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First record of *Leucoraja circularis* (Chondrichthyes: Rajidae) in the Syrian marine waters (Eastern Mediterranean)

Hasan Alkusairy* and Adib Saad

Abstract

Sandy Skate, *Leucoraja circularis* (Couch, 1838), is recorded for first time from the Syrian marine waters. Two specimens of *L. circularis* were caught by bottom trawl at depth about 120 m on 20 February 2017, the first specimen was an immature female and the second an immature male; they measured 580 mm and 628 mm total length, and weighed 880 g and 1240 g, respectively. This capture represents the first documented record of the species in the Syrian marine waters (Eastern Mediterranean) so further investigations should be made to detect new species along the Syrian coast.

Keywords: Sandy skate, First record, Morphometric, Syrian coast

Background

Sandy Skate, *Leucoraja circularis*, is a relatively large species found in the north-east Atlantic and Mediterranean Sea (McCully et al. 2015). This species is only reported in the western Mediterranean Basin (Stehmann and Burkel 1984; Quignard and Tomasini 2000; Psomadakis et al. 2012). The occurrence of *L. circularis* have been reported from southern coast of France in the Gulf of Lion (Quignard 1965), the Ionian Sea (Sion et al. 2003), Strait of Sicily (Ragonese et al. 2003), Italian Seas (Consalvo et al. 2009), the northern coast of Tunisia (Mnasri et al. 2009), Sardinian Sea (Follesa et al. 2003), south-western Adriatic Sea (Ungaro et al. 1996), the Tyrrhenian Sea (Serena et al. 2003) and the Aegean sea (Damalas and Vassilopoulou 2009; Bilecenoğlu et al. 2014).

Off the Syrian coasts, five species of rajidae family were recorded; *Dipturus oxyrinchus, Raja clavata, Raja miraletus* and *Raja radula* (Saad et al. 2006; Ali and Saad 2010). The species being not reported before in the Levant Basin (Golani 2005; Saad et al. 2006; Ali and Saad 2010). This paper is reporting first occurrence of *Leucoraja circularis* from Syrian marine waters also from Levant Basin, and providing the principal biometric and meristic characters of this species.

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Methods

On 20 February 2017, two specimen of *Leucoraja circularis* were captured by a bottom trawler about 10 km south-west off the Lattakia coast (Levant Basin of Mediterranean), 35°34′ N 35°37′ E (Fig. 1), at a depth of 100 m. Identification was made from Fischer et al. (1987). Morphomertic data was recorded according Clark (1926), Stehmann and Burkel (1984), McEachran and Fechhelm (1982), Consalvo et al. (2009) and Mnasri et al. (2009), and meristic data was recorded following Stehmann and Burkel (1984) and Consalvo et al. (2009). Additionally, Aloncle (1966) suggested the use of the external distribution of the mucous pores (ampullae of Lorenzini) in ventral surface, for taxonomy of rajid species. Sexual maturity was defined in accordance with maturity scale for oviparous species given by (Anonymous 2010).

Results

The female and male of *Licuraja circularis* (Fig. 2) measuring 580 mm and 628 mm total length (TL) and weighing 880 g and 1240 g total weight (TW), respectively. Morphometric and meristic data of the two specimens are summarized in Table 1. The identification of the specimens as Lecoraja genus: Snout short, anterior disc margins somewhat convex, slightly concave; a theoretical line from snout tip to pectoral wing tip cutting front margin of disc; thorns present on disc. The characters of

Table 1 Morphometric and meristic characteristics of two specimens of *Leucoraja circularis* (female and male) from the coast of Syria, and compared with similar data previously recorded in specimen caught off the central Tyrrhenian Sea. Measurements are given as (mm) and as percentage value of TL (%)

Authors	This study				Consalvo et al. (2009)	
Specimens	Female		Male		Male	
Year of capture	2017		2017		2005	
Total mass in gram	880		1240		1329	
Morphometric measurements	mm	%TL	mm	%TL	mm	%TL
Total length	580	100.0	628	100.0	663	100.0
Disc length	288	49.7	332	52.9	325	49.0
Disc width	364	62.8	403	64.2	400	60.0
Disc depth	24	4.1	27	4.3	–	–
Eye ball length	15	2.6	18	2.9	20	3.0
Pre-orbital length	61	10.5	65	10.4	70	10.5
Inter-orbital width	23	4.0	24	3.8	25	3.8
Spiracle length	14	2.4	16	2.5	12	1.8
Inter-nasal width	39	6.7	42	6.7	–	–
Inter-spiracular width	37	6.4	40	6.4	42	6.3
Pre-oral length	67	11.6	70	11.1	75	11.3
Mouth width	45	7.8	50	8.0	50	7.5
Width between first gill slit	87	15.0	92	14.6	–	–
Width between fifth gill slit	55	9.5	63	10.0	–	–
Snout tip to first gill slit	111	19.1	120	19.1	–	–
Pectoral fin anterior margin	235	40.5	275	43.8	–	–
Pectoral fin posterior margin	162	27.9	170	27.1	–	–
Pectoral fin inner margin	59	10.2	62	9.9	–	–
Pelvic fin anterior margin	65	17.9	69	17.1	–	–
Pelvic fin posterior margin	84	14.5	87	13.9	–	–
Pelvic fin inner margin	47	8.1	55	8.8	–	–
Tail base fin	40	6.9	46	7.3	–	–
Snout tip to nasal curtain	55	9.7	57	9.2	57	8.6
Snout tip to first dorsal fin	507	87.4	537	85.5	576	86.9
Snout tip to second dorsal fin	546	94.1	577	91.9	–	–
Distance-snout tip to cloaca	260	44.8	283	45.1	290	43.7
Distance-cloaca to end of tail	320	55.2	345	54.9	–	–
Clasper length	–	–	37	5.9	102	15.4
Teeth in rows upper jaw	39		39		39	
Teeth in rows lower jaw	34		34		33	
Nictitating lamellae	15		15		7	
Median row thorns	26		28		26	
Alar thorns	11		11		11	
Orbital ring (thorns)	7		7		5	
Truncal vertebrae	32		32		–	
Pectoral fin rays	90		90		–	
Pseudo-branchial	16		16		–	
Nictitating lamellae	15		15		–	

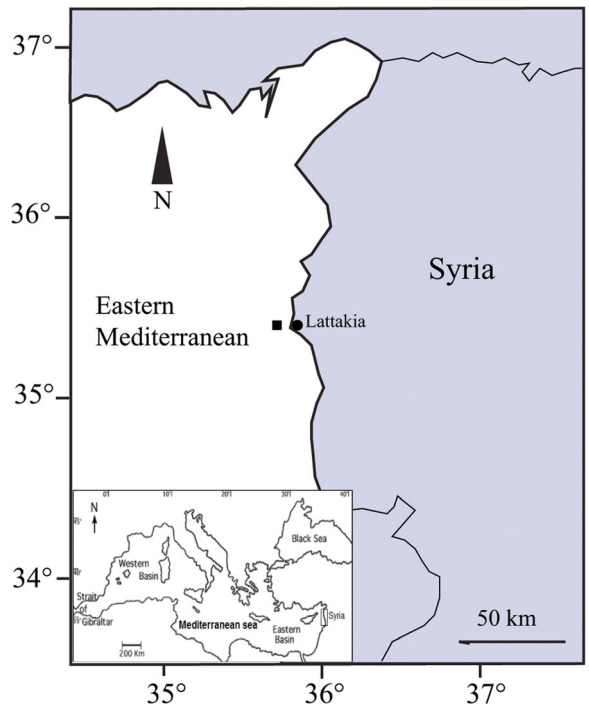

Fig. 1 Map of the Mediterranean and Syrian coast (Eastern Mediterranean) pointing out the specimens collecting locality of *Leucoraja circularis* (black square) and Lattakia city (black circle)

the two specimens *Leucoraja circularis* were as following: disc subrhombic with broadly rounded outer corners, undulated anterior margins, short, bluntly angled snout (> 110°), tip of which a pronounced. Tail solid, a little longer than body, gradually tapering to its tip, with two small, close-set dorsal fins at rear. Typically, a complete row of seven distinct thorns on each orbital rim and a large triangle of many thorns over nape shoulder region; a median row of thorns from behind shoulder girdle to first dorsal fin. Upper surface of both female and male entirely spinoluse with seven thorns in a complete row around inner margin of eye. Prickles along anterior margin of disc thorns on nape. Four parallel rows of prominent thorns along of tail (in front first dorsal fin). Colour of upper side, red-brown with four white spots on the dorsal disc, more clearly on the male. Ventral surface entirely smooth. Colour of underside, white.

Aloncle's line showed that the wing is rather narrow and sharped in its distal end, the curve is strongly rounded and the point is a bit larger than the wing (Fig. 3).

The two specimens were classified as an immature; in male, claspers flexible and shorter than pelvic fins, testes small, and sperm ducts straight and thin; in female, ovaries small, ovarian follicles absent, and oviducal gland barely visible.

Discussion

Leucoraja circularis has no occurrence off the eastern Basin (Mnasri et al. 2009). This is the first documented record of *L. circularis* in Eastern Mediterranean. Consalvo et al. (2009) reported the first record of a male of *L. circularis* was captured from Tyrrhenian Sea in 2005 (Table 1), The morphometric and meristic (teeth in rows upper jaw, teeth in rows lower jaw, nictitating lamellae, median row thorns, alar thorns and orbital ring) characters have been shown to be pretty close to those results of Consalvo et al. (2009). Mnasri et al. (2009) suggested that females and males of *L. circularis* from

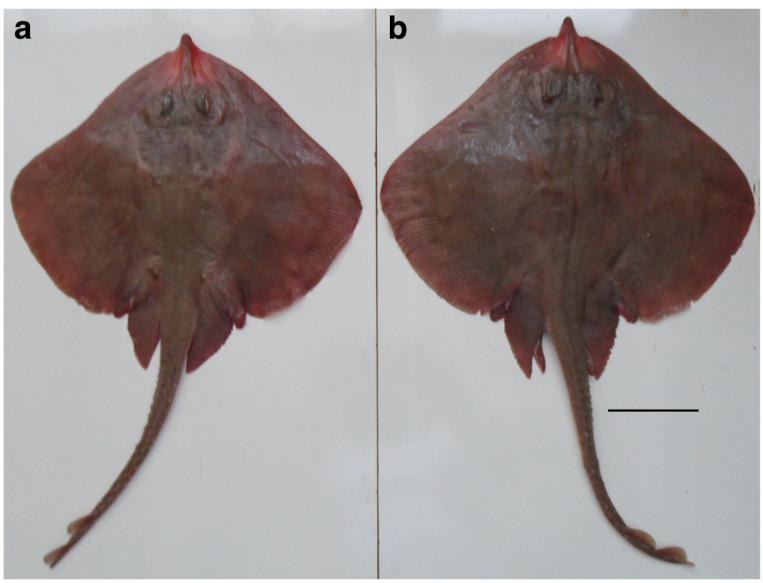

Fig. 2 The two specimens of *Leucoraja circularis* caught off the coast of the Syrian marine waters, **a**: female; **b**: male, scale bar = 100 mm

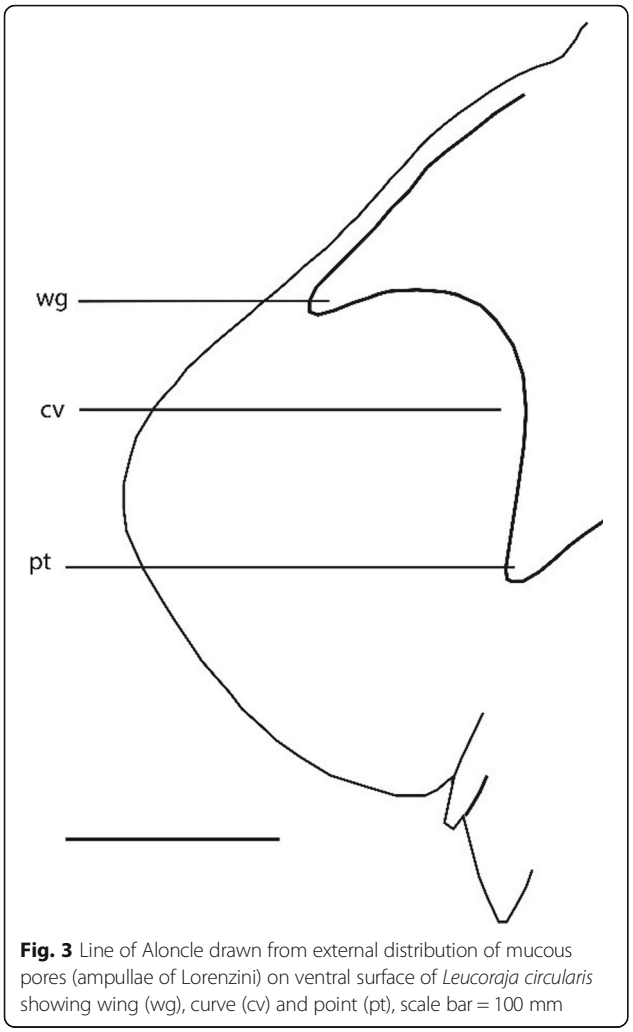

Fig. 3 Line of Aloncle drawn from external distribution of mucous pores (ampullae of Lorenzini) on ventral surface of *Leucoraja circularis* showing wing (wg), curve (cv) and point (pt), scale bar = 100 mm

the northern coast of Tunisia became adult at above 420 mm and 400 mm DW, respectively. In this paper, the male (TL = 628 mm, DW = 403 mm) and the female (TL = 880 mm, DW = 364 mm) were immature, this is compatible with result of Mnasri et al. (2009). All patterns of Aloncle's line in agreement with Mnasri et al. (2009).

The occurrence of *Leucoraja circularis* in the Mediterranean Sea has decreased significantly over the last 60 years (McCully et al. 2015). Moreover, it disappeared from some areas. The distribution of *L. circularis* records in the Mediterranean are presented in Fig. 4, To date the species is rather known in the Italian Seas (Consalvo et al. 2009; Psomadakis et al. 2012), although it seems to be more abundant in the Ionian Sea (Bertrand 2000). Additionally, in the Aegean Sea; Damalas and Vassilopoulou (2009) recorded 65 specimens of *L. circularis* in the bottom trawl fishery of the central Aegean Sea during 1995–2006, and Yığın et al. (2015) listed *L. circularis* in the diversity table of sharks and batoids in the Aegean Sea. This record is giving *Leucoraja circularis* distribution an extended range in the Mediterranean toward Levant Basin.

Conclusions

The number of the recorded cartilaginous species in the Syrian coast is still limited comparing to other regions of the Eastern Mediterranean Basin; this indicates that the cartilaginous species which could be present in the Syrian marine waters have not been reported yet. The occurrence of the two immature specimens of *L. circularis* off the Syrian coast could suggest that a probable *L. circularis* population is established in the area. However, such a hypothesis needs further confirmation.

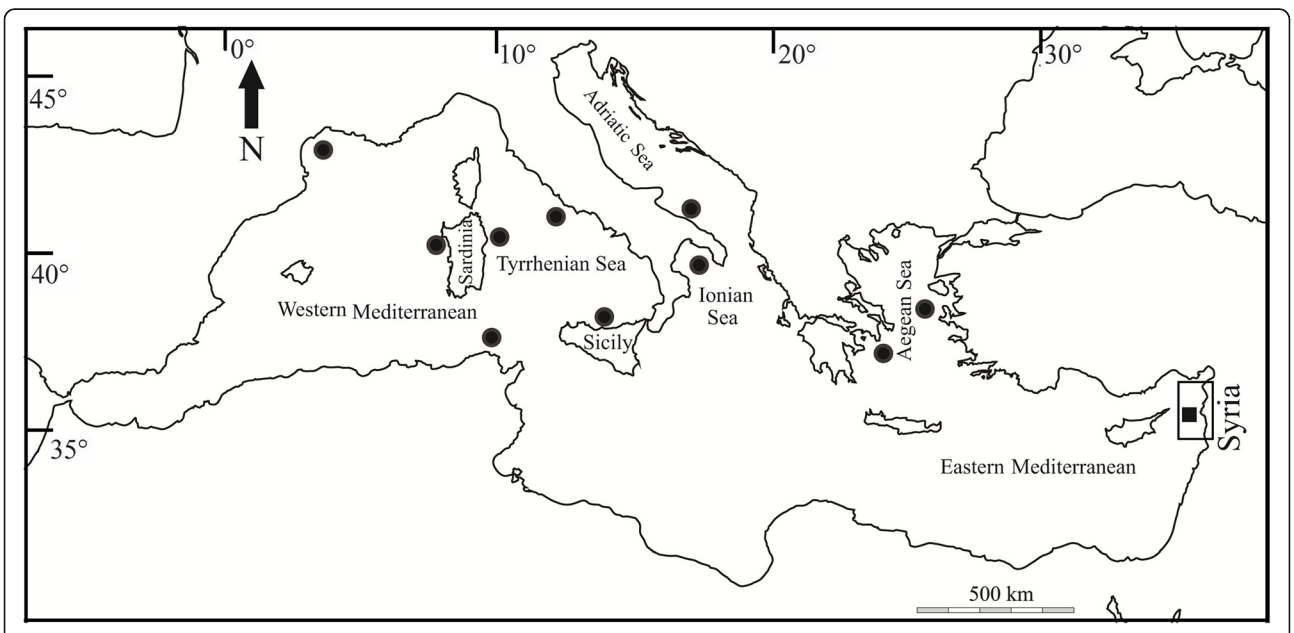

Fig. 4 The distribution of *L. circularis* records in the Mediterranean, previous records: black circles, current record: black square

Abbreviations
DW: Disc width; E: East; N: North; TL: Total length

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Availability of data and materials
The specimens are available at Marine Science Laboratory- Tishreen university- Lattakia- Syria.

Authors' contributions
HA and AS examined specimens, and drafted the manuscript. Both authors gave the final approval for publication.

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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