

MARINE RECORD

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First confirmed record of Sparid *Pagellus bogaraveo* (Brünnich, 1768) in the Syrian marine waters (Levantine Basin)

Adib Saad^{1*} , Mai Masri¹ and Waad Sabour²

Abstract

This paper aims to present the first record of *Pagellus bogaraveo* (Brünnich, 1768) from Syria marine waters. One specimen was caught by trawl nets at about 300 m depth in Rass Albassit, north of Lattakia, on 25 February 2019, and 6 additional specimens were caught by gill nets at a depth of 120 m off Jablah coast on 7 April 2019. This record represents the first sighting of this immigrant Atlantic species introduced in the Eastern Mediterranean (Levantine Basin). These specimens were found mixing in the same net haul with populations other Sparidae species such as: *Pagellus acarne* and *Dentex macrophthalmus*.

Keywords: Sparidae, *Pagellus bogaraveo*, First record, Syrian marine waters, Levantine Basin

Background

The Mediterranean is considered as a semi-enclosed sea; the Western and Eastern basins are separated by siculo-Tunisian strait. The narrow Gibraltar strait is the only sill connection with the Atlantic Ocean. Due to strong evaporation in the Eastern Basin, there is a constant flow of near-surface waters that enter through Gibraltar from the Atlantic into the Mediterranean and running eastward along the North African coast. When reaching the Levantine Basin, this general Atlantic current directs northward along Syro-Lebanese coast and in a westerly direction via southern Turkey, Greece and back to Western Mediterranean until Gibraltar. (Lakkis 2002, 2013; Papaconstantinou 2014).

The Sparidae family includes 148 species worldwide belonging to 37 genus (Nelson et al. 2016). From this high species diversity, 28 species are found in Syrian waters, from which one *Crenidens crenidens* (Forsskal, 1775) is an immigrant species from the Red Sea (Saad 2005), and another species, *Pagellus bellottii* (Steindcner, 1882) originates in the Eastern Atlantic and the Western Mediterranean (Sbaihi and Saad 1992; Fricke et al. 2014). The genus *Pagellus* is represented in Syrian marine waters

by three congeneric species: *Pagellus acarne* (Risso, 1826), *P. erythrinus* (Linneans, 1758) and *P. bellottii* (Steindcner, 1882) (Saad 2005; Ali 2018).

The Blackspot seabream *P. bogaraveo* (Brünnich, 1768), Sparidae, is a demersal fish, inhabiting the Eastern Atlantic Ocean, extending in the East Atlantic from Mauritania to Norway. It is found in regions of Mauritania (Cape Blanco), Morocco, Madeira, Canary and Azores Islands, Gibraltar strait and northward up to North Atlantic. It is common in the Western Mediterranean; becomes rare east of Sicily, the southern Adriatic, Aegean Sea, Sea of Marmara, and is absent from the Black Sea (Krug 1990; Bauchot and Hureau 1986; Spedicato et al. 2002; Mytilineou et al. 2005; Chilari et al. 2006; Wirtz et al. 2008; Herrera 2012). It has recently been recorded in the south-eastern Mediterranean Sea, Port Said, Egypt (Stamouli et al. 2017). The larvae are planktonic and juveniles occur in coastal waters. The adults can be found above rocky, sandy and muddy bottoms from inshore water, down to 400 m in deep water in the Mediterranean and 700 m in the Atlantic (Bauchot and Hureau 1986). Adult individuals are found on offshore seamounts in Azorean waters (Pinho et al. 2014).

The species has not been reported before in the Levantine Basin (Saad 2005; Keskin et al. 2011; Carpenter and Russell 2014). We present here the first confirmed occurrence of *P. bogaraveo* from Syrian waters, and also from the wider Levantine Basin. The main meristic parameters of the seven individuals observed are provided.”

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Material and methods

One specimen of *P. bogaraveo* was caught on 25 February 2019, with a surface seawater temperature of 17 °C and salinity 39.15 ‰, fish were caught during commercial fishing operation, at a depth of 150–300 m, over sandy-rocky bottom, off the shore of Raas Al Bassit, a locality 60 km north of Lattakia (35° 50' N, 35° 50' E). Six other specimens were caught on 7 April 2019, with seawater T° = 19 °C and S = 39.20‰ at 4 km north of Jablah City (35° 21' N, 35° 48' E), using gill net, at a depth of approximately 120 m, on sandy-rocky bottom (Fig. 1).

According to the data given in Table 1, the seven specimens were measured to the nearest (mm), weighted to the nearest (gram) and morphometric measurements with percentages of standard length (SL). All analyzed specimens were preserved in 10% buffered formalin and deposited in the Collection of the laboratory (Figs. 2 and 3).

Result

P. bogaraveo specimens (Figs. 2 and 3) have a total length (TL) between 110 mm and 194 mm, with total weight (TW) between 18.95 g and 74.61 g. Morphometric and meristic data of the seven specimens are summarized

in (Table 1). The specimens of this species present the following characteristics: body oblong, upper profile of head curved, snout short; eye diameter greater than snout length; scales on top of head reaching to a line between posterior margin and middle of eyes; cheeks scaly, preopercular scaleless; mouth low, nearly horizontal; in both jaws, a band of conical and slender teeth in front and at least 2 rows of molars at back; the outer series of conical teeth little enlarged and the inner (second) row of molars the largest (Fig. 4). Dorsal fin with 12 spines and 11 to 12 soft rays; anal fin with 3 spines and 11 or 12 soft rays; last dorsal and anal-fin rays stronger than the preceding ones. The number of scales along lateral line is (72 to 74). The colour is more or less reddish grey, darker on head, lighter on belly; a dark spot at pectoral-fin axils and a large black blotch at origin of lateral line (absent in young); fins more or less bright pink; inside of mouth orange red.

P. bogaraveo has already been mentioned in the Eastern Mediterranean by Carpenter and Russell (2014), but our survey represents the first record in Syrian marine waters. It is probably an immigrant species from Western Mediterranean into Levantine Basin. The observed specimens were found mixing within populations



Fig. 1 Map of the Levantine Basin showing the location of fishing of *P. bogaraveo* on Syrian coast

Table 1 Morphometric measurements in mm and as a percentage of standard length (%SL), and weight in grams recorded in the 7 specimens of *P. bogaraveo* caught off the Syrian coast

Number of specimens	1		2		3		4		5		6		7	
	mm	SL%	mm	SL%	mm	SL%	mm	SL%	mm	SL%	mm	SL%	mm	SL%
Morphometric measurements														
Total length (TL)	194	132%	128	121.90%	119	121.42%	138	123.21%	121	122.23%	117	121.87%	110	125%
Standard length (SL)	150	100%	105	100%	98	100%	112	100%	99	100%	96	100%	88	100%
Body depth (BD)	60	40%	40	38.09%	37	37.75%	42	37.50%	40	40.40%	36	37.50%	34	38.63%
Head length (HL)	47	31.30%	33	31.42%	31	31.63%	36	32.14%	32	32.33%	30	31.25%	29	32.95%
Eye diameter (ED)	21	14%	12	11.42%	11	11.22%	13	11.60%	11	11.11%	11	11.45%	11	12.50%
Preorbital length (Pol)	13	8.67%	10	9.52%	9	9.18%	12	10.71%	9	9.09%	9	9.37%	8	9.09%
Predorsal length (Pdl)	53	35.34%	38	36.19%	33	33.67%	40	35.71%	36	36.36%	36	37.50%	33	37.50%
Dorsal fin Base length (D.B.L)	83	55.34%	55	52.38%	51	52.04%	60	53.57%	51	51.51%	50	52.08%	47	53.40%
Anal fin Base length (A.B.L)	34	22.67%	26	24.76%	22	22.44%	26	23.21%	24	24.24%	24	25%	20	22.72%
Prepectoral length (Ppl)	51	34%	36	34.28%	32	32.65%	38	33.92%	33	33.33%	32	33.33%	29	32.95%
Preanal length (Pal)	101	67.34%	65	61.90%	61	62.24%	70	62.50%	62	62.62%	61	63.54%	57	64.77%
Counts														
Scales on lateral line	72		72		72		72		74		72		72	
Dorsal fin rays	XII + 11		XII + 12		XII + 11		XII + 12		XII + 12		XII + 11		XII + 12	
Anal fin rays	III + 11		III + 11		III + 12		III + 12		III + 12		III + 12		III + 12	
Pelvic fin rays	I + 5		I + 5		I + 5		I + 5		I + 5		I + 5		I + 5	
Total weight (g)	74.61		32.17		25.62		39.37		27.65		24.64		18.95	

of two other sparids *Pagellus acarne* and *Dentex macrophthalmus* at the depths between (100–300 m). So that it is evidence that the species has started to establish population in Syrian marine waters.

Discussion

All measurements, counts, and colour patterns determined the morphological analyses in previous other records of this species in north-eastern Atlantic, the Mediterranean (Whitehead et al. 1986), the Central Eastern Atlantic

(Carpenter and De Angelis 2016) and the south-eastern Mediterranean (Stamouli et al. 2017).

P. bogaraveo is widely distributed in the Eastern Atlantic and is known from southern Norway and around the British Isles down to the Western Sahara, including the archipelagos of Madeira (Wirtz et al. 2008), Azores and the Canary Islands (Pinho et al. 2014). It is common in the western Mediterranean, becomes rare east of Sicily (Carpenter and Russell 2014), except for parts of the Adriatic (D'Onghia et al. 2014), the Aegean



Fig. 2 The first specimen of *P. bogaraveo* from Lattakia coast



Fig. 3 The 6 other specimens of *P. bogaraveo* from Jablah coast

and the Sea of Marmara (Akyol and Ertosluk 2010; Keskin et al. 2011; Bilecenoğlu et al. 2014). It is absent from the eastern to southeastern Mediterranean Sea and the Black Sea (Bauchot and Hureau 1986; Carpenter and Russell 2014).

This species may have been presented in Syrian marine waters as a companion of *P. bellottii* but it has not been confirmed by researchers (Sbaihi and Saad 1992; Saad and Sbaihi 1995; Saad 2005; Ali 2018).

There may have been misidentification issues with *P. bogaraveo* which complicates assessing its spread in the Mediterranean Sea (Table 2). It is difficult to distinguish *Pagellus bellottii* from *Pagellus erythrinus*. They can be confused in terms of general appearance, but they differ from each other by their length of anal-fin base and soft anal-fin rays: whereas the length of anal-fin base shorter than distance from snout tip to posterior margin of eye and (8–9) soft anal-fin rays in *P. erythrinus* (Whitehead et al. 1986; Carpenter and De Angelis 2016; Jawad et al.

2017), while the length of anal-fin base greater than distance from snout tip to posterior margin of eye and (10) soft anal-fin rays in *P. bellottii* (Whitehead et al. 1986; Carpenter and De Angelis 2016; Samuel and Pascal 2016).

On the other hand, *P. bogaraveo* is similar to *Pagellus acarne* regarding the scalation on top of head ending behind a transverse line through middle of eyes, and the colour inside of mouth orange-red. However, *P. bogaraveo* has (11 or 12) anal-fin rays, eye diameter greater than length of snout and a dark blotch at origin of lateral line (Stamouli et al. 2017); whereas *P. acarne* has (9 or 10) anal-fin rays; eye diameter smaller than, or equal to length of snout and a very dark red blotch at upper level of pectoral fin insertion (Whitehead et al. 1986; Carpenter and De Angelis 2016).

There is a great similarity in the formalities between the *Pagellus bellottii* and *Pagrus pagrus*, but it can be easily distinguished by an examination of the anterior teeth in each jaw, there are 4 upper and 6 lower stronger

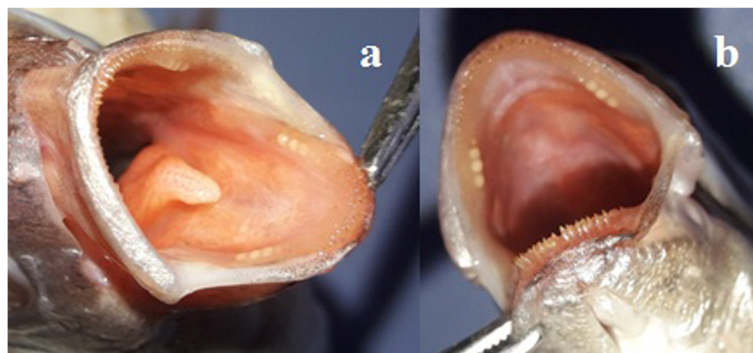


Fig. 4 Teeth of *P. bogaraveo* Specimen from Lattakia coast. **a** lower jaw; **b** upper jaw

Table 2 Comparison of eastern Atlantic and Mediterranean species of *Pagellus* species and *Pagrus pagrus*. According to (Whitehead et al. 1986; Carpenter and De Angelis 2016)

Description	<i>Pagellus bogaraveo</i>	<i>Pagellus erythrinus</i>	<i>Pagellus acarne</i>	<i>Pagellus billattii</i>	<i>Pagrus pagrus</i>
Body	Oblong	Oval and compressed	fusiform	Oblong and compressed	Oval moderately deep.
upper profile of head	curved	straight	depressed above eyes	–	–
Head profile	rounded, snout short;	straight	depressed above eye, snout conical; interorbital space flat	slightly, but regularly convex, becoming steeper from the nape downward in adults,	convex, slightly steeper in front of eye
Eye diameter	greater than snout length	smaller than snout length	smaller than snout length	–	–
Scalation on top of head ending	behind a transverse line through middle of eyes	in front of a transverse line through middle of eye	behind a transverse line through middle of eyes	in front of a transverse line through middle of eye	–
Scale on cheeks	cheeks scaly	cheeks scaly	cheeks scaly	cheeks scaly	6 or 7 rows of scales on cheeks
mouth	mouth low, nearly horizontal	mouth low, slightly oblique; lips thick	mouth low, nearly horizontal; lips thick	mouth low, small, slightly oblique	–
Lateral teeth	molariform	molars in 2 or 3 rows in upper and 2 rows in lower jaw;	molariform	molars arranged in 2 rows	Molariform
Anterior teeth in each jaw	pointed teeth; followed by numerous slightly smaller, cardiform teeth	pointed teeth; followed by numerous slightly smaller, cardiform teeth	pointed teeth; followed by numerous slightly smaller, cardiform teeth	pointed teeth; followed by numerous slightly smaller, cardiform teeth	In front of jaws 4 upper and 6 lower stronger canines-like teeth; at back, smaller and obtuse canines
Gillrakers	18–19 lower, 11–13 upper.	8–10 lower, 5–6 upper.	13–16 lower, 9–12 upper.	9–10 lower, 5–6 upper.	8–10 lower, 6–8 upper.
Dorsal fin rays	XII, XIII + 11–13	XII + 10–11	XII, XIII + 12–13	XII + 11–12	XII + 9–10
Anal fin rays	III + 11, 12	III + 8, 9	III + 9, 10	III + 10	III + 8, 9
lateral line Scales	68–74	55–65	65–72	54–60	52–60
Colour of body	a more or less reddish grey,	a moderately bright pink marked with small blue spots on sides	greyish pink, darker on back	more or less bright red with silvery reflections; often blue spots following scale rows on sides	: pink with silvery reflections
Colour of head	darker on head	head darker, especially between eyes and on snout profile	head darker, particularly between eyes	–	head dark from nape to angle of mouth
Colour of belly	lighter on belly;	–	lighter on belly	–	lighter on belly
interior of mouth	orange red	whitish or greyish	orange-red	whitish or greyish	–
Characteristic colour	a large black blotch at origin of lateral line	posterior dorsal margin of opercle crimson red; a reddish spot on bases of pectoral fins;	a reddish black spot at pectoral fin axis	dark red spot at origin of lateral line and along upper margin of opercle;	caudal fin dark pink, with both tips white

canines-like teeth; at back, smaller and obtuse canines in *Pagrus pagrus* (Whitehead et al. 1986; Carpenter and De Angelis 2016), and there are pointed teeth; followed by numerous slightly smaller, cardiform teeth in *Pagellus bellottii* (Whitehead et al. 1986; Carpenter and De Angelis 2016; Samuel and Pascal 2016).

P. bogaraveo is a demersal species that occurs mostly on the continental shelf slope, on rocky, sandy and muddy bottoms (Afonso et al. 2012) and around islands, at depths of up to 800 m in the Adriatic (Spedicato et al. 2002). It has been observed at a depth of 787 m at Bari Canyon (Southern Adriatic Sea) in groups of up to 40 individuals D'Onghia et al. 2014). The young individuals are found near to the shore, whereas the adults on the continental slope, especially over muddy bottoms. In the eastern Ionian Sea, the species inhabits the shallow waters of the shelf (170 m depth) as juveniles of 180 mm LT, moving to deeper waters of the slope (mainly 400–500 m depth) as adults (Mytilineou et al. 2013).

Conclusion

Seven specimens of *P. bogaraveo* were captured from Syrian coastal waters, mixed with populations of *Pagellus acarne* and *Dentex macrophthalmus*. Previously this species is reported as a native in Atlantic, western and north-eastern Mediterranean. The record in Syrian waters represents the first report of this species in the Levantine Basin. We suppose that is an immigrant from western Mediterranean, the number of specimens is evidence that the species has started to establish a population in Syrian marine waters and extending probably to the entire east Levantine Basin.

Abbreviations

E: East; N: North; S: Salinity; SL: Standard length; T: Temperature; TL: Total length

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Authors' contributions

MM, AS and WS examined specimens and drafted the manuscript. All authors gave the final approval for publication.

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Ethics approval and consent to participate

No ethical approval or consent to participate was required.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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