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ADDITIONAL RECORDS OF SPINETAIL DEVILRAY *MOBULA JAPANICA* (CHONDRICHTHYES: MOBULIDAE) FROM THE TUNISIAN COAST (CENTRAL MEDITERRANEAN)

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ABSTRACT

*The authors report on the capture of two specimens of spinetail devilray *Mobula japanica* (Müller & Henle, 1841) off the northeastern Tunisian coast: two females measuring 190 cm and 270 cm in disc width and weighing 90 kg and 110 kg, respectively. The captures, considered as Herculean immigrants from the eastern tropical Atlantic, confirm the occurrence of the species in the mentioned area. The article discusses and comments on the establishment of a sustainable population in the area and further in the Mediterranean Sea.*

Key words: Mobulidae, *Mobula japanica*, Mediterranean Sea, Tunisian waters, abnormality

NUOVE SEGNALAZIONI DELLA PRESENZA DEL DIAVOLO DI MARE *MOBULA JAPANICA* (CHONDRICHTHYES: MOBULIDAE) LUNGO LA COSTA TUNISINA (MEDITERRANEO CENTRALE)

SINTESI

*Nella presente nota gli autori segnalano la cattura di due esemplari di una delle specie di diavoli di mare, *Mobula japanica* (Müller & Henle, 1841), al largo della costa tunisina nord-orientale. Si tratta di due femmine, la prima con 190 cm di larghezza del disco e 90 kg di peso, la seconda con 270 cm di larghezza e 110 kg di peso. Tali catture confermano la presenza nell'area studiata di questa specie, che arriva dall'Atlantico orientale tropicale ed entra nel Mediterraneo dallo stretto di Gibilterra (considerata pertanto fra i migrati di Ercole). Gli autori discutono e commentano la possibilità di stabilizzazione di una popolazione sostenibile nell'area e nella più ampia regione mediterranea.*

Parole chiave: Mobulidae, *Mobula japanica*, mare Mediterraneo, acque tunisine, anomalia

INTRODUCTION

Spinetail devilray *Mobula japonica* (Müller & Henle, 1841) is widely distributed in tropical to warm temperate waters of the Atlantic, Pacific and Indian Oceans (Townsend & Kyne, 2010; Bustamante *et al.*, 2012). Off the eastern Atlantic coasts, *M. japonica* was reported as *M. rancureli* Cadenat, 1959 from the Ivory Coast (Cadenat, 1959) and the Gulf of Guinea (Blache *et al.*, 1970). *M. rancureli* was afterwards considered as a junior synonym of *M. japonica*, which hence occurs off the western coast of Africa (Louisy, 2002). Additionally, investigations regularly conducted off the Tunisian coasts allowed Capapé *et al.* (2015a) to report the captures of 11 specimens of *M. japonica* from northern areas, which constitute the first Mediterranean records of the species.

Our actions to assess the status of *M. japonica* in Tunisian waters were supported by local fishermen, who

contributed by reporting sightings and captures of specimens. Within this cooperation, we were informed that two specimens had been caught by fishermen off the northern Tunisian coast. The aim of this paper is to describe these captures with respect to the possible establishment of this species in the mentioned area, as well as in other regions of the Mediterranean Sea.

MATERIAL AND METHODS

Two specimens of *Mobula japonica* were captured on 14th and 15th May 2015 at night, during commercial light-fishing targeting European pilchard *Sardina pilchardus* (Walbaum, 1792) and mackerel *Scomber* spp., at an approximate depth of 120–130 m, by means of gill-nets (mesh opening 18 mm), off the north-eastern coast of Tunisia (37° 36' N, 8° 54' E; Fig. 1). The fishing was carried out in that zone based on information provided by experienced fishermen. Both specimens were carefully examined, photographed, weighed to the nearest kilogram and measured to the nearest centimetre, following Capapé *et al.* (2015a); the results are summarised in Table 1.

As the two specimens were dressed out, cut into pieces by retailers and sold rapidly, only their heads were recovered and delivered to the laboratory for further examinations. The heads were preserved in 10 % buffered formalin and deposited in the Ichthyological Collection of the Faculté des Sciences de Bizerte, under catalogue numbers: FSB-Mob-jap-06 and FSB-Mob-jap-07.

RESULTS AND DISCUSSION

The Tunisian *Mobula japonica* specimens were females measuring 190 cm and 270 cm in disc width (DW), respectively, and weighing 90 kg and 110 kg in total body mass, respectively (Tab. 1).

They were identified by the following combinations of characteristics (Fig. 2): disc broad, anterior margins of the pectoral slightly convex, posterior margins concave, angles acute and rounded at the apex; head very short, rostral margin rather straight; elliptical spiracles located above the level of pectoral fins, oval-based stinging spine at the base of the tail; origin of the dorsal fin a little in advance of the beginning of pelvic fins, gill-filter plates not fused with 18–28 lateral lobes, terminal lobe leaf-shaped with longitudinal ridges, mouth on undersurface of head, teeth minute and not arranged in rows, but spaced from each other, tooth height larger than crown width, dorsal surface dark blue with occasional lighter shoulder patches, characteristic white tip on dorsal fin (Fig. 3), belly whitish with dark patches, no dark margin anteriorly. The anterior margin of the smaller specimen (FSB-Mob-jap-06) was not straight due to an evident unusual wide indentation on the left side (Fig. 4). This morphological abnormality may either be a teratology or denote a wound despite the fact that

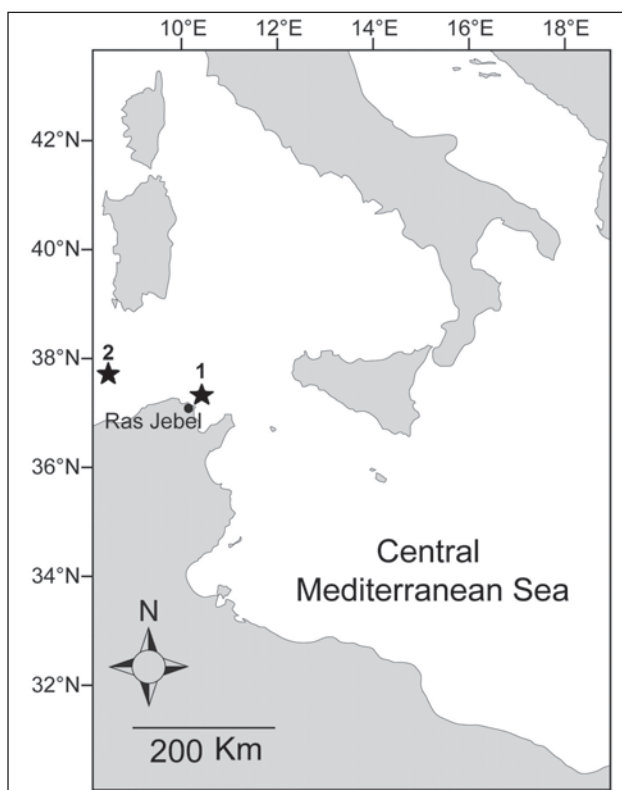


Fig. 1: Map of Central Mediterranean showing the capture sites of the Tunisian specimens of *Mobula japonica* off the Tunisian coast. Legend: black star 1 records published in Capapé *et al.* (2015a); black star 2 records from this study.

Sl. 1: Zemljevid osrednjega Sredozemskega morja z lokalitetami, kjer so bili ujeti primerki vrste *Mobula japonica* ob tunizijski obali. Legenda: zvezdica s št. 1 – podatki, objavljeni v prispevku Capapé *et al.* (2015a); zvezdica s št. 2 – podatki iz pričujoče raziskave.

Tab. 1: Morphometric measurements expressed in centimetres and percentages of disc width (% DW) related to the Tunisian specimens of *Mobula japanica* (FSB-Mob-jap-06 and FSB-Mob-jap-07).**Tab. 1: Morfometrične meritve dveh tunizijskih primerkov vrste *Mobula japanica* (katalogski oznaki FSB-Mob-jap-06 in FSB-Mob-jap-07), izražene v centimetrih in v deležu širine diska (% DW)**

Reference	FSB-Mob-jap-06		FSB-Mob-jap-07	
Sex	Female		Female	
Measurements	cm	% DW	cm	% DW
Disc length	85	44.7	128	47.4
Disc width (DW)	190	100.0	270	100.0
Cephalic fin length	17	8.9	31	11.5
Diameter of eye ball	2.5	1.3	5	1.9
Cranial width	39	20.5	42	15.6
Preoral length	8.5	4.5	10	3.7
Mouth width	25	13.2	31	11.5
Internarial distance	20	10.5	24	8.9
Cephalic fin width	11	5.8	16	5.9
Space between first gill slit	22	11.6	28	10.4
Space between second gill slit	21	11.1	27	10.0
Space between third gill slit	21	11.1	31	11.5
Space between fourth gill slit	21	11.1	30.5	11.3
Space between fifth gill slit	21.5	11.3	31	11.5
Pre-first gill slit length	32.5	17.1	43.5	16.1
Pre-second gill slit length	37.5	19.7	49.5	18.3
Pre-third gill slit length	43.5	22.9	55.5	20.6
Pre-fourth gill slit length	48	25.3	62.5	23.1
Pre-fifth gill slit length	54	28.4	67.5	25.0
Rostrum to 1st gill openings	19	10.0	27.5	10.2
Rostrum to 5 th gill openings	39	20.5	48	17.8
Distance between cephalic fins tips	26	13.7	33	12.2
Distance between cephalic fins	21	11.1	38	14.1
Distance between eyes	31.5	16.6	48	17.8
Interspiracular width	34	17.9	38	14.1
Dorsal fin base length	9	4.7	11	4.1
Total body mass (kg)	90		110	

no healed scar was visible. Similarly patterned injuries generally occur during competition events with carnivorous species, so the possibility that this might also be the case for the specimen herein described cannot be totally excluded (see Capapé *et al.*, 2015b).

All observations about morphology, colour, morphometric measurements and head proportions are consistent with those provided by Notarbartolo Di Sciara (1987), Townsend & Kyne (2010), Bustamante *et al.* (2012) and Capapé *et al.* (2015a). The overall disc width

of specimens captured in Tunisian waters (see Capapé *et al.*, 2015a) ranged between 190 and 270 cm, so according to White *et al.* (2006), who noted that *M. japanica* reaches a maximum DW of 310 cm, but usually measures less than 250 cm in DW, the specimens can be considered large. Generally, large elasmobranch species have the ability to perform long migrations (Capapé, 1989), and the present captures of *M. japanica* off the Tunisian coast corroborate the previous opinion expressed by Capapé *et al.* (2015a). It can be deduced that all



Fig. 2: *Mobula japonica*, specimen FSB-Mob-jap-06, showing the white tip of dorsal fin (scale bar = 20 cm).
Sl. 2: *Mobula japonica*, primerek v zbirki z oznako FSB-Mob-jap-06, z belo obrobljeno konico hrbtne plavuti (merilo = 20 cm)

M. japonica specimens caught in Tunisian waters had come from the eastern tropical Atlantic and entered the Mediterranean Sea through the Strait of Gibraltar, which constitutes a Herculean migration (*sensu* Quignard & Tomasini, 2000).

Is this species at present definitively established in the Mediterranean Sea? Could it be that several previous records of the closely related *M. mobular* were indeed of *M. japonica*, which fact, if adequately supported, corroborates the above reported hypothesis? Despite the fact that all females caught in the area were probably adults (the size at sexual maturity is about 207 cm DW in the Gulf of California according to White *et al.*, 2006), such hypothesis cannot be totally ruled out. However, further

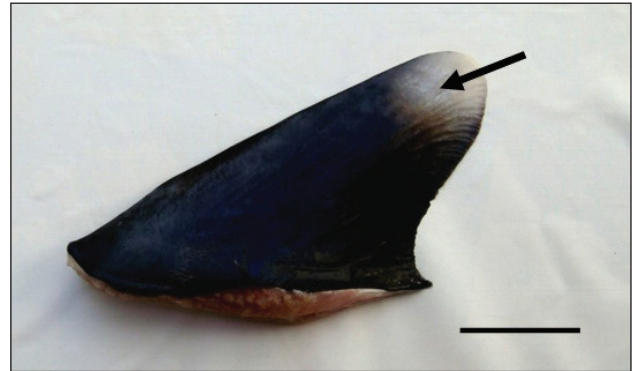


Fig. 3: Dorsal fin showing white tip in *Mobula japonica*, specimen FSB-Mob-jap-07, with scale bar = 3 cm.
Sl. 3: Belo obrobljena konica hrbtne plavuti pri primerku vrste *Mobula japonica* s kataloško oznako FSB-Mob-jap-07 (merilo = 3 cm)

records are needed to confirm the successful establishment of a population of *M. japonica* in the western Mediterranean Sea. Unfortunately, as is the case of other elasmobranch species, *M. japonica* is highly vulnerable due to its *k*-selected characteristics, and therefore it is at present considered as a threatened species (White *et al.*, 2006). The recent increase of spinetail devilray catches in Tunisian waters requires urgent local conservation measures and fishing management to avoid a possible extinction of this species in the area.

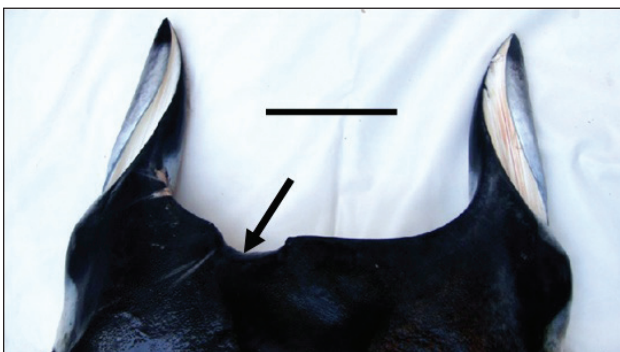


Fig. 4: The anterior margin of *Mobula japonica*, specimen FSB-Mob-jap-06 showing the broad indentation (black arrow), with scale bar = 10 cm.
Sl. 4: Sprednji rob primerka vrste *Mobula japonica* s kataloško oznako FSB-Mob-jap-06 s široko zajedo (črna puščica) (merilo = 10 cm)

NOV ZAPIS O POJAVLJANJU MANTE VRSTE *MOBULA JAPANICA* (CHONDRICHTHYES: MOBULIDAE) VZDOLŽ TUNIZIJSKE OBALE (OSREDNJE SREDOZEMLJE)

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POVZETEK

V pričujočem zapisu avtorji poročajo o ulovu dveh primerkov mante vrste *Mobula japanica* (Müller & Henle, 1841) ob severovzhodni tunizijski obali. Obe sta bili samici, pri čemer je prva merila 190 cm v premeru diska in tehtala 90 kg, druga pa 270 cm in 110 kg. Ta ulov, pri katerem gre za priselitev Herkulovih selivk iz vzhodnega tropskega Atlantika, potrjuje pojavljanje vrste v obravnavanem območju. Avtorji nadalje razpravljajo o morebitni ustalitvi populacije te vrste na obravnavnem območju in širšem Sredozemlju.

Ključne besede: Mobulidae, *Mobula japanica*, Sredozemsko morje, tunizijske vode, anomalije

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