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ADDITIONAL RECORDS OF THE BULL RAY *PTEROMYLAEUS BOVINUS* (CHONDRICHTHYES: MYLIOBATIDAE), IN THE LAGOON OF BIZERTE (NORTHERN TUNISIA, CENTRAL MEDITERRANEAN)

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ABSTRACT

*The authors report on the capture of two large bull rays *Pteromylaeus bovinus* (Geoffroy Saint-Hilaire, 1817) in the Lagoon of Bizerte, a brackish area located in northeastern Tunisia. The specimens were 1110 mm and 1050 mm in disk width (DW), respectively, and weighed 16,200 g and 14,800 g, respectively. They are the largest bull rays recorded in Tunisian waters, a perimediterranean lagoon, and probably in central and southern Mediterranean. These captures are commented and discussed.*

Key words: Chondrichthyes, Myliobatidae, *Pteromylaeus bovinus*, Lagoon of Bizerte, northern Tunisia, maximum size

SEGNALAZIONI AGGIUNTIVE DI VACCARELLA, *PTEROMYLAEUS BOVINUS* (CHONDRICHTHYES: MYLIOBATIDAE), NELLA LAGUNA DI BIZERTE (TUNISIA SETTENTRIONALE, MEDITERRANEO CENTRALE)

SINTESI

*Gli autori segnalano la cattura di due individui di grossa taglia di vaccarella, *Pteromylaeus bovinus* (Geoffroy Saint-Hilaire, 1817), nella Laguna di Bizerte, area salmastra della Tunisia settentrionale. Gli individui presentavano una larghezza del disco (DW) pari a 1110 mm e 1050 mm, e pesavano 16.200 g e 14.800 g, rispettivamente. Si tratta dei due esemplari di vaccarella più grandi mai catturati in acque della Tunisia, in una laguna perimediterranea, e probabilmente nel Mediterraneo centrale e meridionale. Nell'articolo tali catture vengono commentate e discusse.*

Parole chiave: Chondrichthyes, Myliobatidae, *Pteromylaeus bovinus*, Laguna di Bizerte, Tunisia settentrionale, taglia massima

INTRODUCTION

The bull ray, *Pteromylaeus bovinus* (Geoffroy Saint-Hilaire, 1817), is a typical atlanto-mediterranean species, known in the eastern Atlantic from Portugal to South Africa (McEachran & Capapé, 1984) and also off southern Mozambique (Compagno *et al.*, 1989), while in the Mediterranean, *P. bovinus* is more frequently captured in the eastern than in the western basin, more often in southern areas (Capapé, 1989; Zogaris & Dusling, 2010). However, the bull ray was previously reported as a rare elasmobranch species in the Adriatic Sea (Šoljan, 1975; Jardas, 1985), but recent investigations allow the capture of several specimens and provide thorough data on the life history of *P. bovinus* from the area (Dulčić *et al.*, 2008).

Southward, *P. bovinus* was reported throughout the Maghreb shore and especially in Tunisian marine waters (Capapé & Quignard, 1975; Bradaï *et al.* 2004). Investigations conducted in Tunisian waters showed that *P. bovinus* migrated toward northern areas and entered brackish water areas such as the Lagoon of Bizerte (Neifar *et al.*, 1999; El Kamel *et al.*, 2009) and Tunis Southern Lagoon (Mejri *et al.*, 2004). The recent cap-

tures of two specimens in the Lagoon of Bizerte are herein reported and commented.

MATERIAL AND METHODS

Two bull rays were captured by longline on 08 October 2010 at depths between 8 and 12 m, in the north-eastern area of the Lagoon of Bizerte, close to the navigation canal (Fig. 1). The Lagoon of Bizerte is a brackish area located in northeastern Tunisia, between 37°8' N and 37°14' N, and between 9°46' E and 9°56' E. Both specimens were landed at the fishing site of Menzel-Abderrahman by fishermen. Species identification follows Capapé & Quignard (1975) and McEachran & Capapé (1984), while morphometric measurements to the nearest mm and mass to the nearest gram follows Mejri *et al.* (2004). Photographs of both specimens were available.

RESULTS AND DISCUSSION

The two *P. bovinus* captured in the Lagoon of Bizerte were 1110 mm and 1050 mm in disk width (DW), respectively, and weighed 16,200 g and 14,800 g, respectively (Fig. 2). They were adult males having rigid, calcified and large claspers longer than pelvic fins. Morphometric measurements of both specimens are presented in Table 1. The following description is based on both specimens: head large, snout prominent, narrower than the skull, blunted at the tip. Rostral fins at lower level and separate from pectoral fins along the side of the head. Pectoral fins with outer angle acute strongly falciform. Spiracles large, 3 times as long as wide. Tail slender and elongated with dorsal fin beginning in front of tips of pelvic fins. Pre-orbital horns well-developed.

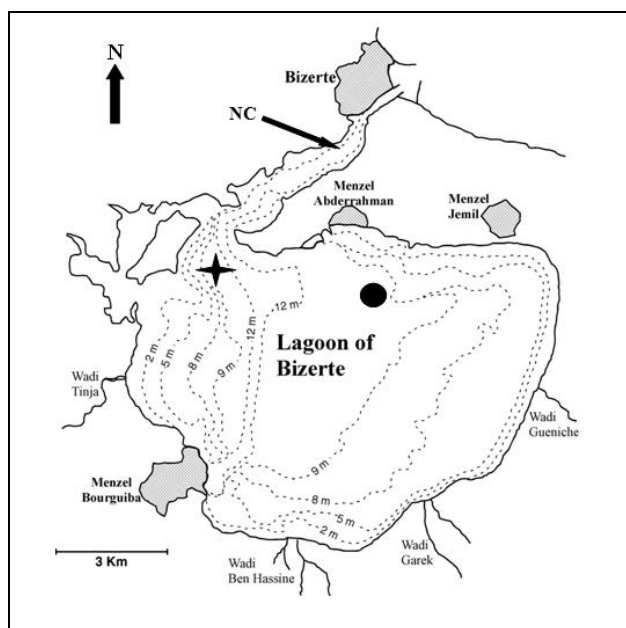


Fig. 1: Map of the Lagoon of Bizerte showing the navigation channel (NC), the capture sites of both adult male *Pteromylaeus bovinus* (black star) and both neonate specimens (black circle; see El Kamel *et al.*, 2009). **Sl. 1:** Zamljevid Lagune Bizerte z označenim navigacijskim kanalom (NC) ter točkama ulova obeh odraslih samcev *Pteromylaeus bovinus* (črna zvezda) in obeh novorojenih primerkov (črna pika; glej El Kamel *et al.*, 2009).



Fig. 2: Both specimens of *P. bovinus* captured in the Lagoon of Bizerte, scale bar = 500 mm.

Sl. 2: Primerka *P. bovinus*, ujeta v Laguni Bizerte, merilo = 500 mm.

Dorsal surface naked with small tubercles down midline of disc. Dorsal plain brown in adults, slightly darker between the eyes, along the center of the body and the length of the tail. Caudal sting beige. Belly off-white to beige.

Morphology, measurements and colour of both specimens are in agreement with Capapé & Quignard (1975), McEachran & Capapé (1984), Seck *et al.* (2002), Dulčić *et al.* (2008) and Lipej *et al.* (2009). Such captures once again confirm the migration towards northern Tunisian areas of a species previously considered to have sub-tropical affinities (Postel, 1956; Bradai *et al.*, 2004). Similar instances have been reported in Tunisian waters, and concern elasmobranch species such as the spiny butterfly ray, *Gymnura altavela* (Linnaeus, 1758) and other teleost species such as the filefish *Stephanolepis diaspros* (Fraser-Brüner, 1940) found in the Lagoon of Bizerte (Bdioui *et al.*, 2004) and off Tabarka, a city located close to the Algerian border (Ben Amor & Capapé, 2008), the blunthead puffer *Sphoeroides pachygaster* (Müller & Troschel, 1848), recorded in northern areas by Chérif *et al.* (2010), and a Lessepsian migrant, the Por's goatfish *Upeneus pori* Ben-Tuvia &

Golani, 1989, also recently recorded in the Lagoon of Bizerte (Azzouz *et al.*, 2010). Such records could be due to the fact that Tunisian marine waters become warmer than waters in other Mediterranean areas (Quignard & Tomasini, 2000). These records agree with Golani's opinion (Golani, 1998), stating that once a lessepsian migrant species or other alien species arrive to the Mediterranean and establish a self-sustaining population, there are no physical barriers preventing its dispersion everywhere.

The capture of two large bull rays inside the Lagoon of Bizerte shows that the navigation channel does not really constitute the main obstacle for the entrance of large species in the area, as it was previously reported by El Kamel *et al.* (2009) who noted that only small-sized elasmobranch species were recorded in this brackish area. The bull rays previously found in the Lagoon of Bizerte were two small specimens, probably neonates according to El Kamel *et al.* (2009). All findings suggest that a sustainable *P. bovinus* population is at present established in the area, probably due to the fact that in the Lagoon of Bizerte the species has found abundance of mussels, oysters and several gastropod

Tab. 1: Morphometric measurements and percents of disk width (% DW) of both specimens captured in the Lagoon of Bizerte.

Tab. 1: Morfometrični podatki in odstotki širine telesne plošče (% DW) obeh primerkov, ujetih v Laguni Bizerte.

Sex	male		male	
Total mass (g)	16200		14800	
Morphometric measurements	mm	% DW	mm	% DW
Total length	1600.0	144.1	-	-
Disk length	740.0	66.7	710.0	67.6
Disk width (DW)	1110.0	100.0	1050.0	100.0
Disk depth	90.0	8.1	90.0	8.6
Snout length	110.0	9.9	80.0	7.6
Snout tip to pectoral	115.0	10.4	115.0	11.0
Anterior interspiracular width	120.0	10.8	120.0	11.4
Inter-nasal width	60.0	5.4	60.0	5.7
Mouth width	80.0	7.2	70.0	6.7
Width between first gill slit	140.0	12.6	140.0	13.3
Width between fifth gill slit	96.0	8.6	90.0	8.6
Snout tip to vent	620.0	55.9	590.0	56.2
Pectoral fin anterior margin	540.0	48.6	510.0	48.6
Pectoral fin posterior margin	470.0	42.3	500.0	47.6
Pectoral fin inner margin	111.0	10.0	90.0	8.6
Pelvic fin anterior margin	130.0	11.7	140.0	13.3
Pelvic fin posterior margin	70.0	6.3	90.0	8.6
Pelvic fin inner margin	60.0	5.4	40.0	3.8
Clasper length	110.0	9.9	110.0	10.5
Dorsal anterior edge	75.0	6.8	75.0	7.1
Dorsal posterior edge	65.0	5.9	50.0	4.8
Dorsal base	85.0	7.7	85.0	8.1

Tab. 2: Size at birth and maximum size (DW, mm) in male *P. bovinus* captured in the Lagoon of Bizerte and records given by authors from different marine areas.**Tab. 2: Velikost ob rojstvu in maksimalna velikost (DW, mm) samcev *P. bovinus*, ujetih v Laguni Bizerte, in podatki avtorjev iz drugih morskih območij.**

Area	Size at birth (DW, mm)	Maximal size (DW, mm)	Authors
Coast of Tunisia	250-290	1040	Capapé & Quignard, 1975
Mediterranean	450	-	McEachran & Capapé, 1986
Coast of Senegal	250-270	1150	Seck <i>et al.</i> , 2002
Tunis Southern Lagoon	310	-	Mejri <i>et al.</i> , 2004
Northern Adriatic	370-450	1135	Dulčić <i>et al.</i> , 2008
Lagoon of Bizerte	426-450	1100	This study

species which constitute the main food of *P. bovinus* (see Capapé, 1976). To date, *P. bovinus* should be considered a marginal species rather than a sedentary one in this restricted area following the definition of Aidan Martin (2005). Additionally, the fishing pressure is rather important in the Lagoon of Bizerte; elasmobranch species such as *P. bovinus* are consumed by local population with low income and are not discarded at sea after capture (El Kamel *et al.*, 2009). *P. bovinus* is vulnerable to fishing pressure because it adheres to K-selected life-histories (*sensu* McAuley *et al.*, 2007) as other elasmobranch species, and their recruitment remains difficult. Additionally, recent investigations showed that *P. bovinus* is not very abundant in the neighbouring shallow coastal waters (Mnasri, 2008).

On the other hand, despite these unfavourable environmental and biological parameters, the observed male

specimens were larger than males previously recorded by Capapé & Quignard (1975). As data in Table 2 show, their maximum size was similar to that of bull rays from Senegal (Seck *et al.*, 2002) and northern Adriatic (Dulčić *et al.*, 2008). Additionally, they were the largest male *P. bovinus* and concomitantly the largest elasmobranch ever recorded in a restricted area, a perimediterranean lagoon (*sensu* Quignard & Zaouali, 1980). Such sizes may be occasional, and could also be the result of the ecological environment of the Lagoon of Bizerte in relation to the food and feeding habits of the species.

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NOVI PODATKI O KLJUNATEM MORSKEM GOLOBU *PTEROMYLAELUS BOVINUS* (CHONDRICHTHYES: MYLIOBATIDAE) IZ LAGUNE BIZERTE (SEVERNA TUNIZIJA, OSREDNJE SREDOZEMLJE)

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POVZETEK

Avtorji prispevka poročajo o ulovu dveh velikih primerkov kljunatih morskih golobov *Pteromylaeus bovinus* (Geoffroy Saint-Hilaire, 1817) v Laguni Bizerte, brakičnem območju v severnovzhodni Tuniziji. Širina telesne plošče

(DW) primerkov je bila 1110 mm in 1050 mm, tehtala pa sta 16.200 g in 14.800 g. Gre za največja primerka kljunatih morskih golobov zabeležena v tunizijskih vodah, perimediteranski laguni in po vsej verjetnosti južnem Sredozemlju.

Ključne besede: Chondrichthyes, Myliobatidae, *Pteromylaeus bovinus*, Laguna Bizerte, severna Tunizija, maksimalna velikost

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