

The northernmost dispersal record of the lionfish, *Pterois miles* (Bennett, 1828) for the Aegean Sea

Aslan balığı, *Pterois miles* (Bennett, 1828)' in Ege Denizi için en kuzey dağılış kaydı

Adnan Çağlar Oruç^{1*} • Tuğçe Şensurat-Genç² • Aytaç Özgül³ • Altan Lök⁴

¹ İzmir Katip Celebi University, Faculty of Fisheries, İzmir, Turkey

² İzmir Katip Celebi University, Faculty of Fisheries, İzmir, Turkey

³ Ege University, Faculty of Fisheries, İzmir, Turkey

⁴ Ege University, Faculty of Fisheries, İzmir, Turkey

 <https://orcid.org/0000-0003-4675-1654>

 <https://orcid.org/0000-0002-5528-3322>

 <https://orcid.org/0000-0001-7706-9012>

 <https://orcid.org/0000-0003-0751-0620>

*Corresponding author: acaglaroruc@gmail.com

Received date: 08.07.2021

Accepted date: 26.11.2021

How to cite this paper:

Oruç, A. Ç., Şensurat Genç, T., Özgül, A. & Lök, A. (2022). The northernmost dispersal record of the lionfish, *Pterois miles* (Bennett, 1828) for the Aegean Sea. *Ege Journal of Fisheries and Aquatic Sciences*, 39(1), 84-87. DOI: [10.12714/egejfas.39.1.12](https://doi.org/10.12714/egejfas.39.1.12)

Abstract: *Pterois miles* (Bennett, 1828) is an aquatic invader and disruptive predator for marine ecosystems. A single lionfish was photographed and sampled in March 2021 during a scientific survey at 36 m depth in Karaburun/İzmir Bay. In this study presents an update on the lionfish's northward progression in the Aegean Sea.

Keywords: Invasive species, *Pterois miles*, lionfish, Mediterranean Sea, Aegean Sea, İzmir Bay

Öz: *Pterois miles* (Bennett, 1828) sucül istilacı tür olup deniz ekosistemleri için yıkıcı bir predatördür. 2021 yılının Mart ayında, Karaburun/İzmir Körfezi'nde gerçekleştirilen bilimsel araştırma esnasında 36 m derinlikte tek bir aslan balığı fotoğraflanmış ve örneklenmiştir. Bu çalışmada Aslan balığının Ege Denizi'ndeki kuzey yönlü ilerleyişi için bir güncelleme sunulmaktadır.

Anahtar kelimeler: İstilacı tür, *Pterois miles*, aslan balığı, Akdeniz, Ege Denizi, İzmir Körfezi

INTRODUCTION

Pterois miles (Bennett, 1828) is regarded as one of the most invasive marine fish species which affects native fish assemblages and human health negatively in invaded ecosystems (Sutherland et al., 2010). Lionfish possess several ecological traits such as high tolerance to a wide range of environmental conditions (Whitfield et al., 2007); rapid growth rate (Johnson and Swenarton, 2016); capability of spawning throughout the year, and high fecundity (Savva et al., 2020) and opportunistic feeding habits (Eddy et al., 2016). This species is currently considered as established in all the Eastern Mediterranean (Savva et al., 2020). Although the lionfish was firstly reported from Israel by Golani and Sonin in 1992, the invasion of *P. miles* in the Mediterranean began in Lebanon in 2012 (Bariche et al., 2013). The twenty-year period between the reports of lionfish was commented by the researchers as the first specimen entered the Suez Canal like many marine organisms (Zenetos et al., 2012); released from captivity (Golani et al., 2002) or it has not been established a population in the Mediterranean (Bariche et al., 2013). In the intervening years, *P. miles* rapidly spread throughout most sectors of the Mediterranean Sea (e.g. Levantine Sea,

southern and central Aegean Sea, Ionian Sea, southern Adriatic Sea, Tunisia, and Italy) (Kletou et al., 2016; Azzurro et al., 2017; Giovos et al., 2018; Dimitriadis et al., 2020; Vavasis et al., 2020; Di Martino and Stancanelli, 2021).

Concerning the Turkish coasts of the Aegean Sea, *P. miles* was firstly reported at Dalyan in 2015 by Turan and Öztürk and has since, the lionfish has expanded towards the northeast Aegean Sea, being reported at Datça (Bilge et al., 2016), Didim (Yapıcı, 2018), Bodrum and Teos (Ulman et al., 2020) and Kokar (Özgül, 2020).

This scientific report presents information about the northern progression of *Pterois miles* in the Aegean Sea.

MATERIAL AND METHODS

A single specimen of *P. miles* was collected from İzmir Bay (Karaburun), Aegean Sea (38.65 N°-26.52 E°) on 18 March 2021, at a depth of 36 m (Figure 1). The water temperature was 15.0 °C. Photographs and underwater videos of *P. miles*, when it was detected in the propeller gap of the 9 Eylül shipwreck was taken (Figure 2).

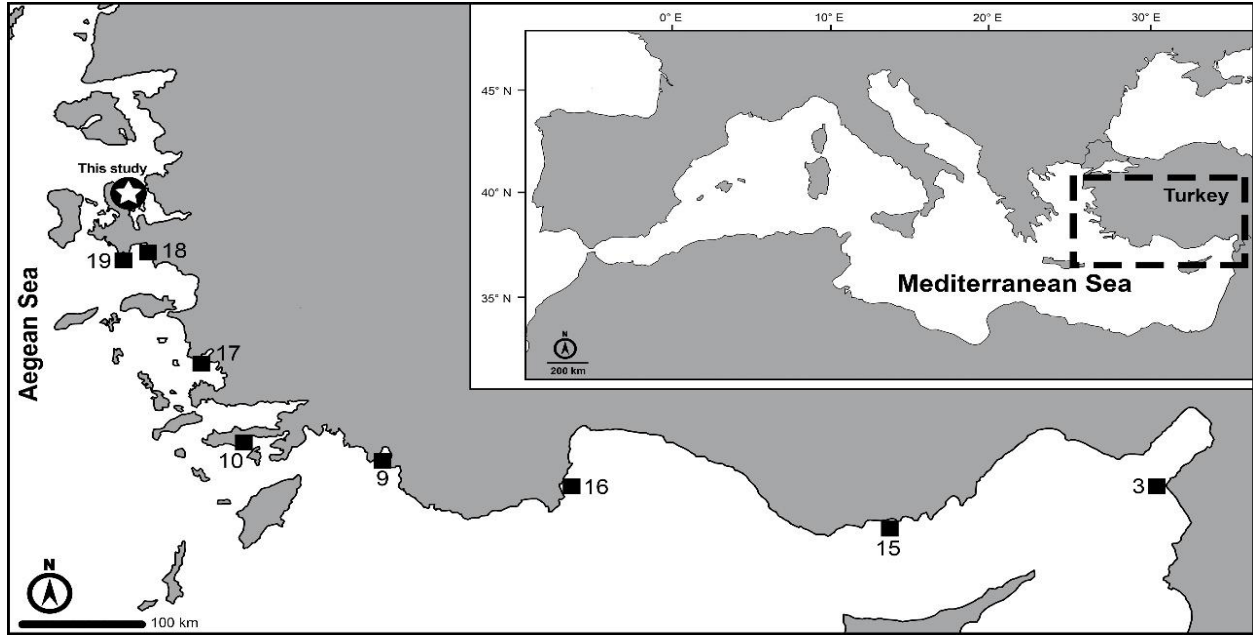


Figure 1. (★) *Pterois miles* in İzmir Bay (Aegean Sea) (■) Previous records of *P. miles* in Turkish coasts. The numbers refer to the references listed in Table 1

Table 1. Scientific reports of *P. miles* from the Levantine Sea to the Aegean Sea (Report localities from Turkish coasts were shown in Figure 1 with numbers indicated in the table. Updated from Özgül (2020)

No	Location	Coordinates	Length Range (TL mm)	Habitat	Depth (m)	Observation Method	Reference
1	Herzliya, Israel	-	328	-	35	Trawl	Golani and Sonin, (1992)
2	Al Minie, Lebanon	34.29N 35.54E	209	Coralligenous	30	Gill net	Bariche et al., (2013)
3	İskenderun, Turkey	36.17N 35.46E	276	Rocky bottom	25	-	Turan et al., (2014)
4	Rhodes, Greece	36.38N 28.24E	-	Rocky bottom	7	Diving	Crocetta et al., (2015)
5	Rhodes, Greece	35.91N 27.85E	-	Shipwreck	-	Diving	Crocetta et al., (2015)
6	Rhodes, Greece	36.45N 28.21E	-	Rocky bottom	2	Diving	Crocetta et al., (2015)
7	Ormidia, Cyprus	-	170	-	10	Gill net	Iglesias and Frotte, (2015)
8	Karpas, Cyprus	-	373	Rocky bottom	40	Gill net	Oray et al., (2015)
9	Dalyan, Turkey	-	-	Sandy bottom	11	Diving	Turan and Öztürk, (2015)
10	Datça, Turkey	36.69N 27.68E	-	-	10	Gill net	Bilge et al., (2016)
11	NE Crete, Greece	35.20N 26.30E	250	Rocky bottom	33	Gill net	Daillianis et al., (2016)
12	SE Crete, Greece	35.01N 25.96E	100	Rocky bottom	12-37	-	Daillianis et al., (2016)
13	Karpathos Island, Greece	35.55N 27.20E	100	Rocky bottom	17	Diving	Mytilineou et al., (2016)
14	Karpathos Island, Greece	35.50N 27.22E	200	Rocky bottom	16	Diving	Mytilineou et al., (2016)
15	Mersin, Turkey	36.08N-33.40E	250	-	100-110	Trawl	Yağlıoğlu and Ayas (2016)
16	Kemer, Turkey	-	85-293	Rocky Bottom	10-15	Spearfishing	Özgür-Özbek et al., (2017)
17	Didim-Aydın, Turkey	37.20N 27.14E	-	Rocky bottom	18	Diving	Yapıcı, (2018)
18	Bodrum and Teos, Turkey	-	100	Rocky bottom	10	Diving	Ulman et al., (2020)
19	Kokar Bay, Turkey	38.13N 26.61E	144	Rocky bottom	15	Spearfishing	Özgül, 2020
20	İzmir Bay, Turkey	38.65N 26.52E	309	Sandy bottom	36	Diving	This study



Figure 2. An underwater photograph of *P. miles* sampled in this study

The specimen was identified according to Golani and Sonin (1992) and Bariche et al. (2013). Morphometric measurements were taken using a digital caliper to the nearest 0.1 mm. Total length (TL, mm), standard length (SL, mm), and total weight (TW, g) were measured. The specimen was fixed in 4% formaldehyde solution and deposited in the fish collection of the Sea Museum of Izmir Kâtip Çelebi University, Turkey (IKC PIS 1262).

RESULTS

The specimen was 309 mm in total length (TL), 208 mm in standard length (SL) and 402 g in total weight. Morphometric measurements and meristic counts of the *P. miles* specimen were as follows: dorsal fin rays XIII+10; anal fin III+6; pectoral fin rays 14; pelvic fin rays I, 5; caudal fin rays 14, gill rakers 14. Body depth 36.9; head length 32.7 of % SL snout length 39.7; eye diameter 18.5 and interorbital width 20.1 % of head length (HL). Pelvic longest fin ray 38.2 and pectoral longest ray 63.4 % of SL (Figure 3).



Figure 3. Adult specimen of *P. miles* from the İzmir Bay, Turkey

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After the diagnostic characters were determined, dissection of the lionfish was performed. It was observed that the sex of the lionfish was male, stomach and gut were empty.

DISCUSSION

The Eastern Mediterranean is threatened by highly invasive fish species (Bonanno and Orlando-Bonaca 2019). One of these invasive species is *P. miles*, which is raising serious concerns for the potential impacts on the local marine ecosystems and native species (Charles and Duker 2008).

The northernmost occurrence of *P. miles* in the Mediterranean Sea was reported by Di Martino and Stancanelli (2021) at three locations in the Adriatic Sea. In the Aegean Sea, previously *P. miles* reported by Özgül (2020) from Kokar Bay as the northernmost location. This scientific record represents the most northward range expansion of the *P. miles* in the Aegean Sea reported up today.

In this study, *Pterois miles* was sampled at 15 °C at the propeller gap of the shipwreck. According to Kimball et al. (2004) lionfish were stationary and fed infrequently at 15 °C and also Özgür-Özbek et al., (2017) stated that *P. miles* continued feeding at 14.9 °C. However, the specimen of this study had a completely empty stomach and gut. As stated in Balazy et al., (2019) shipwrecks can act as a stepping stones in bio-invasion and some non-indigenous species even thrive better on the added structures (Airolidi et al., 2015).

The Mediterranean Sea is the world's most invaded marine region (Edelist et al., 2013). Following the invasion process with scientific studies and monitoring activities are globally important to minimize the negative effects of *P. miles* on marine habitats.

ACKNOWLEDGEMENTS

The specimen was sampled during the fieldwork of the project which is funded by the Scientific and Technological Research Council of Turkey, Grant Number 117Y033. We would like to great thanks Hamdullah Aras who helped to material sampling. Thanks a lot also to Darryl T. for support language help and proof reading.

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