDINA DI GOLANI, *ETRUMEUS GOLANII* (OSTEICHTHYES: DUSSUMIERIIDAE) IN ACQUE DELLA TUNISIA CON COMMENTI SULLA DISTRIBUZIONE NEL MEDITERRANEO

SINTESI

*La presenza della sardina di Golani, *Etrumeus golanii* (Dussumieriidae), migrante lessepsiano, è stata confermata al largo delle coste tunisine con la cattura di un esemplare con rete da circuizione commerciale, il 13 marzo 2020, nel Golfo di Hammamet. Il campione, una femmina matura, misurava 262 mm di lunghezza totale e pesava 178,22 g. Nell'articolo vengono fornite le caratteristiche morfometriche e meristiche dell'esemplare catturato. Questo nuovo ritrovamento di *E. golanii* conferma la rapida espansione di questo migrante lessepsiano nel mare Mediterraneo.*

Parole chiave: sardina di Golani, *Etrumeus golanii*, migrazione lessepsiana, Golfo di Hammamet, intervallo di espansione, Mediterraneo

INTRODUCTION

The Golani round herring *Etrumeus golanii* DiBattista, Randall & Bowen, 2012 is a Lessepsian migrant (*sensu* Por, 1978), native to the western Indian Ocean and common in the Red Sea (Golani & Fricke, 2005). The species migrated through the Suez Canal into the Mediterranean Sea, where it was first recorded in the eastern Levant Basin, off Haifa, and misidentified as the red-eye round herring *Etrumeus teres* (DeKay, 1848) by Whitehead (1963). Successive records occurred in eastern Mediterranean regions, where viable populations are probably established (Golani, 2000, 2005).

After migrating toward western areas, the species was first recorded in the central Mediterranean in the waters surrounding the Lampedusa Island by Falautano et al. (2006). It was redefined the Golani round herring *E. golanii* by DiBattista et al. (2012) and furtherly recorded with its new taxon in Tunisia (Boussellaa et al., 2016, Rafrafi-Nouira et al., 2017), Libya (Shakman et al., 2017), Algeria (Kassar & Hemida in Stamouli et al., 2017), and Morocco (Tamsouri et al. (2019). In this paper, an additional record of *E. golanii* from the Tunisian coast is reported and the species' distribution throughout the Mediterranean and its status in this sea are discussed.

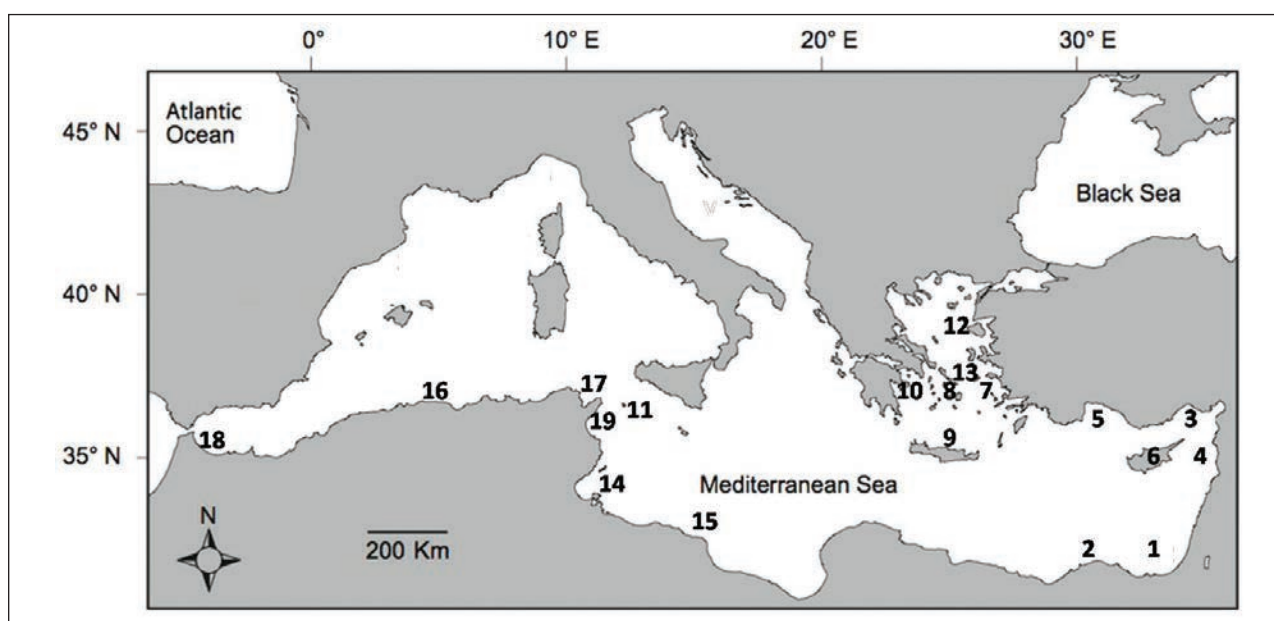


Fig. 1: Map of the Mediterranean Sea, copied from Rafrafi et al. (2015), indicating the distribution of Golani round eye *Etrumeus golanii* by chronological order. 1: Haifa Bay, Israel, Whitehead (1963). 2: Off Egypt, El Sayed (1994). 3: Off Iskenderun, Turkey, Başusta et al. (1997). 4: Off Syria, erroneously reported as *Etrumeus sadina* (Mitchill, 1814), Saad (2002) in Ali (2018). 5: Antalya Gulf, Turkey, Yılmaz & Hoşsucu (2003). 6: Off Limassol, Cyprus, Golani (2005). 7: Rhodes, Greece, Corsini et al. (2005). 8: Cyclades, Greece, Kallianiotis & Lekkas (2005). 9: Hydra Island, Greece, Zenetos et al. (2008). 10: Crete, Greece, Kasapidis et al. (2007). 11: Lampedusa, Italy, Falautano et al. (2006). 12: Dikili Coast, Turkey, Yarmaz et al. (2010). 13: Gulf of Izmir, Turkey, Akyol & Ulaş (2016). 14: Gulf of Gabès, Tunisia, Boussellaa et al. (2016). 15: Off Misrata, Libya, Shakman et al. (2017). 16: Off Cherchell, Algeria, Kassar & Hemida in Stamouli et al. (2017). 17: Off Ras Jebel, Tunisia, Rafrafi et al. (2017). 18: Fnideq Bay, Morocco, Tamsouri et al. (2019). 19: Gulf of Hammamet, Tunisia, present study.

Sl. 1: Zemljevid Sredozemskega morja (prirejeno po Rafrafi in sod., 2015) in podatki o razširjenosti vrste *Etrumeus golanii* glede na časovni interval pojavljanja. 1: Zaliv Haifa, Izrael, Whitehead (1963). 2: v vodah Egipta, El Sayed (1994). 3: v vodah okoli Iskenderuna, Turčija, Başusta in sod. (1997). 4: pred Sirijo, napačno določena kot *Etrumeus sadina* (Mitchill, 1814), Saad (2002; v Ali 2018). 5: zaliv Antalya, Turčija, Yılmaz & Hoşsucu (2003). 6: pred Limassolom, Ciper, Golani (2005). 7: Rodos, Grčija, Corsini in sod. (2005). 8: Kikladi, Grčija, Kallianiotis & Lekkas (2005). 9: otok Hydra, Grčija, Zenetos in sod. (2008). 10: Kreta, Grčija, Kasapidis in sod. (2007). 11: Lampedusa, Italija, Falautano in sod. (2006). 12: obala Dikili, Turčija, Yarmaz in sod. (2010). 13: zaliv Izmir, Turčija, Akyol & Ulaş (2016). 14: zaliv Gabès, Tunizija, Boussellaa in sod. (2016). 15: pred Misrato, Libija, Shakman in sod. (2017). 16: v vodah pred Cherchell, Alžirija, Kassar & Hemida v Stamouli in sod. (2017). 17: pred Ras Jebel, Tunizija, Rafrafi in sod. (2017). 18: zaliv Fnideq, Maroko, Tamsouri in sod. (2019). 19: zaliv Hammamet, Tunizija, pričujoča raziskava.

MATERIAL AND METHODS

On 13 March 2020, a specimen of *E. golanii* was observed at the fish landing site of Kélibia. The specimen was caught in the Gulf of Hammamet at 36°46'57" N and 11°17'52" E, during the night, at a depth of 40-42 m (Fig. 1). It was caught together with other pelagic teleost species such as the round sardinella *Sardinella aurita* Valenciennes 1847, the Mediterranean horse-mackerel *Trachurus mediterraneus* (Steindachner, 1868), and the Atlantic chub mackerel *Scomber colias* Gmelin, 1789. The specimen of *E. golanii* was frozen and delivered to the laboratory, where it was identified, photographed, measured and weighed. Morphometric and meristic characteristics were recorded following Nielsen & Johnson (1983), and are summarized in Table I. The specimen was preserved in 10% buffered formaldehyde, deposited in the Ichthyological Collection of the Institut Supérieur de Pêche et d'Aquaculture de Bizerte (Tunisia), under catalogue number ISPAB-Etr-gol-01.

RESULTS AND DISCUSSION

The specimen of *E. golanii* from eastern Tunisian waters measured 262 mm in total length (TL) and weighed 178.22 g (Fig. 2). The specimen was identified as *E. golanii* based on a combination of morphological characteristics: body elongated and cylindrical in its anterior part, large head, eye covered by adipose eyelid, dorsal fin origin before midpoint, pelvic fin behind dorsal fin base, a single W-shaped pelvic scute at the base of pelvic fins, lack of series of scutes along the belly, scales very deciduous, easily detached, colour dark blue with silvery flanks and belly.

The present specimen was as an adult female at stage 4 of maturity, with 4.13 g of gonad weight. Such observation is in agreement with Yarmaz *et al.* (2010), Boussellaa *et al.* (2016), Falautano *et al.* (2006) and Tamsouri *et al.* (2019). Size at first sexual maturity for *E. golanii* from the Egyptian Mediterranean waters ranged from 122 to 126 mm in males and from 120 to 131 mm in females (El-Sayed 1996, Osman *et al.* 2013). Additionally, most of the individuals caught so far have been relatively large adults (Yarmaz *et al.*, 2010).

The stomach of this specimen was empty. Boussellaa *et al.* (2016) noted that *E. golanii* fed on preys similar to those previously reported, such as zooplankton, mainly copepods and euphausiids rather than fish larvae and molluscs (Froese & Pauly, 2005; Kallianiotis & Lekkas, 2005; Osman *et al.*, 2013; Tanaka *et al.*, 2006). These observations suggest that *E. golanii* has probably adapted to its new environment.

Morphometric and meristic characters of *E. golanii* were recorded and all data are in total agreement with those from other areas of the central and eastern Mediterranean Sea (Table 1). Therefore, the present finding constitutes the third record of this species in Tunisian waters, based on a single specimen. Seven specimens were captured in southern Tunisia, Gulf of Gabès, and one specimen, described by Rafrafi-Nouira *et al.* (2017), was singled out from a haul of specimens captured in northern Tunisia, off Ras Jebel, by pelagic trawl following an experienced fisherman aware of local fishing grounds. Additionally, fishermen from north-eastern Tunisia landing at the fishing site of Kélibia reported that this species is occasionally observed together with *S. aurita* and *S. colias*. Therefore, the occurrence of *E. golanii* in the Tunisian coast cannot be ruled out, however further records are needed before confirming the successful local establishment of the species.



Fig. 2: Specimen of *Etrumeus golanii* (ref. ISPAB Etr-gol-01) captured in the Gulf of Hammamet, Tunisia, scale bar = 20 mm.
Sl. 2: Primerek vrste *Etrumeus golanii* (ref. ISPAB Etr-gol-01), ujet v zalivu Hammamet, Tunizija, merilo = 20 mm.

Tab. 1: Morphometric measurements and meristic counts recorded for the specimen of *Etrumeus golanii* specimen caught in the Gulf of Hammamet (ref. ISPAB Etr-gol-01), and those recorded for specimens captured in other Mediterranean areas.

Tab. 1: Morfometrične meritve in meristična štetja pri primerku vrste *Etrumeus golanii*, ujetem v zalivu Hammamet (ref. ISPAB Etr-gol-01) in pri primerkih, ujetih v drugih predelih Sredozemskega morja.

Authors	Cyprus (Lymassol) 2000 Golani (2000)	Italy (Lampedousa) 2006 Falautano <i>et al.</i> (2006)	Turkey (Dikili Strait) 2009 Yarmaz <i>et al.</i> (2009)	Turkey (Izmir Bay) 2016 Akyol & Ulaş (2016)	Tunisia (Gulf of Gabes) 2014 Boussellaa <i>et al.</i> (2016)	Tunisia (Ras Jebel) 2017 Rafrafi-Nouira <i>et al.</i> (2017)	Morocco (Alboran Sea) 2018 Tamsouri <i>et al.</i> (2019)	Tunisia (Gulf of Hammamet) 2020 Present study
Number of specimens	2	1	1	1	7	1	7	1
Measurements (mm)								
Total length	-	231	149	180	225–265	222	252–283	262
Fork length	-	211	138	159	200–243	200	228–260	236
Standard length	138–213	202	127	153	165–225	188	215–243	224
Body depth	20.6–42.4	35.6	25	28	34.5–41.3	41.2	43–50	48
Predorsal fin length	—	88	59	66	87–102	82.5	92–107	98
Prepectoral fin length	—	—	—	38	—	—	46.5–56	52
Preanal fin length	—	—	—	127	—	—	175–203	186
Head length	31–53.5	45	19	34	39.2–49.3	44.3	45–52	50
Eye diameter	9.3–18.6	12.44	9	11	10.2–12.5	13	13–15	14
Preorbitary length	—	—	—	12	—	—	13–16	15
Dorsal fin base length	—	26.6	17	—	24.2–26.1	31.6	31–35	34
Anal fin base length	—	9.4	9	—	9–9.5	11	9–12	11
Pelvic fin length	—	14.3	—	—	14–22	14	14–16	15
Meristic counts								
Dorsal fin rays	17–20	18	18	17	18	19	18	18
Pectoral fin rays	15–17	15	16	16	16	16	15–16	17
Pelvic fin rays	8–10	8	7	8	8	9	8	8
Anal fin rays	9–10	12	9	9	9	9	9–10	9

An update of the currently known distribution of this species in the Mediterranean is summarized in Figure 1. It is evident that *E. golanii* is abundantly recorded in the eastern Mediterranean, where viable populations have probably established. Additionally, the species constitutes an important local commercial resource (Akyol & Ulaş, 2016, Corsini *et al.*, 2005, DiBattista *et al.*, 2012). The presence of *E. golanii* received a positive feedback without any negative impact on local fisheries resources, as reported by Kassari & Hemida in Stamouli *et al.* (2017) and Tamsouri *et al.* (2019).

In conclusion, the recent observation of an additional specimen of *E. golanii* in the central Mediterranean Sea (Tunisian waters) may be linked to the environmental parameters, which are becoming more

favourable for this species (Tamsouri *et al.*, 2019). As a consequence, we could in the future expect the establishment of a viable population in Tunisian waters confirming the expansion of this species throughout the Mediterranean Sea.

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NOV ZAPIS O POJAVLJANJU VRSTE *ETRUMEUS GOLANII* (OSTEICHTHYES:
DUSSUMIERIIDAE) IZ TUNIZIJSKIH VODA S KOMENTARJI O NJENI
RAZŠIRJENOSTI V SREDOZEMSKEM MORJU

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POVZETEK

V zalivu Hammamet v tunizijskih vodah so 13. marca 2020 komercialni ribiči v zaporno plavarico ujeli primerke vrste *Etrumeus golanii* (*Dussumieriidae*). Bila je samica, ki je merila 262 mm v dolžino in tehtala 178,22 g. O ulovljenem primerku avtorji podajajo morfometrične meritve in meristične podatke. Novi podatek o pojavljanju vrste *E. golanii* potrjuje hitro razširjanje te lesepske selivke v Sredozemskem morju.

Ključne besede: *Etrumeus golanii*, lesepska selitev, zaliv Hammamet, širjenje areala, Sredozemsko morje

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