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Research Article / Araştırma Makalesi

Confirmation of *Pteragogus trispilus* Randall, 2013 (Labridae) with an Additional Record from Iskenderun Bay (Eastern Mediterranean, Turkey)

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Abstract: *Pteragogus trispilus* Randall, 2013, previously known as *Pteragogus pelycus,* is a lessepsian migrant to the eastern Mediterranean Sea. Reporting two specimens, this paper confirms the occurrence of the species in Iskenderun Bay (Eastern Mediterranean coast of Turkey) in addition to the previous reports from the Mediterranean coast of Turkey. This report is the first observation for the location and; thus, fills a gap in the distribution range of the species. All measurements and counts as well as morphological and color descriptions of *P. trispilus* are given in the study.

Keywords: Labridae, Iskenderun coast, eastern Mediterranean, Turkey

İskenderun Körfezi (Doğu Akdeniz, Turkiye)'nden İlave Kaydı ile *Pteragogus trispilus* Randall, 2013 (Labridae)'un Teyidi

Öz: Daha önce *Pteragogus pelycus* olarak bilinen *Pteragogus trispilus* Randall, 2013, Doğu Akdeniz'deki lessepsiyen göçmen bir türdür. Bu çalışmada Türkiye'nin Doğu Akdeniz kıyısından önceki kayıtlara ek olarak, İskenderun Körfezi (Türkiye'nin Doğu Akdeniz kıyıları)'nden elde edilen iki bireyi ile türün varlığı bir kez daha kanıtlanmıştır. Bu rapor İskenderun Körfezi için yapılan ilk gözlemdir ve türün dağılım aralığındaki bir boşluğu doldurmaktadır. *P. trispilus*'un morfolojik ve renk tanımlarının yanı sıra tüm ölçümler ve sayımlar metin içerisinde verilmiştir.

Anahtar kelimeler: Labridae, İskenderun sahili, Doğu Akdeniz, Türkiye

1. Introduction

The opening of the Suez Canal in 1869 resulted in the introduction of Red Sea species to the Mediterranean Sea. This act of migration was called as 'Lessepsian migration' by Ferdinand de Lesseps. The penetration and invasion increased following the construction of the Aswan Dam in 1970 (Galil, 1993). Eventually, this phenomenon became the main reason of the increase in the faunal divergence in the Mediterranean Sea (Quignard & Tomasini, 2000; Golani, Orsi-Relini, Massuti, & Quignard, 2002).

Pteragogus trispilus Randall, 2013 is a lessepsian migrant to eastern Mediterranean Sea (Corsini-Foka et al., 2015; Iglésias & Frotté, 2015; Bilecenoglu, 2016) and now widespread throughout the region.

The first record of the species in the Mediterranean was the report of an observation made in 1991 along the coast of Israel (Golani & Sonin, 1992). Further reports of the occurrence of the species in the Mediterranean Sea were made from Rhodes (Corsini & Economidis, 1999; Kalogirou, Corsini-Foka, Sioulas, Wennhage, & Pihl, 2010; Kalogirou, Wennhage, & Pihl, 2012), Turkey (Taşkavak, Bilecenoglu, Başusta, & Mater, 2000; Öğretmen, Yilmaz, & Torcu Koc, 2005; Öz, Okuş, & Ahsen, 2007; Bilecenoglu, 2010), Cyprus (Kaya, Bilecenoglu, & Golani, 2000), Lebanon (Harmelin-Vivien, Bitar, Harmelin, & Monestiez, 2005), Egypt (Halim & Rizkalla, 2011; Azzurro, Milazzo & Maynou, 2012), the Hellenic Seas (Sterioti, 2012), Syria (Soliman, Ali, Saad, Reynaud, & Capapé, 2014), and Tunisia (Hamed, Miled-Fathalli, & Chakroun-Marzouk, 2018).

Today, *P. trispilus* is considered as a successful invader distributed throughout the Mediterranean Sea (EastMed, 2010; Bilecenoglu, 2016). This study gives the details obtained from two specimens, one of which was encountered in its natural habitat during an underwater observation. In this paper, the occurence of *P. trispilus* is reported for the first time from Iskenderun Bay, adding another brick in the wall to fill the gap in the geographic distribution of this species in eastern Mediterranean.

2. Material and Methods

The first specimen of *P. trispilus* was photographed at a depth of 3 m during a SCUBA diving expedition in Konacık/Arsuz (Iskenderun Bay) on 17th of September 2012. The second specimen of *P. trispilus* was a male captured in Gökmeydan (Coordinate: 36°26'N, 35°54'E), Iskenderun Bay on 13rd of April 2018. This specimen was caught on rocky bottoms, partially covered with algae and sea grass, by shrimp trammel net of 22mm mesh size (Fig. 1 and Fig. 2). It was immediately photographed upon the capture and transported to the laboratory for more detailed examination. Morphometric measurements of the male specimen were made to the nearest 0.1 mm using

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digital caliper and weighed to the nearest gram (g). The specimen is deposited in the Museum of the Faculty of Marine Sciences and Technology, Iskenderun Technical University with catalogue number MSM-PIS/2018-3. Distribution of the *P. trispilus* in the Red Sea and the Mediterranean Sea has given according to previous capture records and the present report from Iskenderun Bay (Fig. 3).

Figure 1: Underwater observation of *Pteragogus trispilus* in Konacık (Arsuz), Iskenderun Bay (Photo: Deniz Ergüden)

Figure 2: A male specimen of *Pteragogus trispilus*, 66.5 mm TL, from Iskenderun Bay (MSM-PIS/2018-3)

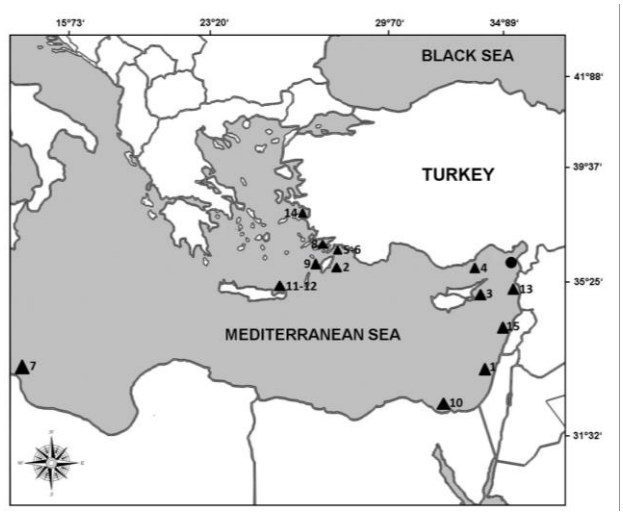

Figure 3: Map showing the capture sites of *Pteragogus trispilus* in the Mediterranean Sea.

▲, Previous record; ●, Present record; 1, Haifa Bay, Israel; 2, Rhodes Island (Aegean Sea), Greece; 3, Magosa Bay, Cyprus; 4, Ovacık, Mersin Bay, Turkey; 5, Fethiye, Gökova Bay, Turkey; 6, Gökova Bay (Southern Aegean Sea), Turkey; 7, Lebanon coast; 8, Datça-Bozburun Peninsula, Turkey; 9, Coast of Rhodes, Greece; 10, Alexandria coast, Egypt; 11-12, Heraklion Bay (Cretean Sea), Greece; 13, off Tartous Harbour, Syria; 14, Kuşadası Bay, Aegean Sea, Turkey; 15, Gulf of Tunis, Tunisia

3. Results

The body of the *P. trispilus* is compressed and covered with large cycloid scales. Mouth terminal, slightly oblique, the maxilla extending posteriorly to a vertical at posterior edge of pupil; two pairs of large recurved canine teeth place anteriorly in jaw. The second pair is large and out curved. The previous reports of the *P. trispilus* from the Mediterranean Sea are given in Table 1 together with the findings of the present study.

The main diagnostic characters and morphometric measurements of the captured male specimen of *P. trispilus* are given in millimeters: the specimen was 66.5 mm in total length and 50.5 mm in standard length, and 5.39 g in total weight. The other morphometric data of the male specimen obtained from fishing was given in Table 2 and the compared to previous reports from the Red Sea (Golani & Sonin, 1992), Syrian coast (Soliman, Ali, Saad, Reynaud, & Capapé, 2014) and the central Mediterranean Sea, the Gulf of Tunis (Hamed, Miled-Fathalli, & Chakroun-Marzouk, 2018).

The color of the specimen was mostly light brown-reddish; an oblique elliptical black spot on opercula, broadly rimmed in yellow; a vertical white streak to each side of posterior edge of pre-opercula; scattered small black spots behind eye and on nape; pupil rimmed with orange, the rest of iris with seven spoke-like dark lines; lateral line with black dots and dashes and white dots; median fins olivaceous with white dots on rays, oblique white lines on spinous portion ventral part of head and posterior opercula of male suffused with orange.

3. Discussion

The species previously was mistaken as *Pteragogus pelycus* which is claimed not to inhabit in the Mediterranean waters (Randall, 2013). *Pteragogus trispilus* is a small non-commercial fish species typically inhabits at bottoms with detached brown algae or small coral patches and rocks in coastal areas. Although Randall (2013) claimed that, the species is usually found at 9-28 m depths. Golani & Sonin, (1992) reported the trawling of the species from depths of 32-80 m. However, the first specimen reported in this study was observed at 3 m depth in its natural habitat in Konacık (Arsuz) on rocky and sandy bottoms, partially covered with algae, during a SCUBA diving expedition (Fig. 1). The second one was a male specimen caught at a depth of 22 m from Gökmeydan (Arsuz) by a shrimp trammel net (mesh size 22 mm). This depth range is in accordance with literature (Randall, 2013). However, with this finding vertical distribution range of the species should be revised as 3-80 m.

Pteragogus trispilus is distinguished from the other cogeneric species, *P. pelycus*, by having 13 simple dorsal-fin rays (versus 12-13), 13 branched pectoral fin rays (versus 12), very long pelvic fins, reaching well posterior of anal fin, and rounded caudal fin. Besides, *P. trispilus*

have a straight dorsal profile of the head compared to the very strong concavity in the dorsal profile of the head of adult *P. pelycus*. The interorbital of *P. trispilus* is convex whereas it is nearly flat in adult *P. pelycus*. Iris of the eye of an adult *P. trispilus* has seven spoke-like short lines instead of small dark spots; the shape of the ocellus on the opercula is smaller and different from that of *P. pelycus*. There is a black spot on each of the first three membranes of dorsal fin (Randall, 2013). However, black spots in *P. pelycus* are on the upper part of the first 2-4 inter spinous dorsal membrane.

Table 1. Records of *Pteragogus trispilus* from Mediterranean Sea covering the period 1992-2018.

References	Number of Samples	Record Date	Location	Sampling Gear	Depth	Length, TL (mm)
Golani and Sonin (1992)	2	16.07.1991	Haifa Bay, Israel	Trawl-net	32-80	52.1-60.5*
Corsini and Economidis (1999)	1	03.09.1992	Rhodes Island (Aegean Sea), Greece	Fishing Rod	10	80.8*
	1	21.10.1993		Trawl-net	100	77.6*
	1	18.10.1994		Trawl-net	-	58.1*
	1	26.01.1995		Trawl-net	-	78.6*
	2	01.03.1994		Trawl-net	-	54.9-66.1*
Kaya et al. (2000)	2	17.05.1997	Magosa Bay, Cyprus	Trawl-net	32-35	64.8-74.9
Taşkavak et al. (2000)	2	24.08.1998	Ovacık, Mersin Bay, Turkey	Hand net	1	75.3*
Bilecenoglu et al. (2002)	1	2000	Fethiye, Gokova Bay, Turkey	Visual observation	-	5
Ögretmen et al. (2005)	2	2000-2001	Gökova Bay (Southern Aegean Sea), Turkey	Gill net	-	65-71
Harmelin-Vivien et al. (2005)	>1	2001	Lebanon Coast (eastern Mediterranean Sea)	Visual observation	0-32	-
Öz et al. (2007)	1	16.09.2002	Datça-Bozburun Peninsula, Turkey	Visual observation	6-15	-
Kalogirou et al. (2010)	>3	2008	Coast of Rhodes, Greece	Purse seine	5-35	-
Azzurro et al. (2012)	1	02.07.2010	Alexandria coast, Egypt	Gill net	15-20	130
Sterioti (2012)	2	23.08.2015 27.09.2011	Heraklion Bay (Cretean Sea), Greece	Trawl	15-33	75
Soliman et al. (2014)	1	15.02.2014	off TartousHarbour, Syria	Bottom cage net	38	93
Yapici et al. (2015)	1	04.06.2014	Kuşadası Bay, eastern Aegean Sea, Turkey	Trammel net	25	83
Hamed et al. (2018)	1	07.02.2016	Gulf of Tunis, Tunisia	Gill net	-	113
Present study	1	17.09.2012	Konacık (Arsuz), Iskenderun Bay, Turkey	Visual observation	3	-
Present study	1	13.04.2018	Gokmeydan, Iskenderun Bay, Turkey	Trammel net	22	66.5

*Standard Length (SL)

In the present study, all measurements, counts, and morphological characters agree with those of Randall's (1981 and 2013). As indicated by Randall (1981), the second ray of the pelvic fin is extended and reaches to about the end of the anal fin in males, but it is shorter in females. In males, the forehead is high and convex is above the eye

while the snout is slightly turned up. However, the dorsal profile of the head of females, in general, is straight and less then pronounced than in male (Corsini & Economidis, 1999).

The native range of this species includes western Indian Ocean to the Red Sea (Golani, Orsi-Relini, Massuti, & Quignard, 2002), the eastern coast of Africa southwards to Durban, South Africa and, Madagascar, and adjacent Indian Ocean Islands (Randall, 2013). *P. trispilus* inhabiting in the Mediterranean Sea feeds on invertebrates strictly related to the grass niches (Corsini & Economidis, 1999; Kalogirou, Wennhage & Pihl, 2012). Similarly, the male specimen observed during diving was naturally inhabiting among algae communities (*Corallina officinalis, Jania rubens* and *Padina pavonica*) on the rocks.

Table 2: Measurements and counts of *Pteragogus trispilus* compared with three previous records

Metric (mm)	**Present study**	**Golani and Sonin (1992)**	**Soliman et al. (2014)**	**Hamed et al. (2018)**
Number	**n=1**	**n=2**	**n=2**	**n=1**
Total length (TL)	66.5	-	93-92	113
Standard length (SL)	50.5	52.1-60.5	75-74	86
Head length (HL)	18.8	35.7-37.2*	21-21	32
Body depth	18.2	32.5-32.6*	28-28	31
Pre-dorsal fin length	18.0	-	24-23	30
Pre-pectoral fin length	1.78	-	25-23	29
Pre-pelvic length	19.4	-	25-25	33
Pre-anal fin length	32.1	-	42-41	52
Caudal fin length	16.5	-	-	28
Caudal peduncle length	3.7	-	10-10	11
Eye diameter	3.5	-	6-6	6
Jaw length	5.8	-	8-8	10
Pre-orbital length	6.0	-	-	10
Post-orbital length	9.0	-	-	15
Interorbitaldistance	4.0	-	4-4	7
Dorsal fin ray	31.2	-	54-52	53
Anal fin ray	12.4	-	28-29	21
Pectoralfin ray	13.1	-	14-15	23
Pelvicfin ray	23.5	-	37-32	36
Meristic				
Dorsalfin ray	XI + 9	XI + 9 (XI + 8-9)	XI+ 9 - XI+8	XI + 9
Anal fin ray	III + 9	III + 9 (III+ 8-9)	III+ 8- III+ 9	III + 9
Pectoral fin ray	13	13 (13-14)	13-13	13
Pelvic fin ray	I + 5	I + 5	I + 5	I + 5
Caudal fin ray	14	-	13-12	-
Weight	5.39	-	11.61-10.92	19.13

*Percentage of SL

Surveys conducted on lessepsian migrants in Turkish waters have increased since 1994 (Gücü, Bingel, Avsar, & Uysal, 1994; Bilecenoglu, 2010; Ergüden & Turan, 2013; Ergüden, Gürlek, & Turan, 2018). Nevertheless, further research is required to reveal details about the habitat's requirements for the establishment of non-indigenous species in the area. Besides, future collaboration between researchers and fishermen should be encouraged for the early detection of recent penetration of non-native species into the Mediterranean marine waters.

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