Düzce University Journal of Science & Technology

Research Article

The First Record of the Red Cornetfish (*Fistularia petimba* Lacepède, 1803) in the Aegean Sea

Hasan CERİM [a,*], Sercan YAPICI [a], Anıl GÜLŞAHİN [a], Ozan SOYKAN [b], Gökçen BİLGE [a]

[a] *Su Ürünleri Fakültesi, Muğla Sıtkı Koçman Üniversitesi, Muğla, TÜRKİYE*
[b] *Su Ürümleri Fakültesi, Ege Üniversitesi, İzmir, TÜRKİYE*
** Sorumlu yazarın e-posta adresi: gbilge@mu.edu.tr*
DOI: 10.29130/dubited.756372

ABSTRACT

An occurrence of a red cornetfish *Fistularia petimba* here reported for the first time from the Aegean Sea. On 19 October 2019 four specimens from the Gökova Bay and on 17 November 2019 one specimen from the Güllük Bay, were collected using different fishing gears in the Aegean Sea. This finding shows that *F. petimba* is rapidly expanding northwards, from the Levantine Sea to the Aegean Sea.

Keywords: *Range expansion, Bioinvasion, Anatolian coast*

Ege Denizi'ndeki Kırmızı Külah Balığı (*Fistularia petimba* Lacepède, 1803)'nın İlk Kaydı

ÖZET

Bu çalışmada, kırmızı külah balığı (*Fistularia petimba*)'nın Ege Denizi'ndeki ilk kaydı rapor edilmiştir. 19 Ekim 2019 tarihinde Gökova Körfezinden dört adet ve 17 Kasım 2019 tarihinde Güllük Körfezi'nden bir adet birey, farklı balık ağları ile elde edilmiştir. Bu bulgular, *F. petimba*'nın Levantin Denizi'nden Ege Denizi'ne, yani Kuzey'e doğru hızlı bir şekilde yayılmaya başladığını göstermektedir.

Anahtar Kelimeler: *Dağılım genişlemesi, Biyo-istila, Anadolu kıyıları*

Received: 22/06/2020, Revised: 14/12/2020, Accepted: 17/12/2020

I. INTRODUCTION

The family Fistulariidae consists of only one genus with four valid species, two of which have been reported in the Mediterranean: *Fistularia petimba* Lacepède, 1803 [1] and *Fistularia commersonii* Rüppell, 1838 [2].

Figure 1. *Observations of Fistularia petimba in the Mediterranean: 1 [1], 2 [5], 3 [8], 4 [9], 5 [6], 6 [7], PS: Present study.*

The red cornetfish, *Fistularia petimba*, is distributed in the Atlantic (southeastern Florida to Galicia, Spain), and the Indo-Pacific coasts (Red Sea, north to southern Japan and the Ogasawara Islands, south to Victoria, Australia) [3]. It is a benthopelagic species and inhabits coastal areas over soft bottoms, usually at depths greater than 10 m [3]. The maximum length reported of *Fistularia petimba* was 200 cm in total length [4], however, observed specimens are usually not longer than 100 cm. This species has been reported from the western and eastern Mediterranean coasts (Figure 1): Spain [1], Israel [5], Syria [6], Cyprus [7] and Turkey [8, 9].The present study represents the first record of *F. petimba* for the Aegean Sea and decreases the distributional gap between the western and eastern Mediterranean.

II. MATERIALS AND METHODS

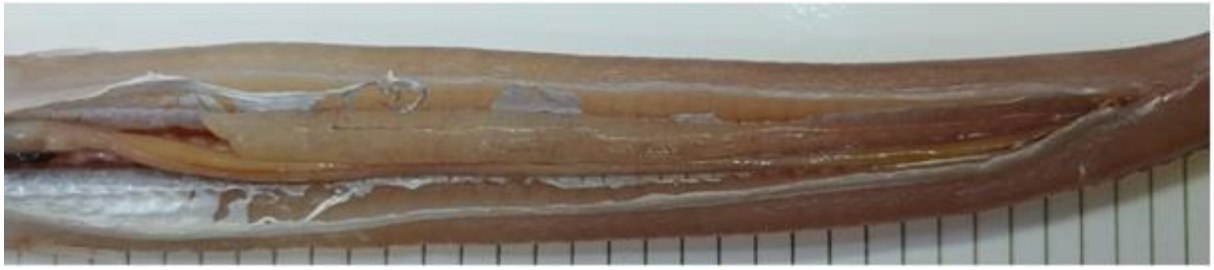
A total of five *F. petimba* specimens were captured during the commercial fishing operations along the southern Aegean coasts of Turkey (Figure 2a, 2b). On 17 November 2019, the one specimen of red cornetfish was collected in Güllük Bay via bottom trawl at about 65 m depth while the latter four specimens were obtained from Gökova Bay at a depth of 15–20 m via longline on 19 October 2019 (Figure 1). Morphological identification procedures described by [10] were followed.

(a)

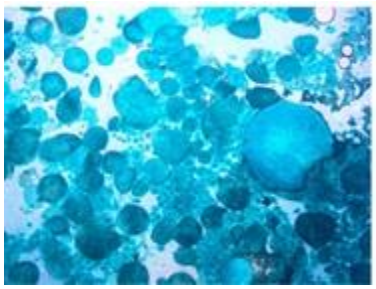
(b)

Figure 2. (a) *Gökova Bay specimens,* ***(b)*** *Güllük Bay specimen*

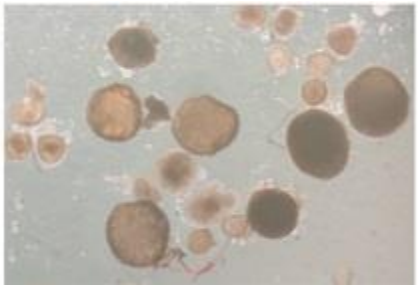
Following identification, morphological features were measured to the nearest mm and total body weight (to the nearest 0.01 g) was determined. Sex and maturity stage were assessed by visual examination of the gonads (Figure 3a, 3b). Oocytes were examined as both stained and non-stained. Gonads were stained with fast green.



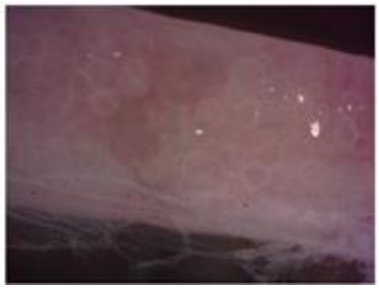
(a)



(b)



(c)



(d)

Figure 3. (a) *General view of gonad,* ***(b)*** *stained oocytes with fast green,* ***(c)*** *non-stained oocytes,* ***(d)*** *different-sized oocytes in the ovary*

III. RESULTS

The specimens of *Fistularia petimba* collected from Aegean Sea ranged from 337 to 504 mm in total length (TL) without filament. According to [10], a brief description of the all fresh specimens as follows: the body shape of *Fistularia* extremely is elongated and depressed. Strong and sharp serrations on the snout, and also on the pre-orbital and post-orbital ridges. Elongate bony plates present and imbedded in skin along midline of back, posterior lateral line ossifications ending in a retrorse spine (Figure 4). Body colorations is red to orange-brown above, silvery below [10]. A comparison of morphometric values with the previous records is given in Table 1.

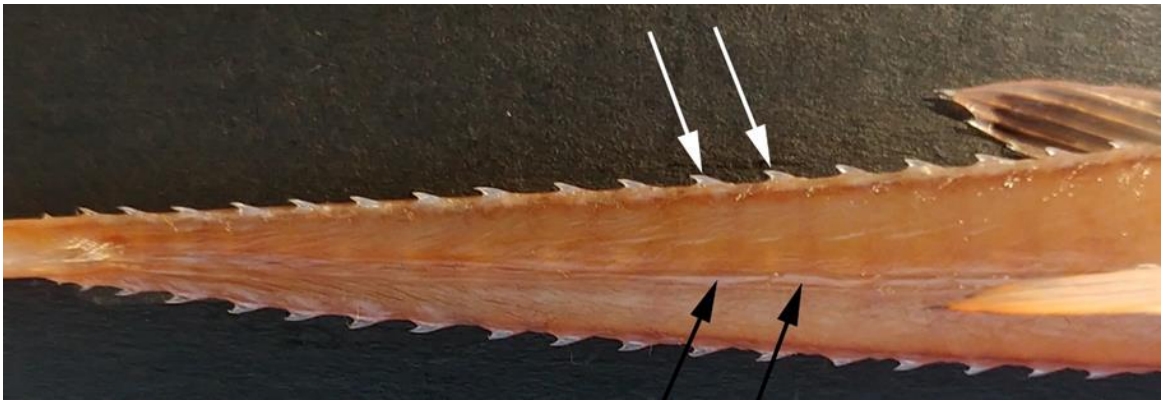


Figure 4. *Distinguished features of F. petimba (dorsal view): posterior lateral line ossifications, sharp spines (white arrows) and embedded plates (black arrows)*

IV. DISCUSSION

The red cornetfish *Fistularia petimba* spreads throughout the tropical Atlantic and the Indo-West Pacific Ocean, including the Red Sea [3]. Its first Mediterranean record given from Cadiz, Spain in 1996 and the single collected specimen was assumed to originate from the West African coast populations of the species [1]. During 20 years, no sightings were reported until 2016 and then several sightings were recorded from the Levant Sea [5, 7, 8, 9]. Considering the lengthy time passed between the first and the second records of this species, this situation may be explained as evidence of a failed introduction. Although *F. petimba* is distinguished from its three congeneric species by sharp retrorse spines along the posterior lateral line ossifications and elongated bony plates embedded in the skin along the midline of its back [5], the cornetfishes, genus *Fistularia*, have similar morphological properties such as extremely elongated and depressed body, sharp serrations on the snout as well as on the pre-orbital and post-orbital ridges. In addition, unique red coloration of *F. petimba* is seen only in its adult form. In juvenile stage, *F. petimba* exhibits similar body color pattern (brown to grey above its mid body and bright grey to silvery-white below) with its congeneric, *F. commersonii*. Consequently, it may be claimed that there is a detection lag arising from these morphological similarities within this taxon. The similarity between *F. petimba* and *F. commersonii* is not limited to morphological features. Considering biological and ecological similarities between *Fistularia* species in the Mediterranean, [5] stated that *F. petimba*, as in its congeneric *F. commersonii*, has the same capability to quickly spread throughout the Mediterranean waters. *F. commersonii*, gained the title of Lessepsian sprinter [11] by colonizing the entire Mediterranean in less than a decade, covering 1000 km per year [12]. Except for the first record, considering the locations where *F. petimba* is reported in the Mediterranean, an average invasiveness momentum of the red cornetfish is approximately 700 km per year (Figure 1).

Total length (with filament) of reported east-Mediterranean individuals including the present study varies between 443-685 mm (Table 1). *Fistularia petimba* has a tropical Atlantic origin, however, it

extends in the Indo-West Pacific region to eastern Australia [10]. [5] revealed the genetic similarity between collected species in his study and published Indian samples. This finding may be indication that *F. petimba* invaded the Mediterranean Sea through the Suez Canal rather than Gibraltar Strait. If indeed pioneer/founder individuals of *F. petimba* in the Mediterranean derived from Atlantic population, east-Mediterranean individuals will be smaller than their conspecifics in the western Mediterranean and in the Atlantic due to well-known "Levantine nanism" phenomenon [13, 14]. [5] pointed out that a revisionary study would be necessary to solve the confusion created by the cryptic diversity in this taxon.

Table 1. *Comparison of the meristic and morphometric data of* Fistularia petimba *specimens in the Mediterranean Sea.*

	Present study (2020)					[8]				[1]	[5]	[9]		[6]	[7]
	Güllük Bay (Turkey)	Gökova Bay (Turkey)				Antalya Bay (Turkey)		İskenderun Bay (Turkey)		Cadiz (Spain)	Ashdod (Israel)	Mersin Bay (Turkey)		Lattakia (Syria)	Cyprus
Meristic counts															
Dorsal rays	16	16	15	15	16	16	16	16	16	15	15	-	-	-	13
Anal rays	15	15	15	15	15	15	15	15	15	15	14	-	-	-	14
Pectoral rays	15	15	16	15	15	15	16	15	16	15	15	-	-	-	15
Pelvic rays	6	6	6	6	6	6	6	6	6	6	6	-	-	-	6
Metric measurements (mm)															
Total length (with filament)	642	-	457	470	443	-	460	505	633	1240	415	685	633	642	602
Total length (no filament)	504	352	369	357	337	398	351	435	474	-	295	513	465	-	491
Fork length	431	340	359	347	324	389	342	424	460	-	-	495	455	-	-
Standart length	483	336	353	341	320	383	335	419	453	1040	280	459	442	448	401
Head length	181	134.9	134.5	131.1	123	142.5	127.53	154.29	166.00	365.00	-	193	165	157	177
Pre-orbital length	139	102.5	106.6	102.9	96.6	112.06	104.63	120.18	131.61	264.00	85.50	137	120	-	138
Post-orbital length	25.28	18	18.6	17.5	16.4	21.27	19.78	23.54	24.98	-	14.6	280	230	-	25
Horizontal eye diameter	12.7	8.3	9.1	9.7	8.9	12.25	9.81	12.42	13.09	26	8.7	14.0	12.0	-	14
Inter-orbital length	6.21	4.9	5.2	5.1	4.3	4.78	4.06	5.44	5.35	20	-	14.0	12.0	-	-
Vertical eye diameter	8.5	4.0	5.8	6.2	5.3	7.17	5.46	6.75	7.42	16	-	-	-	-	6
Pre-dorsal length	399	281	294	284	265	315	272	350	372	851	235.0	407	370	372	389
Dorsal base length	18.8	12.8	12.7	12.1	11.7	13.78	13.3	18.06	20.95	36	-	23.0	17.5	17.0	-
Pre-anal length	399	279	291	281	263	314	270	350	372	849	-	407	370	372	377
Anal base length	13.3	13.2	12.2	12.7	12.6	13.76	14.36	15.52	17.58	37	-	20.0	15.5	17.0	-
Upper jaw length	22.4	10.6	11.4	11.3	10.8	12.64	12.44	12.76	15.03	39	-	9.5	7.5	-	-
Lower jaw length	25.9	12.7	13.1	12.7	12.2	8.72	13.02	14.55	16.54	46	-	15.0	12.5	-	-
Pectoral fin length	19.8	14.5	11.7	12.8	12.5	15.94	17.83	19.45	23.37	54	-	23.0	18.5	9.0	-
Pelvic fin length	11.5	6	6.2	6.1	5.9	8.14	7.71	8.42	11.51	-	-	10.0	8.5	4.0	-
Body depth	12.3	9.4	9.3	9.2	8.4	9.74	9.88	11.56	16.28	41	-	13.0	12.0	13	-
Body width	20.9	12.1	15.4	13.7	14.3	15.08	14.75	18.32	21.77	45	-	22.5	18.5	-	-
Head depth	13.2	8.5	9.0	8.9	8.7	10.06	10.03	11.8	14.30	36	8.8	-	-	-	-
Inter-nostril length	6.7	4.9	5.2	5.1	4.8	6.62	6.06	6.84	7.17	-	-	-	-	-	-
Mouth opening	5.7	3.0	3.4	3.2	3.0	3.95	3.45	5.01	5.36	-	-	-	-	-	-
Height of upper caudal	26.2	18.0	18.3	18.1	17.8	20.5	18.38	21.87	26.00	57	-	-	-	-	-
Height of lower caudal	25.4	17.9	18.2	18.0	17.6	-	18.06	20.74	25.23	-	-	-	-	-	-

Considering abiotic (particularly temperature) or biotic features in the Mediterranean Sea, once an introduced species in the Mediterranean from the Indo-Pacific regions established a self-sustaining population, it could be suggested that no physical barriers prevented its dispersal westward. Atlantic-based literature on *F. petimba*, indicated that the length of mature red cornetfish adults is greater than 1,000 mm then there is no valid known data on the first maturity length of *F. petimba* in the Mediterranean Sea. For congeneric *F. commersonii*, these values are found as 65.4 (females) and 54.7 cm (males) in TL (snout to caudal fin upper lobe) by [15]. It is known that invasive species tend to become dominant in the environment by reaching sexual maturity in the early stages of their lives [16]. In the present study, an ovigerous female red cornetfish specimen with 50.4 TL cm was collected from Güllük Bay (Figure 3). [15] also determined female reproductive season of *F. commersonii* in the Mediterranean is from May to October. Our ovigerous *F. petimba* female was collected in November. [15] asserted that some individuals undergo a late maturity within the annual cycle or even a second spawning period if conditions are favourable. The critical threshold of the spawning activity for *F. commersonii* was reported as above 22°C [15]. The seawater temperature, where the mature female was collected in the present study, was reported as 23°C. On the other hand, [17] declared that *F. commersonii* has demonstrated a great capacity to adapt to local hydro-climatic conditions.

Therefore, it may be possible that tropical-Atlantic origin *F. petimba* is able to reproduce under more extreme conditions. In terms of invasive species, the presence of an ovigerous female may indicate the existence of an established population [18]. Additionally, asynchronous ovarian development indicates partial spawning, and this strategy is applied to increase recruitment success under unsuitable environmental conditions and used by invasive fish species to increase settlement success in the new environment [19].

Oocyte maturation of collected females in the present study was determined as an 'asynchronous' ovarian development in which oocytes in different stages are present at the same time (Figure 3a,b,c). A similar situation was reported for *F. commersonii* by [15]. Asynchronous development of oocytes is a common feature in marine fishes of low latitudes [20] and as well as the congeneric *F. commersonii* [15], *F. petimba* has been maintained this situation in the Mediterranean.

[17] stated that the occurrence of small groups of adults of uniform size may be indicative of an incoming establishment of a new self-generating population while [9] stated that the presence of different sized individuals of invaders in the migrated regions indicates settlement success. In the present study, a small group of uniform size was collected from Gökova Bay. Based on the findings of the present study and the aforementioned assertions the results of the present study provide new elements to evaluate a possible establishment success of *F. petimba* in the southern Aegean Sea.

V. CONCLUSION

In conclusion, the present record confirms the first occurrence of red cornetfish in the Aegean Sea, representing a northwestward georeferenced record and increasing the number of species of the Aegean ichthyofauna.

ACKNOWLEDGEMENTS: Authors would like to thank Mr. İsa Özdemir and Mr. Hamza Yentüz for providing a specimen.

V. REFERENCES

[1] S. Cárdenas, D. A. Berastegui and J. M. Ortiz, "First record of Fistularia petimba Lacepéde, 1803 (Pisces, Fistulariidae) off the coast of Cadiz (southern Iberian Peninsula)," *Bol. Inst. Esp. Oceanogr.*, vol. 13, no. 1, pp. 83-86, 1997.

[2] D. Golani, "First record of the bluespotted cornetfish from the Mediterranean Sea," *J. Fish. Biol.*, vol. 56, pp. 1545-1547, 2000.

[3] R. Froese, and D. Pauly. (2019, December 1). *FishBase* [Online]. Available: http://www.fishbase.org

[4] J. G. Sanches, "Catálogo dos principais peixesmarinhos da República de Guiné-Bissau," *Publ. Avuls. Inst. Nac. Invest. Pescas.*, vol. 16, pp. 429, 1991.

[5] N. Stern, G. Paz, Y. Yudkovsky, H. Lubinevsky and B. Rinkevich, "The arrival of a second 'Lessepsian sprinter'? the first record of the redcornetfish Fistularia petimba in the eastern Mediterranean," *Medit. Mar. Sci.*, vol. 18, no, 3, pp. 524-528, 2017.

[6] C. Hussein, A. Ibrahim and F. Alshawy, "First record of red cornetfish, Fistularia petimba Lacepède, 1803 (Actinopterygii: Fistulariidae) from the Syrian coast," *Int. J. Aquat. Biol.*, vol. 7, no. 3, pp. 175-179, 2019.

[7] B. Dragičević, *et al.*, "New Mediterranean biodiversity records (December 2019)," *Medit. Mar. Sci*., vol. 20, no. 3, pp. 645-656, 2019.

[8] A. Ünlüoğlu, S. Akalın, İ. Dal, E. M. Tıraşın and C. M. Aydın, "First record of red cornetfish Fistularia petimba (Syngnathiformes: Fistulariidae) from Antalya and Iskenderun bays along Turkish coasts of the Mediterranean sea," *J. Appl. Ichthyol.*, vol. 34, pp. 978-980, 2018.

[9] N. Çiftçi, D. Ayas and M. Doğangün, "New locality record for Fistularia petimba Lacepède, 1803 from the northeastern Mediterranean sea (Mersin bay)," *MedFAR*, vol. 2, no. 2, pp. 42-48, 2019.

[10] R. A. Fritzsche, "A review of the cornetfishes, genus Fistularia (Fistulariidae), with a discussion of intrageneric relationships and zoogeography," *Bull. Mar. Sci.*, vol. 26, pp. 196-204, 1976.

[11] P. K. Karachle, C. Triantaphyllidis and K. I. Stergiou, "Bluespotted cornetfish, Fistularia commersonii Rüppell, 1838: A Lessepsian sprinter," *Acta. Ichthyol. Piscat.*, vol. 34, pp. 103-108, 2004.

[12] E. Azzurro, S. Soto, G. Garofalo and F. Maynou, "Fistularia commersonii in the Mediterranean sea: invasion history and distribution modeling based on presence-only records," *Biol. Invasions.*, vol. 15, pp. 977-990, 2013.

[13] F. D. Por, *The legacy of Tethys. An aquatic zoogeography of the Levant*, 1st ed., Dordrecht, Netherlands: Kluwer Academic, 1989, pp. 1-216.

[14] G. Goren, "The fishes of the Mediterranean: A biota under siege," in *The Mediterranean Sea: Its History and Present Challenges*, 1st ed., Dordrecht, Netherlands: Springer, 2014, pp. 385-400.

[15] M. Bariche, G. Kazanjian and E. Azzurro, "A lag of 25 years: Evidence from an old capture of Fistularia commersonii Ruppell, 1838 from Lebanon (Mediterranean Sea)," *J. Appl. Ichthyol.*, vol. 30, pp. 535-536, 2013.

[16] G. Rilov, "The integration of invasive species into marine ecosystems," in *Biological Invasions in Marine Ecosystems—ecological, Management, and Geographic Perspectives*, 1st ed., Heidelberg, Germany: Springer-Verlag, 2009, pp. 214−244.

[17] P. N. Psomadakis, U. Scacco, I. Consalvo, M. Bottaro, F. Leone and M. Vacchi, "New records of the Lessepsian fish Fistularia commersonii (Osteichthyes: Fistulariidae) from the central Tyrrhenian sea: Signs of an incoming colonization?," *Mar. Biodivers. Rec.*, vol. 2, 2009.

[18] B. S. Galil, Y. Levitt-Barmats, H. Lubinevsky, Y. Yudkovsky, G. Paz and B. Rinkevich, "A record of Arcania brevifrons Chen, 1989 (Crustacea; Decapoda; Leucosiidae) from the Mediterranean coast of Israel," *Bioinvasions Rec.*, vol. 6, no. 3, pp. 249-253, 2017.

[19] S. Yapıcı and H. Filiz, "Biological aspects of two coexisting native and non-native fish species in the Aegean sea: Pagellus erythrinus vs. Nemipterus randalli," *Medit. Mar. Sci.*, vol. 20, no. 3, pp. 594-602, 2019.

[20] D. A. Pavlov, N. G. Emel'yanova and G. G. Novikov, "Reproductive Dynamics," in *Fish Reproductive Biology: Implications for Assessment and Management*, 1st ed., New Jersey, USA: Wiley-Blackwell, 2009, pp. 52-97.