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SHORT COMMUNICATION KISA MAKALE

Maximum length record and some biological characters of devil firefish *Pterois miles* Bennett, 1828 for Aegean Sea, Turkey

Kırmızı aslan balığı *Pterois miles* Bennett, 1828'in Ege Denizi'nin Türkiye kıyısı için maksimum boy kaydı ve bazı biyolojik özellikleri

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Abstract: Present work reports the maximum size record of *Pterois miles* for Turkish Seas with some additional biological information. The greatest individual of *P. miles* was caught off Çökertme Bight, Bodrum (Southern Aegean Sea) at 10 m depth with a spear gun on 15 July 2021. Captured individual of devil firefish was 34.0 cm in total length and 707.55 g in total weight. Specimen was male with a gonad weight of 13.6 g and it was determined to be 6 years old. A prey fish *Chromis chromis* were detected in the stomach in definable visible condition. Total length and weight of the mentioned individual are the greatest for the Turkish Seas among the reported studies up to date.

Keywords: Devil firefish, Scorpaenidae, maximum size, age, feeding, Southern Aegean Sea

Öz: Bu çalışma, bazı ek biyolojik bilgilerle birlikte Türkiye Denizleri için *Pterois miles* in maksimum boy kaydını sunmaktadır. Örnek 15 Temmuz 2021'de Bodrum (Güney Ege Denizi) Çökertme Koyu açıklarında 10 m derinlikte zıpkınla yakalanmıştır. Yakalanan kırmızı aslan balığının toplam boyu 34.0 cm ve toplam ağırlığı 707.55 olarak tespit edilmiştir. Örneğin 13.6 g gonad ağırlığında ve 6 yaşında bir erkek birey olduğu belirlenmiştir. Mide içeriğinde bir av balığı olan *Chromis chromis* tanımlanabilir bir durumda tespit edilmiştir. Söz konusu bireyin toplam boy ve ağırlığı, bugüne kadar bildirilen çalışmalar arasında Türkiye Denizleri için en büyük olanıdır.

Anahtar kelimeler: Aslan balığı, Scorpaenidae, maksimum boy, yaş, beslenme, Güney Ege Denizi

INTRODUCTION

The devil firefish (*Pterois miles*) is a marine and reef associated fish, which inhabits shallow waters on rocky or sandy bottoms down to 85 m depth (Froese and Pauly, 2022). It naturally lives in the Indian Ocean (Persian Gulf), Atlantic Ocean, South Africa and occurred in the Red Sea (Frose and Pauly, 2022). The devil lionfish is reported to be one of the most successful invasive alien species in the history of aquatic invasions (Rocha et al., 2015). Environmental tolerances, reproductive output, predation defense, diet composition, and feeding behaviour are the main factors of its wide distribution (Cote´ et al., 2013). *Pterois miles* together with its congeneric *Pterois volitans* have been exploited for marine aquarium trade worldwide and both are consumed by local people as a part of their tradition. One of the most important biological characteristics of the fish is highly venomous fin spines which may cause human death. Despite of its interesting features scientific studies focusing on the biology and the fisheries of the species are limited.

The records of the devil firefish were given from the Mediterranean Sea at Haifa Bay in 1991 (Golani and Sonin, 1992), Lebanon coast (Bariche et al., 2013), İskenderun Bay in Turkey (Turan et al., 2014), Rhodes in Greece (Crocetta et al., 2015), Tunisia (Azzurro et al., 2017; Karachle et al., 2017), Italy (Azzurro et al., 2017) and Libya (Al Mabruk and Rizgala, 2019). Invasiveness of the species for Turkish seas has emphasized in comprehensive studies (Filiz et al., 2017; Tarkan et al., 2021; Vilizzi et al., 2021). Several papers reported a westerly migration of the species from the Southern coast of Turkey (Bilge et al., 2016; Yağlıoğlu and Ayaş, 2016; Turan et al., 2017; Özgül, 2020) and first occurrence reports for the Aegean Sea were from Fethiye Bay and Dalyan coast in 2015 (Turan and Öztürk, 2015). Distribution of the species along the Aegean Sea has expanded towards the northeast and the northernmost presence of the species was reported from Kokar Bay-İzmir (Özgül, 2020).

Despite its invasiveness and occurrences in Turkish seas, scientific studies focusing on the biology and the fisheries of the species are limited. Especially, in the absence of basic data, the maximum observed length is useful for the rapid evaluation of growth rates (Froese and Binohlan, 2000). This paper documents the maximum size record of *P. miles* for Turkish Aegean Sea waters with some additional biological information and is considered to make a contribution to biology of the species.

MATERIAL AND METHODS

On 15 July 2021, a male specimen of *P. miles* was captured by the second author of this paper from Çökertme Bight-Bodrum (Figure 1) by a speargun at depth of 10 m on rocky bottoms. Fish was taken to the laboratory in the ice box and metric measurements with meristic counts were performed when the fish was fresh. Identification of the specimen was based on Schultz (1986) and Golani et al. (2006). Total length (TL) of the individual was measured to the nearest mm and weighted to the nearest 0.1g. Sex determination was based on macroscopically investigation of the gonads and gonad weight (GW) was measured to the nearest 0.01 g. Age estimation was based on otolith examination. For this purpose, sagittal otoliths were removed, prepared for age readings and observed by a stereoscopic microscope. Three readers were involved in the age determination and winter rings (black ones) were counted during the age readings. One opaque and 1 transparent rings together were considered to be the indicator of one-year growth.

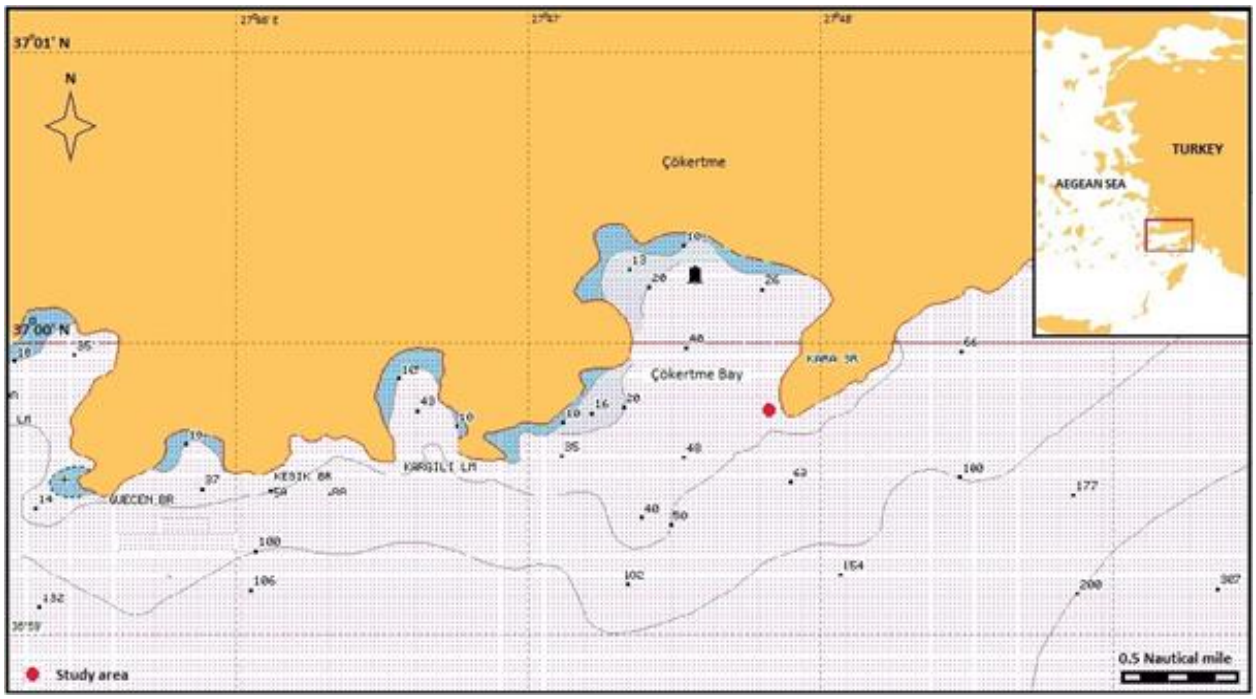

Figure 1. Sampling location (Red spot on the map indicates the sampling point)

RESULTS

Captured individual of devil firefish was 34.0 cm in total length (TL) and 707.55 g in total weight (TW) (Figure. 2). Some morphometric characters for *P. miles* are given in Table 1. Sex of the specimen was male (Figure 3) with a gonad weight of 13.6 g during the III. maturity stage (mature) which was creamy white, soft and occupying 3/4 of the body cavity. Age of the specimen was determined to be 6 (Figure 4).

During the spearfishing trial, crowded schools of *Chromis chromis* (damselfish) were observed in the area and one individual was detected in the stomach of the captured specimen with a good visible condition (Figure 5) during the stomach observation.

Figure 2. The maximum sized devil firefish from Çökertme Bay, Southern Aegean Sea

Table 1. Some morphometric characters for *P. miles*

Metric measurements	Value
Total length (TL) (cm)	34
Weight (g)	707.55
Standard length (SL) (cm)	26
Max. Body depth (cm)	11.4
Girth (cm)	29.2
Head length (HL) (cm)	7.9
Pre-orbital length (cm)	4
Eye diameter (ED) (mm)	15.6
Pre-dorsal lenght (cm)	7.5
Pre-anal length (cm)	17.3
Pre-pelvic lenght (cm)	7.3
Pre-pectoral fin length (cm)	7.8
Caudal peduncle depth (CPDe) (cm)	3.8
Interorbital width (cm)	2.1
First dorsal fin length (cm)	10.8
Second dorsal fin length (cm)	5.8
Total Dorsal length (cm)	18.1
Anal fin base length (AL) (cm)	4.3
Gonad weight (GW) (g)	13.6
Liver weight (g)	14.5
Meristic counts	**Number**
Number of dorsal fin spines	13
Number of dorsal fin soft rays	11
Number of anal fin spines (AS)	3
Number of anal fin soft rays (AR)	7
Number of pectoral fin rays	14
Number of pelvic fin spines	1
Number of pelvic fin soft rays (PeR)	5
Number of caudal fin soft rays	14

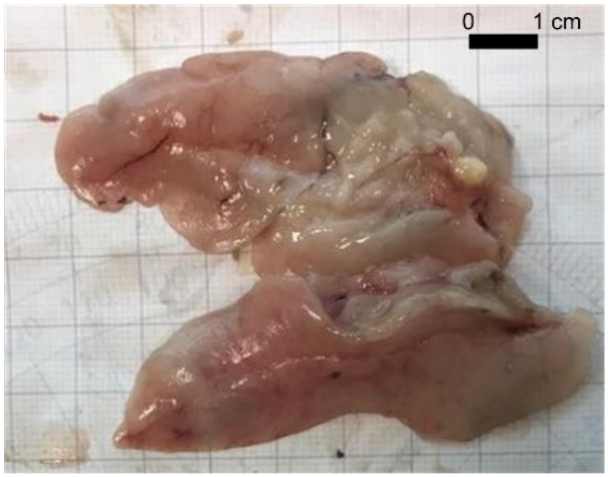

Figure 3. Male gonad of the devil firefish

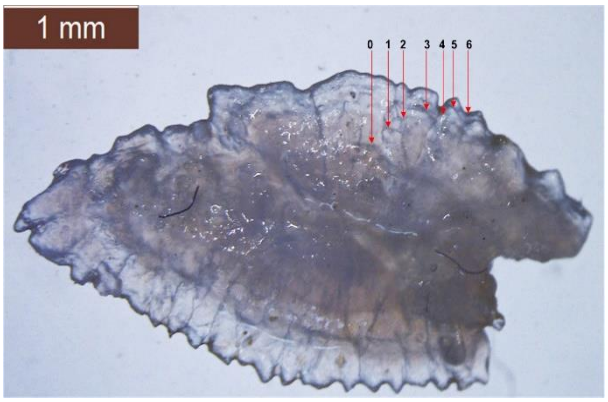

Figure 4. Sagittal otolith of the devil firefish

Figure 5. Stomach content of the devil firefish

DISCUSSION

The length of a fish is the fundamental criteria required to identify reproduction, recruitment, growth and mortality. Therefore, length data when supported with other parameters such as maturity and age, especially for species like *P. miles* which has limited biological data, becomes of crucial importance. The present study proves that invasive devil firefish can grow above the previously reported maximum length values along the Turkish coast and presents the maximum size for Turkish waters. Although our TL value is the highest for Aegean Sea among the reported studies so far, the maximum length record of the species for Mediterranean belonged to Oray et al. (2015) with a TL value of 37.3 cm. The number of scientific studies with regard to biology and other aspects of *P. miles* is still scarce in the Aegean Sea due to its continuous settlement and dispersal to northwards. Therefore, length and weight records for *P. miles* were given for all possible localities instead of only from the Aegean Sea, in order to make a better comparison of these parameters (Table 2).

Table 2. Reported length and weight of *P. miles* in previous studies(L: Length, W: Weight)

Author(s)	Sex	Area	N	Lmax (cm)	Wmax (g)
Oray et al. (2015)	-	Northern Cyprus	1	37.3	-
Özgür et al. (2017)	-	Antalya, Türkiye	8	29.3	398.7
Zannaki et al. (2019)	♂	Rhodes, Greece	21	25.8	352.3
	♀		12	31.5	330.0
Ozgül (2020)	-	İzmir, Türkiye	1	14.4	38.8
Present study	♂	Çökertme Bay, Türkiye	1	34.0	707.5

The number of lionfishes is rapidly increasing in the Mediterranean Sea and also along the Turkish coast including the Aegean Sea. *P. miles* has been reported to be a temperature dependent (Dabruzzi et al., 2017) species and it can not survive below 10 °C (Kimball et al., 2004). However, Özgür et al. (2017), stated that devil lionfish continued feeding in low winter temperature (14.9 °C). Rapid invasion of devil firefish along the Mediterranean coast is related to increase in water temperature in recent years and from this point, *P. miles* is expected to expand its' dispersal in the Aegean Sea. The probable results of the invasion are habitat and ecosystem destruction due to their potential to directly consume or outcompete native species. Although the introduction of the species to the Mediterranean is still scarce (aquarium release, ballast water transfer, Atlantic based dispersal or passage through the Suez Canal) (Yapıcı, 2018), observations of established populations with juvenile individuals in the Mediterranean Sea is a strong proof of colonization (Bariche et al., 2017).

Feeding habit of a fish is one of the most important biological features affecting its growth. We found only one *C. chromis* individual in the stomach parallel to Zannaki et al. (2019) who focused on the feeding habit of *P. miles* by notifying *C. chromis* as prey with a 5% abundance among 51 prey items. Damselfish is reported to be the most abundant fish in the Mediterranean ecosystem which is also a prey source for predator fish and sea birds. It is also found in the diet of Scorpaenidae family (Pinnegar, 2018). High abundance of damselfish in the sampling area may indicate the feeding habit of devil firefish. On the other hand, invasive *Pterois* species were also reported to be preys of dusky grouper (*Ephinephelus marginatus*) and goldblotch grouper (*Ephinephelus costae*) (Turan et al., 2017). The absence of predators (mainly due to over exploitation) that consume devil firefish may also be effective in reaching large size and wide range distribution. Therefore, the preservation of top predators especially by reducing illegal fishing pressure on such species in the Mediterranean and the Aegean Sea can be nominated to be the best administrative tool for controlling the rapid dispersal of the species. Maximum length is an important theoretical parameter in fisheries science (Dulcic and Soldo, 2005). Further comprehensive studies are urgently required on the biology and feeding habits of devil firefish and red lionfish and struggle against them by applying ecosystem friendly capture techniques not only for Turkish coast but also for Mediterranean basin. The information presented here is considered to contribute to fisheries biology of the species and international scientific literature.

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AUTHORSHIP CONTRIBUTIONS

Ozan SOYKAN: Conceptualization, methodology, software, writing and editing. Ali ULAŞ**:** Data curation, visualization, investigation.

CONFLICTS OF INTEREST

The authors declare that there is no known financial or personal conflict that may affect the research (article).

ETHICS APPROVAL

Approval was granted by the Ethics Committee of Ege University (22.04.2020 /No:2020-048). The authors declare that all applicable guidelines for sampling, care, and experimental use of animals in this study have been followed.

DATA AVAILABILITY

The data sets generated during and/or analyzed during the current study will be provided by the corresponding author upon the request of the editor or reviewers. For questions regarding datasets, the corresponding author should be contacted

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