



First record of the Indo-Pacific striped eel catfish, *Plotosus lineatus* (Thunberg, 1787) from Turkish marine waters

Servet Ahmet Dođdu¹, Ali Uyan¹, Necdet Uygur², Mevlüt Gürlek¹, Deniz Ergüden¹,
Cemal Turan^{1*}

¹Molecular Ecology and Fisheries Genetics Laboratory, Marine Science Department, Faculty of Marine Science and Technology, Iskenderun Technical University, 31220 Iskenderun, Hatay, Turkey.

²Maritime Vocational School, Iskenderun Technical University, Iskenderun, Hatay, Turkey.

Abstract

Three specimens of striped eel catfish, *Plotosus lineatus* (Thunberg, 1787) were caught by a spear gun at depths of 20 m on 4 April 2016 from Iskenderun Bay (Çevlik harbour), North-eastern Mediterranean coast of Turkey. With the present study, *P. lineatus* is the first time reported from Turkish marine waters, in the Iskenderun Bay, the Northeastern Mediterranean and also this is the first *Plotosid* species recorded from Turkish Seas.

Keywords:

Striped eel cat fish, *Plotosus lineatus*, Lessepsian migration, Turkish marine waters.

Article history:

Received 10 April 2016, Accepted 08 May 2016, Available online 10 May 2016

Introduction

The opening of the Suez Canal in November 1869 connected the tropical Red Sea with the Mediterranean, known for its primarily temperate fauna, dramatically affecting both marine commerce and the biodiversity of the Mediterranean (Gewing et al., 2014).

Nowadays, many alien fish species, which entered the Mediterranean through the Suez Canal, have established dense populations in the north-eastern coastal waters of Turkey

*Corresponding Author: Cemal Turan, e-mail: cemal.turan@iste.edu.tr

(Ergüden & Turan, 2013). To date, about 100 Indo-Pacific fish species have been introduced via the Suez Canal and reported from the Levantine basin of the Mediterranean Sea (Stern et al., 2014).

The striped eel cat fish *Plotosus lineatus* (Thunberg, 1787) is one of the most recent invaders, and it is rapidly becoming a dominant component of the benthic biota of the Levantine Sea. *P. lineatus* belongs to the family Plotosidae that consists of 6 genera and 32 valid species. *P. lineatus* has a wide Indo-Pacific distribution (Froese & Pauly, 2016), and sometimes can enter freshwaters of East Africa (Lake Malawi) and Madagascar (Taylor & Gomon, 1986).

P. lineatus was first time recorded in the Mediterranean by Golani (2002) and has colonized population in the entire Israeli coast. The second record of *P. lineatus* was given from the Egypt coast of El-Arish city by Temraz & Ben Souissi (2013). The third record of *P. lineatus* was given from the Syrian coast of Tartous city by Ali et al. (2015). *P. lineatus* is also second marine catfish record from the Mediterranean after reported a single specimen of Atlantic *Arius parkii* (Günther, 1864) from the coast of Israel by Golani & Sonin (1996).

To date, *P. lineatus* is the first time recorded from Turkish coastal waters that is also fourth record from the Mediterranean Sea and first *Plotosid* species reported from this Turkish Mediterranean region.

Material and Method

Three specimens of striped eel catfish *P. lineatus* were caught by using a spear gun on sandy-rocky bottom at a depth of 20 m on 4 April 2016 from the Cevlik harbor, Iskenderun Bay, north-eastern Mediterranean coast of Turkey (36° 07'N, 35° 91'E) (Fig. 1).



Figure 1. Captured specimen of *Plotosus lineatus* from Cevlik (north-eastern Mediterranean, Turkey)

The diagnostic features of the captured *P. lineatus* specimens were similar with those previously reported in Israel, Egypt and Syrian coasts (Golani, 2002; Temraz & Ben Souissi, 2013; Ali et al., 2015). Morphometric and meristic characters of the collected three specimens were taken and morphometric measurements of the specimens were made to the nearest 0.01 mm using digital calliper. All measurements, morphological descriptions and colourations of the captured *P. lineatus* specimens agree with previous descriptions by Gomon (1984), Golani (2002) and Ali et al., (2015). The specimens are deposited in the Museum of the Faculty of

Marine Sciences and Technology, Iskenderun Technical University, with catalogue numbers MSM-PIS/2016-2, MSM-PIS/2016-3 and MSM-PIS/2016-4.



Figure 1. Sampling location (★) of *Plotosus lineatus* from Çevlik harbour. ●; Previous records (1: Golani 2002, 2: Temraz & Ben Souissi 2013, 3: Ali et al., 2015, 4: Present study)

Results

The captured three specimens of *P. lineatus* were 216, 222 and 245 mm in total length, 202, 206 and 225 mm in standard length, and 63.73 g, 85.88 g and 64.03 g in total weight, respectively. Moderately eye large; upper jaw overhanging; lips distinct; conical teeth in upper jaw is visible when mouth closed. Two irregular rows of teeth in the lower jaw and the anterior conical seem becoming granular. Having four pairs of barbels; the nasal and the maxillary barbels reach the posterior edge of eye or slightly beyond; triangular vomerine patch of granular teeth (Figure 3). The inner mental barbel is slightly shorter than the outer one. First dorsal spine is stout with anterior and posterior serration. Second dorsal fin is long and confluent with anal fin. The pectoral-fin spine has upper and lower serration; it is easily detached from the rest of the fin. Smooth body has no scales. A distinct dendritic organ is made of folded tissue located behind anus. Color of its body is brown with two narrow white stripes; both originating at the snout, one crossing above the eye, the other below. Second dorsal and anal fins are paler than the rest of the body with a black margin. Ventral surface is white with brownish red dendritic organ (Randall, 1995; Golani,

2002 and Ali et al., 2015). Morphometric measurements with percentage of total length (TL) and meristic counts were given at Table 1.



Figure 3. Head of captured specimen of *P. lineatus*, having eight barbels.

Table 1. Morphometric and meristic measurements of 3 captured *P. lineatus*. *; the measurements are rated according to head length; the others are rated according to total length.

Morphometric measurements	mm	%TL	mm	%TL	mm	%TL
Total length	222	100	245	100	216	100
Standard length	206	92.79	226	92.24	202	93.52
Head length	39.29	17.70	44.97	18.36	38.71	17.92
Interorbital space	11.7	5.27	13.32	5.44	11.26	5.21
Eye horizontal diameter*	5.52	14.05	5.47	12.16	4	10.33
Eye vertical diameter*	5.52	14.05	5.47	12.16	4	10.33
Iris horizontal diameter*	2.72	1.23	3.28	1.34	2.79	1.29
Iris vertical diameter*	2.75	1.24	3.28	1.34	2.79	1.29
Nasal barbel length	19.73	8.89	26.68	10.89	18.53	8.58
Maxillary barbel length	22.48	10.13	23.62	9.64	22.42	10.38
Mental barbel length	14.3	6.44	17.65	7.20	16.67	7.72
Pectoral fin length	23.28	10.49	24.15	9.86	24.88	11.52
Pectoral fin base	16.2	7.30	13.07	5.33	15.47	7.16
Pectoral fin spine length	10.32	4.65	10.7	4.37	9.88	4.57
Dorsal fin length	23	10.36	31.43	12.83	26.28	12.17
Dorsal fin base	15.16	6.83	18.11	7.39	16.2	7.50
Dorsal fin height	21.28	9.59	22.34	9.12	22.61	10.47

Dorsal fin spine length	10.04	4.52	11.49	4.69	12.71	5.88
Pelvic fin length	15.78	7.11	17.97	7.33	16.65	7.71
Pelvic fin base	12.08	5.44	12.8	5.22	11.63	5.38
Anal fin length	121	54.50	125	51.02	119	55.09
Anal fin base	13.48	6.07	13	5.31	10.9	5.05
Anal fin height	10.59	4.77	12.02	4.91	13.38	6.19
Body depth	24.85	11.19	28.46	11.62	23.72	10.98
Pre-pectoral length	40.18	18.10	44.82	18.29	41.52	19.22
Pre-dorsal length	52.4	23.60	56.88	23.22	51.44	23.81
Pre-anal length	90.47	40.75	101.69	41.51	86.2	39.91
Pre-pelvic length	74.56	33.59	87.66	35.78	74.39	34.44
Meristic counts / Specimen	1	2	3			
First dorsal fin spinous rays	1	1	1			
First dorsal fin soft rays	4	4	4			
Second dorsal fin soft rays	85	83	85			
Pectoral fin spinous rays	1	1	1			
Pectoral fin soft rays	10	10	10			
Anal fin soft rays	67	65	66			
Pelvic fin soft rays	11	10	11			
Total weight (g)	63.73	85.88	64.03			

Discussion

P. lineatus has a wide Indo-Pacific distribution and is characterized by four pairs of barbels around the mouth and a pointed tail (Nelson, 1994). *P. lineatus* is found on reefs, along open coasts in estuaries and in tidal pools from the Red Sea and east Africa to Japan and Samoa (Golani et al., 2002). They feed on crustaceans, mollusks, worms, and sometimes fish (Fisher et al., 1990). *P. lineatus* reaches sexual maturity after 1-3 years, at a length of 140 mm (Thresher, 1984). Its eggs are demersal and larvae planktonic and adults are known to hide under ledges during the day.

P. lineatus has a significant commercial value in the aquarium industry (Situ & Sadovy, 2004; Scandol & Rowling, 2007) but is discarded at all sizes by Israeli trawl fishermen. In shallower depths than trawling fields (<15 m), numerous observations of dense juveniles schooling in rocky habitats have been made by swimmers and SCUBA divers.

P. lineatus has venomous spines that cause painful injuries and was included in the list of 100 worst invasive species in the Mediterranean (Streftaris & Zenetos 2006). According to Liao et al. (1997), Isbister (2001) and Tam et al. (2007), *P. lineatus* has caused a high rates of injury in Taiwan, Hong Kong and Australia. *P. lineatus* was first recorded in the Mediterranean, and 10% of fish-related injuries in Israel were caused by *P. lineatus* (Gweta et al., 2008). Haddad et al. (2008) stated that dozens of injuries to fishermen and beach goers were recently reported by the Poison Information Center in Rambam Health Care Campus, Israel. Injuries from venomous cat fish can be fatal however, no deaths from *P. lineatus* stings have been recorded so far.

The number of lessepsian species has increased dramatically during the last decade in Turkish marine waters (Turan et al., 2015; Gürlek et al., 2016; Gurlek et al., 2016a,b). Especially, physical conditions in the eastern Mediterranean are changing over the last decades (Turan et al. 2016). Furthermore, minimum (winter) and maximum (summer) water temperatures are increasing in the Mediterranean Sea, which may facilitate establishment of thermophilous species in the Mediterranean Sea due to water temperature (Rilov & Treves, 2010; Turan et al., 2016). Therefore, the increase in water temperature has been considered as the main reason for the increasing introductions of tropical fish in the Mediterranean Sea (Ben Rais Lasram et al., 2010; Golani, 2010; Turan, 2010; Öztürk & Turan, 2012).

The present study report first record of *P. lineatus* in the Turkish marine waters. This species will probably be well established like other invasive fish species in the Iskenderun Bay and along the Mediterranean coast of Turkey and this finding warn a danger of painful injuries for fishermen and other people in the coastal areas.

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