

ADDITIONAL RECORDS OF SANDBAR SHARK, *CARCHARHINUS PLUMBEUS* (CHONDRICHTHYES: CARCHARHINIDAE) FROM THE NORTHERN TUNISIAN COAST (CENTRAL MEDITERRANEAN SEA)

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ABSTRACT

*Recent investigations conducted off Ras Jebel in the northern Tunisian coast have allowed a collection of 9 specimens of sandbar shark *Carcharhinus plumbeus* (Nardo, 1825), 5 males and 4 females. They ranged in size between 890 and 2030 mm and weighed between 3.5 and 38 kg. Such captures confirm the occurrence of the species in an area where a viable population seems to be successfully established. However, the origin of the species remains uncertain, it probably migrated from southern Tunisia, where the species is rather abundant, or, possibly, from western areas, the Algerian coast, where it is also commonly caught.*

Key words: *Carcharhinus plumbeus*, description, distribution, expansion range, central Mediterranean Sea

NUOVI RITROVAMENTI DELLO SQUALO GRIGIO, *CARCHARHINUS PLUMBEUS* (CHONDRICHTHYES: CARCHARHINIDAE) LUNGO LA COSTA SETTENTRIONALE DELLA TUNISIA (MEDITERRANEO CENTRALE)

SINTESI

*Recenti indagini condotte al largo di Ras Jebel, lungo la costa settentrionale della Tunisia, hanno permesso di raccogliere 9 esemplari di squalo grigio, *Carcharhinus plumbeus* (Nardo, 1825), ossia 5 maschi e 4 femmine. Le lunghezze degli esemplari variavano tra gli 890 e i 2030 mm, mentre il peso era compreso tra i 3,5 e i 38 kg. Tali catture confermano l'ipotesi che una popolazione vitale si sia stabilita con successo in quest'area. Tuttavia, il punto d'origine della specie rimane incerto. Gli autori ipotizzano che sia migrata dal sud della Tunisia, dove la specie è piuttosto abbondante, o da zone a occidente, quali la costa algerina, dove viene comunemente catturata.*

Parole chiave: *Carcharhinus plumbeus*, descrizione, distribuzione, intervallo di espansione, Mediterraneo centrale

INTRODUCTION

The sandbar shark *Carcharhinus plumbeus* (Nardo, 1827) is a migratory species widely distributed throughout the world and commonly reported from southern Mediterranean areas (Capapé, 1989). However, it disappeared from the northern areas of the western Basin, such as the coast of France, for instance (Capapé *et al.*, 2000). The species has been only sporadically captured in the Adriatic Sea (Costantini & Afferente, 2003; Lipej *et al.*, 2008; Dragičević *et al.*, 2010) and in the southern Aegean Sea, off southwestern Turkey (Bilecenoglu *et al.*, 2014), whereas it is still commonly and abundantly caught off the Maghreb coast (Hemida *et al.*, 2002; Saïdi *et al.*, 2005).

Carcharhinus plumbeus is abundant in southern Tunisian areas, such as the Gulf of Gabès, but rather rare in northern areas, its range extending as far as the Gulf of Tunis (Capapé, 1989). However, three specimens were captured in the waters surrounding the Cani Rocks (Rafrafi-Nouira *et al.*, 2015), and a large female was caught off Tabarka, a city located in the northern Tunisian coast, close to the Algerian border (Soufi-Kechaou *et al.*, 2018).

In the wake of a collaboration with experienced fishermen aware of fishing grounds, we were informed of other

specimens of *Carcharhinus plumbeus* captured in the northern coast of Tunisia. These captures are presented and commented in this paper, offering us the opportunity to assess the real status of the species in the area.

MATERIAL AND METHODS

On 11 July 2018, 9 specimens of *Carcharhinus plumbeus* were caught by pelagic longlines, on sandy-rocky bottoms, at depths between 140 and 170 m, together with sparid species and swordfish *Xiphias gladius* Linnaeus, 1758. These captures occurred off the city of Bizerte in northern Tunisia, at 37° 27' 13" N and 9° 51' 03" E (Fig. 1). All specimens were measured for total length (TL) to the nearest millimetre by digital callipers and weighed to the nearest gram. Due to the local economic value of *C. plumbeus*, they were immediately sold, except for the smallest specimen, which was donated by the fishermen for further laboratory examination. Morphometric measurements and tooth counts were performed on this shark following Rafrafi-Nouira *et al.* (2015). The head of the specimen was fixed in 10% buffered formalin, preserved in 75% ethanol and deposited in the Ichthyological Collection of the Faculté des Sciences de Bizerte (Tunisia), under the catalogue number FSB-Car-plu-02.

RESULTS AND DISCUSSION

The specimens were identified as *Carcharhinus plumbeus* following a combination of main morphological characters (Fig. 2): body stout, snout broadly rounded and short; first dorsal fin high, triangular, its origin over pectoral bases; pectoral fins broadly triangular, relatively long; interdorsal ridge present; upper teeth broadly triangular and serrated, with oblique cusp; lower teeth erect with narrow serrated cusp (Fig. 3), dental formula [13-1-13/12-1-12]; skin almost entirely covered by dermal denticles compactly arranged; denticles rounded, with 4 to 6 ridges extending from base to crown, exhibiting several cusps (Fig. 4); colour of body grey to bronze on upper surface, belly whitish.

The morphology, the measurements (Table 1), the shape of the teeth in the upper and lower jaws and that of dermal denticles coincided with previous observations by Capapé *et al.* (1979), Cadenat & Blache (1981), Garrick (1982), Branstetter (1984) and Compagno (1984), allowing to identify these 9 captured specimens as *C. plumbeus*.

Of these 9 specimens, 5 were males and 4 females (Fig. 2). The total length ranged between 1367 and 2030 mm in males, and between 890 and 1258 mm in females. The total body weight in males and females ranged between 12 and 38 kg, and between 3.5 and 9.8 kg, respectively. Following previous observations related to the specimens from the Tunisian coast (Capapé,

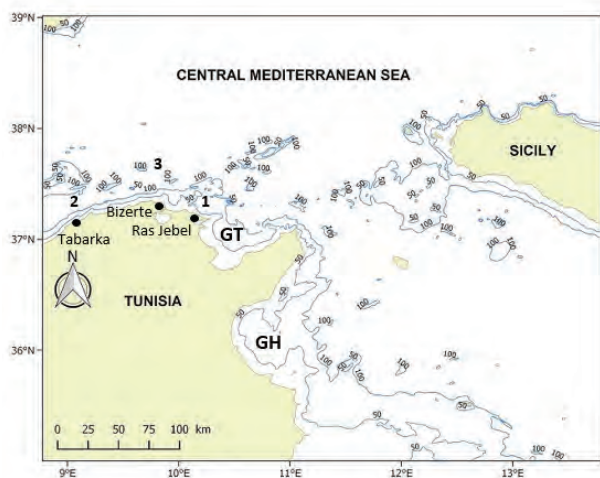


Fig. 1: Map of the northern Tunisian coast indicating two previous and the present capture sites of *Carcharhinus plumbeus*: 1. in the waters surrounding the Cani Rocks off Ras Jebel (Rafrafi *et al.*, 2015); 2. in the waters surrounding the Galite Islands and the Cani Rocks off Tabarka (Soufi-Kechaou, 2018); 3. off Bizerte (this study). GT = Gulf of Tunis, GH = Gulf of Hammamet. **Sl. 1:** Zemljevid severne tunizijske obale z označbo dveh predhodnih in nove lokalitete, kjer so ujeli sive morske pse: 1. vode, ki obkrožajo Cani Rocks blizu predela Ras Jebel (Rafrafi *et al.*, 2015); 2. vode, ki obdajajo otoke Galite in Rocks blizu Tabarka (Soufi-Kechaou, 2018); 3. okoli Bizerte (pričujoča študija). GT = tuniški zaliv, GH = hammameški zaliv.

Tab. 1: Morphometric measurements (in mm) and as percentages of total length (TL %) recorded in the specimens of *Carcharhinus plumbeus* (ref. FSB-Car-plu-02) caught off Bizerte.**Tab. 1: Morfometrične meritve (v mm) in delež celotne dolžine (TL %) primerkov *Carcharhinus plumbeus* (ref. FSB-Car-plu-02) ujetih pri Bizerti.**

Reference	FSB-Car-plu-02	
	Male	
Sex		
Morphometric measurements	mm	% TL
Total length	890	100.00
Head length	170	19.10
Prebranchial length	165	18.54
Preorale length	65	7.30
Prenasal length	20	2.25
Intergill length	140	15.73
Eye with	11	1.24
Eye height	12	1.35
Internasal length	50	5.62
Mouth width	80	8.99
Distance between snout 1st gill	70	7.87
Precaudal length	250	28.09
First dorsal base	100	11.24
First dorsal inner margin	35	3.93
First dorsal posterior margin	110	12.36
First dorsal anterior margin	120	13.48
Second dorsal base	40	4.49
Second dorsal inner margin	35	3.93
Second dorsal posterior margin	40	4.49
Second dorsal anterior margin	40	4.49
Pectoral base	55	6.18
Pectoral inner margin	43	4.83
Pectoral anterior margin	140	15.73
Pectoral posterior margin	130	14.61
Pelvic base	40	4.49
Pelvic inner margin	30	3.37
Pelvic anterior margin	40	4.49
Pelvic posterior margin	50	5.62
Anal base	35	3.93
Anal inner margin	30	3.37
Anal anterior margin	50	5.62
Anal posterior margin	45	5.06
Dorsal caudal margin	220	24.72
Upper postventral caudal margin	130	14.61
Subterminal caudal margin	25	2.81
Lower postventral caudal margin	50	5.62
Preventral caudal margin	80	8.99
Terminal caudal margin	50	5.62
Caudal peduncle height	40	4.49
Weight		
Total body mass (g)	3500	



Fig 2: The nine specimens of *Carcharhinus plumbeus* caught off Bizerte. Scale bar = 300 mm.

Sl. 2: Devet primerkov sivega morskega psa, ujetih blizu Bizerte. Merilo = 300 mm.

1984; Saïdi et al., 2005), male and female *C. plumbeus* mature between 1545 and 1600 mm, and between 1660 and 1720 mm, respectively. Therefore, of the 5 males captured, 4 were adults and 1 was juvenile, as confirmed by the observation of claspers, which were rigid, calcified and developed in the former (see Colletot, 1969). Conversely, it appears that all sampled females were probably juvenile, because they had not yet reached the size associated with sexual maturity (see Capapé, 1984; Saïdi et al., 2005).

This is the first time that a significant number of *Carcharhinus plumbeus* was discovered in the northern Tunisian coast. Previous, even recent, captures of this species made in the same comprised large, adult and juvenile males and females (Rafrafi-Nouira et al., 2015; Soufi-Kechaou et al., 2018). Therefore, the presence of *C. plumbeus* in northern Tunisian waters supports the hypothesis of an established population in the area. So much so, as there exist nursery areas for *C. plumbeus* (Bradai et al., 2005) in southern Tunisia and migrations of elasmobranch species from these areas were



Fig. 3: Head of specimen FSB-Car-plu-02, with ventral surface showing teeth in the upper and lower jaws. Scale bar = 20 mm.

Sl. 3: Glava primerka FSB-Car-plu-02 s spodnje strani; vidni so zobje iz zgornje in spodnje čeljustnice. Merilo = 20 mm.

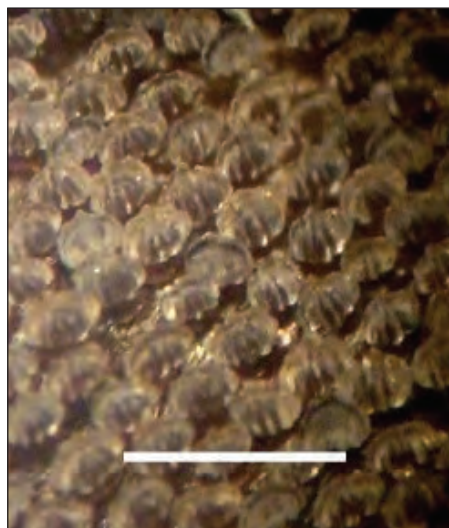


Fig. 4: Placoid scales removed from the skin of specimen FSB-Car-plu-02. Scale bar = 0.5 mm.

Sl. 4: Iz kože primerka FSB-Car-plu-02 pobrane plakoidne luske z dentikli. Merilo = 0,5 mm.

suggested by Rafrafi-Nouira *et al.* (2015). Additionally, *C. plumbeus* is rather abundant in the nearby Algerian waters, and migration from this region towards the east, including the Tunisian coast, has probably occurred. Due to the global warming of the Mediterranean (Francour *et al.*, 1994), it appears that some species can be found in areas where they were previously considered rare or unknown (Ben Raïs Lasram & Mouillot, 2009); internal migration of fish has been reported throughout the Tunisian waters (Rafrafi-Nouira, 2016), with extensive migrations from distant regions, such as the Red

Sea and the Eastern Tropical Atlantic, further enhancing the already important changes in the local biodiversity (Ben Amor *et al.*, 2016; Ounifi-Ben Amor *et al.*, 2016). Additionally, these findings may support the thesis that at present, this species cannot exactly be considered as threatened (Musick *et al.*, 2009). However, following Souif-Kechaou *et al.* (2018), opposite patterns manifest in other large Mediterranean shark species, which have been faced with a drastic decline in population and are, therefore, on the way to becoming extinct in this sea (Ferretti *et al.*, 2008).

NOVI ZAPISI O POJAVLJANJU SIVEGA MORSKEGA PSA, *CARCHARHINUS PLUMBEUS* (CHONDRICHTHYES: CARCHARHINIDAE) NA SEVERNI TUNIZIJSKI OBALI (OSREDNJE SREDOZEMSKO MORJE)

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POVZETEK

V okviru recentnih raziskav v vodah okoli lokalitete Ras Jebel na severni tunizijski obali je bilo ujetih 9 primerkov sivega morskega psa *Carcharhinus plumbeus* (Nardo, 1825), 5 samcev in 4 samice. V dolžino so merili med 890 in 2030 mm in tehtali med 3,5 in 38 kg. Ta ujetja potrjujejo prisotnost vrste v predelu, kjer je še vedno prisotna ustaljena viabilna populacija. Kakorkoli že, izvor teh primerkov je še vedno slabo poznan; verjetno izvirajo iz voda južne Tunizije, kjer je vrsta še vedno razmeroma pogosta, ali pa iz zahodnih predelov iz Alžirije, kjer jo še vedno pogosto ulovijo.

Ključne besede: *Carcharhinus plumbeus*, opis, razširjenost, razširjanje, osrednje Sredozemsko morje

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