

## RESEARCH ARTICLE

# Occurrences of *Pterois miles* (Bennett, 1828) between 1992 and 2016 from Turkey and the Mediterranean Sea

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### Abstract

The devil firefish, *Pterois miles* (Bennett, 1828), is an invasive venomous Lessepsian fish species with a wide distribution within tropical waters of the Indian and Atlantic Oceans. The first Mediterranean record of *P. miles* was reported from Haifa Bay in 1991 and 22 years later, two specimens were reported from the Lebanese coast. Even though this species is considered as rare in the Mediterranean Sea up to 2015, it was recorded with an increasing rate from the Mediterranean coast of Turkey recently. In this study, a review of the scientific reports is given in the Mediterranean Sea with the reports of *P. miles* sightings on electronic social media, which were photographed by local divers in the Turkish coast of the Mediterranean Sea. Date of sighting, locality, depth, water temperature and other information were also recorded. The aim of the present study is to compile information about the increasing occurrence of the species in the Turkish coasts of the Mediterranean Sea.

**Keywords:** Devil firefish, Lessepsian fish, biological invasion, Mediterranean Sea

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### Introduction

The opening of the Suez Canal in 1869, which created a corridor between two distinct biogeographical provinces, allowed the so-called 'Lessepsian migration' of Indo-Pacific species into the Mediterranean (Por 1978). Many fish species migrated between two areas via the Suez Canal, some of which are venomous and have high invading potentials. Stonefish (*Synanceia verrucosa* Bloch and Schneider, 1801) (Bilecenoğlu 2012), devil firefish *Pterois miles* (Bennett, 1828) (Turan *et al.* 2014), striped eel catfish, *Plotosus lineatus* (Thunberg, 1787) (Doğdu *et al.* 2016) and red lionfish *Pterois volitans* (Linnaeus, 1785) (Gürlek *et al.* 2016) have recently been reported as venomous alien fish in the Mediterranean Sea.

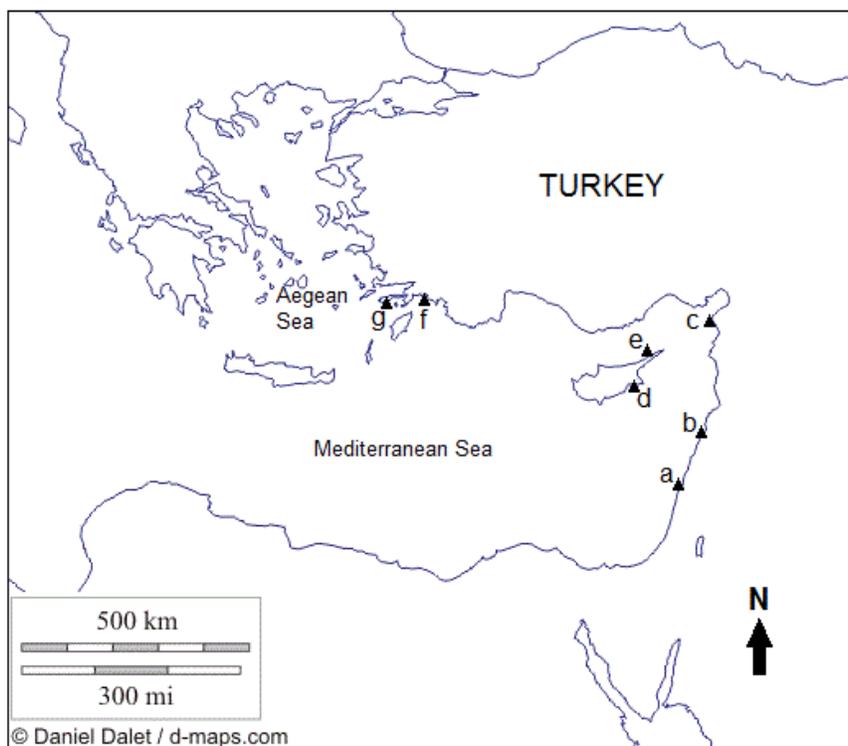
*P. miles* is a reef-associated demersal species with a wide distribution within tropical waters of the Indian Ocean, Persian Gulf (Wright 1988) and the Red Sea south to Port Alfred, South Africa and east to Sumatra, Indonesia (Fricke 1999). It is an invasive alien species in the Atlantic Ocean up to 60 m depth (Sommer *et al.* 1996), as it is in the Mediterranean Sea (Golani and Sonin 1992). They live in coastal waters (Kuitert and Tono-zuka 2001) and their fin spines are highly venomous, which may cause death (Sommer *et al.* 1996). *P. miles* is a carnivorous species in general and reaches a total length of 35 cm (Sommer *et al.* 1996). Golani and Sonin (1992) first recorded a single specimen from Haifa Bay on the Mediterranean coast, in 1991, and two specimens were reported from the Lebanese coast 22 years later by Bariche *et al.* (2013). It was considered as rare in the Mediterranean Sea up to 2015, however, the location records became very frequent and the distribution expanded to the Turkish coast of the Aegean Sea in recent years (Turan and Ozturk 2015; Bilge *et al.* 2016). The aim of this study is to compile the knowledge of the occurrences of *P. miles* in the eastern Mediterranean Sea with a review of the scientific reports as well as the observations of divers and fishermen.

## Materials and Methods

An extensive literature review was carried out to collect all available information on the distribution of *P. miles* in the Mediterranean coast of Turkey. Peer-reviewed publications were the prior sources in retrieving the information needed, with internet databases, dissertations, and occasionally, scientific reports were used whenever necessary to fill in the gaps in the peer-reviewed literature. On the other hand, reports of lionfish sightings on electronic social media, like Facebook, photographed by local divers, were also collected. Date of sighting, locality (area and depth), water temperature and other information available were recorded.

## Results and Discussion

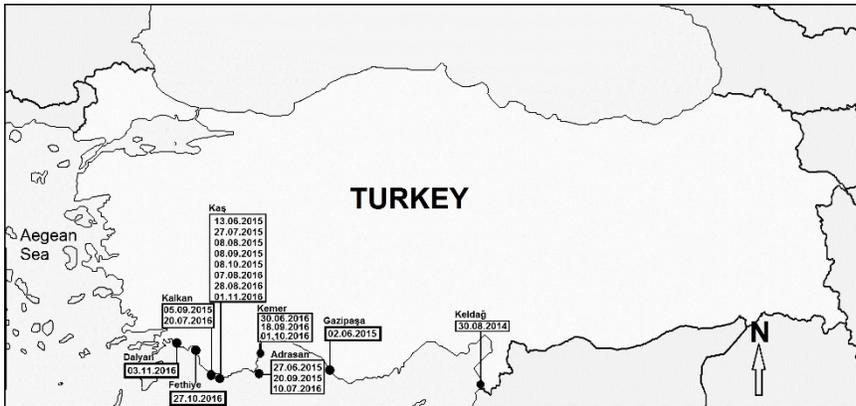
Recent records of *P. miles* specimens from the Turkish waters of the Mediterranean and Aegean Sea are given in Tables 1 and 2. The record of eight specimens were found in seven scientific reports (Golani and Sonin (1992), Bariche *et al.* (2013), Turan *et al.* (2014), Iglésias and Frotté (2015) and Oray *et al.* (2015) for the eastern Mediterranean Sea; Turan and Özturk (2015) and Bilge *et al.* (2016) for the Aegean Sea) between 1992 and 2016 in the Mediterranean Sea (Figure 1, Table1). These records were made between the depths of 10 and 40 m.



**Figure 1.** Locations of lionfish occurrence (a: Golani and Sonin (1992), b: Bariche *et al.* (2013), c: Turan *et al.* (2014), d: Iglésias and Frotté (2015), e: Oray *et al.* (2015), f: Turan and Özturk (2015), g: Bilge *et al.* (2016)). Further details are provided in Table 1.

**Table 1.** Scientific reports of lionfish occurrence in the Mediterranean Sea

Source	Locality	Coordinates	Depth (m)	Date	Catching/Observation method
Golani and Sonin (1992)	Herzliya, Israel	-	35	28.07.1991	Deep trawl
Bariche <i>et al.</i> (2013)	Al Minie, Lebanon	34.29N 35.54E	-	02.10.2012	Wire trap
Bariche <i>et al.</i> (2013)	Al Minie, Lebanon	34.29N 35.54E	30	12.12.2012	Trammel net
Turan <i>et al.</i> (2014)	Iskenderun, Turkey	36.17N 35.46E	25	04.2014	-
Iglésias and Frotté (2015)	Ormidia, Cyprus	-	10	22.05.2014	Net
Oray <i>et al.</i> (2015)	Karpas, Cyprus	-	40	26.02.2015	Gill net
Turan and Özturk (2015)	Dalyan, Mugla, Turkey	-	11	08.2015	Diving
Bilge <i>et al.</i> (2016)	Datça, Mugla, Turkey	36.69N 27.68E	10	04.2016	Gill net



**Figure 2.** Reports of lionfish sightings on electronic social media/networks and within the local community of divers in the Mediterranean coast of Turkey. Further details are provided in Table 2.

A total of 21 lionfish sightings via diving observations were found. The first sighting was made in August 2014 in Hatay (Turkey) by Necdet Uygur (Figure 2, Table 2). These records were made between 4-30 m depth and the temperature 20-29°C. Three juvenile specimens (<10 cm, in TL) were observed between 18.09.2016 and 01.11.2016 in Antalya.

**Table 2.** Records of *Pterois miles* specimens in the Mediterranean Sea based on diving observations by the local divers

Date	Source	Locality	Coordinates	Depth (m)	Temp (°C)
30.08.2014	Necdet Uygur	Keldağ, Hatay	35.95N 35.92E	8	-
07.09.2014	Hasan Sansarcı	Adrasan, Antalya	36.21N 30.41E	22	-
02.06.2015	Mehmet B. Bayraktar	Gazipaşa, Antalya	-	-	-
13.06.2015	Ahmet Moğol	Kaş, Antalya	36.19N 29.64E	-	-
27.06.2015	Osman Temizel	Adrasan, Antalya	36.31N 30.47E	5	20
27.07.2015	Murat Draman	Kaş, Antalya	36.19N 29.64E	-	-
08.08.2015	Gencer Özdemir	Kaş, Antalya	36.19N 29.64E	4	29
05.09.2015	Taner Şahakalkan	Kalkan, Antalya	36.25N 29.41E	18	27
08.09.2015	Erhan Öztürk	Kaş, Antalya	36.19N 29.64E	-	-
20.09.2015	Özgür Karapınar	Adrasan, Antalya	36.31N 30.47E	12	-
08.10.2015	Alpaslan Yazar	Kaş, Antalya	36.19N 29.64E	10	-
30.06.2016	Nejat Semerci	Kemer, Antalya	35.53N 30.56E	-	-
10.07.2016	Bülent Kılınç	Adrasan, Antalya	36.31N 30.47E	-	-
20.07.2016	Mark Taylor	Kalkan, Antalya	36.25N 29.41E	8	25
07.08.2016	Coşkun Teziç	Kaş, Antalya	-	30	-
28.08.2016	Okan Ünsür	Kaş, Antalya	-	17	-
18.09.2016*	Cem Gazivekili	Kemer, Antalya	-	21	-
01.10.2016*	Muammer Civelek	Kemer, Antalya	-	-	-
27.10.2016	Lütfü Tanrıöver	Fethiye, Muğla	-	-	-
01.11.2016*	Tolga Taymaz	Kaş, Antalya	-	16	22
03.11.2016	Ugur Türk	Dalyan, Muğla	-	-	-

\*Juvenile specimens (<10 cm, in TL).

The numbers of the sightings during the dives in the Mediterranean coasts of Cyprus and Turkey between 2014 and 2016 are given in Table 3. According to this dataset, lionfish sightings increased on both sides.

**Table 3.** Numbers of lionfish sightings via diving in the Mediterranean coasts of Cyprus and Turkey between 2014 and 2016 (the data from Cyprus was taken from Kletou *et al.* (2016) for comparison).

Year	Cyprus	Turkey	Total
2014	6	2	8
2015	18	9	27
2016	*	10	10

\*Deficient data

## Discussion

Bernadsky and Goulet (1991) reported that the adult bluespotted cornetfish (*Fistularia commersonii* Rüppell, 1838) is a natural predator of the juveniles of *P. miles* in the Gulf of Aqaba. According to Kletou *et al.* (2016), lionfish have very few documented natural predators due to their venomous spines. Native groupers in the western Atlantic which have learned to eat this non-indigenous species have been seen close to lionfish in at least three cases in their study but it remains to be seen whether native groupers such as *Epinephelus marginatus* will learn to prey on lionfish and control their invasion (Maljković *et al.* 2008).

Restrictions on fishing seem sensible to help threatened IUCN Red List species such as the Mediterranean dusky grouper, as these may in turn help control the spread of invasive fish (Mumby *et al.* 2011; Kletou *et al.* 2016).

According to Kletou *et al.* (2016), judging from the recent increase of *P. miles* in the eastern Mediterranean Sea, its few natural predators, dispersal capabilities of its planktonic larvae and its ability to adapt to a range of habitats, they suspect that a rapid expansion throughout the Mediterranean Sea may soon be followed by significant impacts on local ecosystems and fisheries. Furthermore, CO<sub>2</sub> emissions which contribute to the global warming, including the sea temperature of the Mediterranean Sea, and the deepening and widening of the Suez Canal are expected to increase invasion rates of Indo-Pacific species through the Suez Canal to the Mediterranean (Kletou *et al.* 2016; Galil *et al.* 2015; Hall-Spencer and Allen 2015). Turan and Öztürk (2015) stated that, deepening and enlargement of the Suez Canal will bring negative ecological and socio-economic consequences to Turkey and other riparian states of the Mediterranean Sea. Regional cooperation and an urgent alert system should be established with the help of local and regional funds. Alvarez (2014) quoted that the lionfish has become the most numerous marine non-native invasive species in the world and proposed a call for actions against this predator fish. Turan *et al.* (2014) stated that this species may spread by dispersion by water currents and may extend its distribution along the Mediterranean coast of Turkey from east to west. Among twenty-one diving

records in the Turkish coasts, eight of them were reported from Kaş, Antalya due to the popularity of the areas as diving points.

Table 3 shows that lionfish sightings increased for both Turkey and Cyprus from 2014 to 2016. Even though there is no scientific reports on the reproduction of this species in the Mediterranean Sea up today, observations of juvenile specimens (n=3) may be circumstantial evidence for their ability of reproduction. We need urgent cooperation between the countries in the Mediterranean Basin and further researches on the age, growth, distribution, feeding and reproductive behaviour and other bio-ecological characteristics to keep ecological balance of our seas against this kind of invasive species.

## ***Pterois miles* (Bennett, 1828) türünün Akdeniz'deki detaylı kayıtları (1992-2016)**

### **Öz**

Aslan balığı, *Pterois miles* (Bennett, 1828), Hint ve Atlantik Okyanusları'nın tropikal sularındaki resiflerde dağılım gösteren istilacı ve zehirli bir balık türüdür. *P. miles* Akdeniz'de ilk defa Haifa Koyu'nda 1991 yılında bulunmuş ve yirmi iki yıl sonra Lübnan kıyılarından iki birey daha rapor edilmiştir. 2015 yılına kadar özellikle doğu Akdeniz ile sınırlı bir alanda, tüm Akdeniz için nadir olarak bulunduğu kabul edilse de, 2014 yılından sonra Akdeniz'in Türkiye kıyıları ile Kıbrıs'ta daha fazla sayıda görülmeye başlamıştır. Bu çalışmada, türün Akdeniz'deki kayıtları ile ilgili olan bilimsel raporlar yanında, Türkiye kıyılarında dalgıçlar tarafından fotoğraflar ile belgelenmiş ve elektronik sosyal medyada yayınlanmış kayıtları verilmiştir. Türe ait bireylerin görüldüğü tarih, lokalite, derinlik, su sıcaklığı ve mevcut olan diğer bilgiler de sunulmuştur. Bu çalışmanın amacı, türün Türkiye'nin Akdeniz kıyılarındaki görülme sıklığındaki artışın ortaya konulmasıdır.

**Anahtar kelimeler:** Aslan balığı, lesepsiyen balıklar, biyolojik istila, Akdeniz

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