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RECORDS OF BASKING SHARKS, *CETORHINUS MAXIMUS* (GUNNERUS, 1765) (CHONDRICHTHYES: CETORHINIDAE) OFF THE MAGHREBIN SHORE (SOUTHERN MEDITERRANEAN): A SURVEY

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ABSTRACT

*In the present paper, the authors list a number of records on historical and recent captures of *Cetorhinus maximus* off the Maghrebine shore (Algerian and Tunisian coasts) and compare them with similar data concerning other Mediterranean areas. They discuss and comment on the occurrence of the basking shark population in the Mediterranean Sea.*

Key words: Chondrichthyes, Cetorhinidae, *Cetorhinus maximus*, Maghrebine shore, Algeria, Tunisia, Mediterranean Sea

SEGNALAZIONI DI SQUALO ELEFANTE, *CETORHINUS MAXIMUS* (GUNNERUS, 1765) (CHONDRICHTHYES: CETORHINIDAE) DI FRONTE ALLA COSTA MAGREBINA (MEDITERRANEO MERIDIONALE): INDAGINE

SINTESI

*Nell'articolo gli autori espongono minuziosamente dati storici e recenti di catture di *Cetorhinus maximus* di fronte alla costa magrebina (algerina e tunisina), e li confrontano con dati simili provenienti da altre aree del Mediterraneo. Gli autori inoltre discutono e commentano la presenza della popolazione di squalo elefante nel mar Mediterraneo.*

Parole chiave: Chondrichthyes, Cetorhinidae, *Cetorhinus maximus*, costa magrebina, Algeria, Tunisia, mare Mediterraneo

INTRODUCTION

Out of the fourteen large migratory sharks reported off the Maghreb shore (Quignard & Capapé, 1971, 1972; Capapé, 1987, 1989; Hemida, 1998; Bradai, 2000; Hemida & Labidi, 2001; Hemida & Capapé, 2002, 2003; Hemida et al., 2002a, b), only three species, the sandbar shark, *Carcharhinus plumbeus*, the spinner shark, *C. brevipinna*, and the blue shark, *Prionace glauca*, reproduce and develop in the area (Capapé, 1984, 1989; Hemida & Capapé, 2003). The other migratory sharks are occasionally captured in the area. In the last ten years, records of basking sharks from the waters off the Maghreb shore have been more frequent (Bradai, 2000) than those reported earlier on by other authors (Dieuzeide et al., 1953; Quignard & Capapé, 1971; Capapé, 1975; Capapé et al., 1975). In this paper, the authors present historical and recent records of *C. maximus* off the Maghreb shore and compare its occurrence with those in other Mediterranean areas, such as the Tyrrhenian and Ligurian Seas and the eastern Adriatic, from where similar observations have been reported by Serena et al. (2000) and Soldo & Jardas (2002).

MATERIAL AND METHODS

Records of basking sharks off the Maghreb shore were collected from literature data concerning the area and observations at fishing sites located along the Algerian and Tunisian coasts (Fig. 1). The former is divided into western, central and eastern areas and the latter in northern, central and southern areas.

Table 1 presents details of each record, sex (when

possible), total length (to the nearest mm), mass (to the nearest gram), capture depth (in metres), fishing gear, fishing site and the area either in Algerian or Tunisian waters, fishing date and reference. Fishing sites are plotted in figure 1 for Algerian records and in figure 2 for Tunisian records, the latter showing the captures made in the Gabès Gulf. Some body measurements were made on two specimens caught off the Algerian coast. They are detailed in Table 2. Body measurements *pro parte* follow Compagno (1984) and clasper length was measured on the inner edge of the clasper from the pelvic girdle to tip of clasper according to Collenot (1969).

RESULTS AND DISCUSSION

Altogether, 21 records are presented in Table 1, 20 from the period between 1966 and 2002, and 12 since 1998. Record No. 21 is also presented in figure 3. Observations of fishes from both Algerian and Tunisian coastal waters began at the end of the 19th century according to the literature review included in Hureau & Monod (1973). Furthermore, research focusing exclusively on elasmobranch species was conducted thirty years ago off the Tunisian coast (Quignard & Capapé, 1971, 1972) and recently off the Algerian coast (Hemida, 1998; Hemida & Labidi, 2001). Since 1960, 39 specimens were reported by Serena et al. (2000) from the Tyrrhenian and Ligurian Seas, and 13 specimens by Soldo & Jardas (2002) from the eastern Adriatic.

In our case, males outnumbered females; sixteen specimens were males and only five were females (F/M=3.2:1). On the other hand, of the 24 specimens

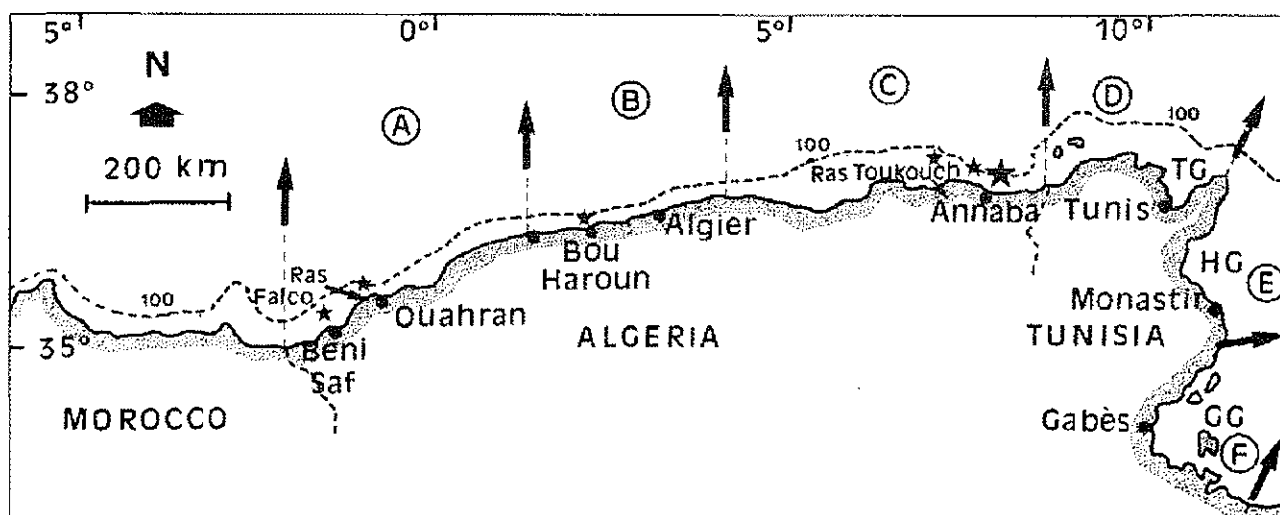


Fig. 1: Map of the Maghreb shore showing the *Cetorhinus maximus* fishing sites where a single specimen (small black stars) or two or more specimens (large black stars) were captured.

Sl. 1: Zemljevid maghrebskega obrežnega morja, kjer so bili ujeti morski psi orjaki *Cetorhinus maximus*: eden na lokalitetah, označenih z majhnimi črnimi zvezdicami ter dva ali več na lokaliteti, označeni z večjo črno zvezdico.

(among 47) sexed by Serena et al. (2000), 11 were males and 13 females (F/M = 1:1.18), while among 27 specimens, Soldo & Jardas (2002) reported the sex of four specimens, two males and two females.

In Table 1, total length ranged from 2700 to 7350 mm, but of the 14 measured specimens ten were over 4000 mm. Most of the measured specimens reported by Serena et al. (2000) and Soldo & Jardas (2002) were over 4000 mm long. They are large specimens and most of them were adult.

All the specimens from the Maghreb coastal waters were captured by pelagic fishing gear at depths of max. 30 m. According to Serena et al. (2000), only three specimens were found at depths between 70 and 200 m.

Twelve individuals were caught between March and August, and one in winter. Information provided by Algerian fishermen revealed that in the waters off Annaba (eastern Algeria, Fig. 1), basking sharks were exceptionally caught in spring and summer. These capture periods agree with those presented by Serena et al. (2000) for Tyrrhenian and Ligurian Seas and Soldo & Jardas (2002) for the Adriatic. Serena et al. (2000) suggested that the occurrence of basking sharks was probably due to the increase in primary production and to the higher production of zooplankton. Soldo & Jardas (2002) added that this opinion requires a further and thorough investigation in the Adriatic Sea.

Nine specimens were caught off the Algerian coast and twelve off the Tunisian coast. All the fishing sites were in inshore waters, generally in more or less protected areas, such as Bays of Ouahran and Annaba along the Algerian coast. Decades ago, Dieuzeide et al. (1953) reported on the capture of a juvenile male with atypically curved nose at the end of 1929 and added that *C. maximus* was rather common off the coast of Algeria. After more than 70 years it appears that in spite of the great anthropogenic fishing pressures basking sharks are still caught in the area, although only as bycatch species.

Serena et al. (2000) suggested that the basking shark population inhabiting Tyrrhenian and Ligurian waters is an appropriate hypothesis. With regard to the previous papers and their own observations, Soldo & Jardas (2002) noted that 'the basking shark is a relatively rare but constant species in the Adriatic'.

Serena et al. (2000) added that the Mediterranean Sea could be also an important reproductive area for *C. maximus*, although they did not exclude the possibility that Atlantic migrants entered the Mediterranean through the Straits of Gibraltar. They emphasized that *C. maximus* was relatively more abundant in the eastern Atlantic Ocean than in the Mediterranean Sea. Barrull & Mate (1996, 2002) wrote that the basking shark was more often reported from the western Mediterranean than from its eastern part.

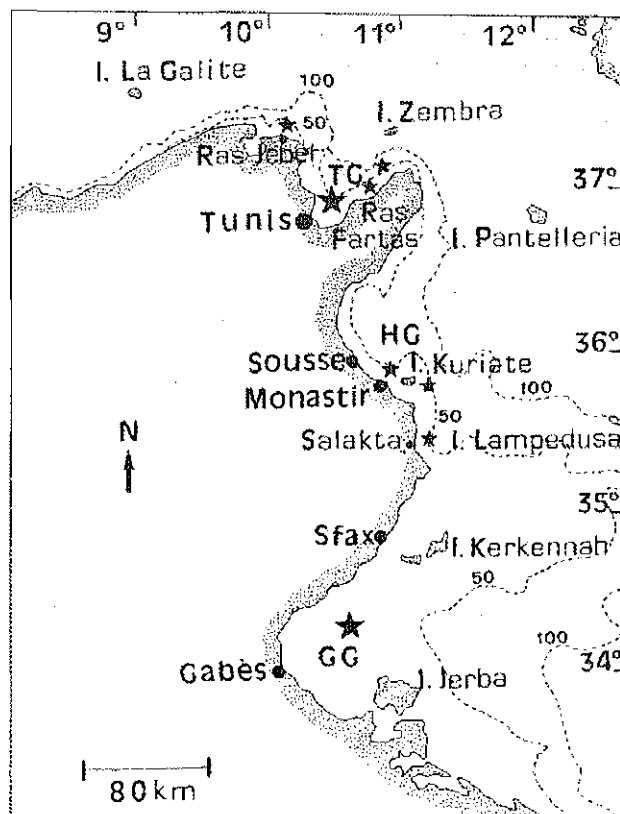


Fig. 2: Map of the Tunisian coast showing the *Cetorhinus maximus* fishing sites where a single specimen (small black stars) or two or more specimens (large black stars) were captured.

Sl. 2: Zemljevid tunizijskih obalnih voda, v katerih so ribiči ujeli morske pse orjake *Cetorhinus maximus*: enega na lokalitetah, označenih z majhnimi črnimi zvezdicami ter dva ali več na lokalitetah, označenih z večjimi črnimi zvezdicami.

Among the specimens recorded along the Maghrebine shore, only the two reported from the western Algerian area could be considered Atlantic migrants. The other records were made in the region located between central Algerian and southern Tunisian coasts. Lipej et al. (2000) reported on the occurrence of *C. maximus* in the Gulf of Trieste, off Piran (northern Adriatic). The basking shark has also been recorded in the Levantin Basin (Golani, 1996) and, quite recently, in Turkish coastal waters in the Mediterranean by Kabasakal (2002), who wrote that 'it is not clear whether the occurrence of the basking in the seas of Turkey is incidental or exhibits a seasonal regularity'.

Our present observations speak in favour of the opinion presented by Soldo & Jardas (2002). Migrations from the eastern Atlantic certainly need to be confirmed. On the other hand it is difficult to state, at present, whether the basking shark population develops and re-

Tab. 1: Historical and recent records of *Cetorhinus maximus* off the Maghreb shore.

Tab. 1: Starejši in novejši podatki o morskem psu orjaku *Cetorhinus maximus* iz obrežnih maghrebskih voda.

Record	Sex	TOT (mm)	Mass (kg)	Depth (m)	Capture method	Fishing site	Area	Fishing date	Reference
1	Male	3750	?	?	Gill-nets (?)	Ras Falcon	western Algeria	27/12/1929	Dieuzeide et al. (1953)
2	Male	?	?	?	?	Tunis Gulf	northern Tunisia	1964	Chakroun (1966)
3	Male	?	?	?	?	Tunis Gulf	northern Tunisia	1965	Chakroun (1966)
4	Male	5340	?	30 (?)	Pelagic trawl	Kuriate Islands	central Tunisia	03/1976	Capapé et al. (1975)
5	Male	6000	?	?	?	Tunis Gulf	northern Tunisia	1979	Najar (1980)
6	Male	2700	?	?	?	Tunis Gulf	northern Tunisia	1980	Najar (1980)
7	Female	6270	?	10 (?)	Pelagic trawl	Off Monastir	central Tunisia	1981	unpubl. data
8	Male	3500	332	5	Gill-nets	Ras Fartas (Tunis Gulf)	northern Tunisia	08/1981	unpubl. data
9	Female	7100	?	12	Pelagic gill-nets	Off Skhira (Gabès Gulf)	southern Tunisia	1992	Bradaï & Ghorbel (1992)
10	Female	?	?	5	Pelagic gill-nets	Off Annaba	eastern Algeria	19/04/1998	unpubl. data
11	Male	?	?	5	Pelagic gill-nets	Off Beni-Saf	western Algeria	08/05/1998	unpubl. data
12	Male	?	?	?	Pelagic gill-nets	Off Annaba	eastern Algeria	10/05/1998	unpubl. data
13	Male	7150	?	?	Gill-nets	Ras Jebel (Tunis Gulf)	northern Tunisia	1998	Rais & Baccar (1998)
14	Male	7370	?	3	Gill-nets	Gabès Gulf	southern Tunisia	29/12/1999	unpubl. data
15	Male	?	?	?	?	Off Salakta	central Tunisia	23/03/2000	unpubl. data
16	Male	4900	546	5	Pelagic trawl	Off Bou-Haroun	central Algeria	31/03/2000	unpubl. data
17	Female	3300	176	5	Pelagic trawl	Off Annaba	eastern Algeria	03/04/2000	unpubl. data
18	Male	>6000	1000	5	Pelagic trawl	Ras Toukouch	eastern Algeria	18/05/2000	unpubl. data
19	Female	?	?	5	Pelagic trawl	Ras Toukouch	eastern Algeria	18/05/2000	unpubl. data
20	Male	4250	?	?	Purse seine	Gabès Gulf	southern Tunisia	24/04/2001	unpubl. data
21	Male	>7000	1500	?	Pelagic trawl	Off Annaba	eastern Algeria	28/03/2002	unpubl. data

Tab. 2: Body measurements made on two *Cetorhinus maximus* caught off the Algerian coast.

Tab. 2: Telesne mere dveh morskih psov orjakov *Cetorhinus maximus*, ujetih v tunizijskih obrežnih vodah.

Measurements (mm)	Record 16	Record 17
Total length	4900	3300
Snout to first dorsal fin	2020	1700
Snout to second dorsal fin	3600	2220
First dorsal height	520	350
Second dorsal height	150	100
Pectoral fin length	620	510
Pelvic fin length	390	260
Caudal fin length	1050	770
Snout to nostril	90	60
Mouth width	680	430
Internostril space	140	90
Snout to mouth	310	185
Clasper length	390	-

produces off the Maghreb shore or whether it only feeds in the area. However, as captures of basking sharks increased during the last ten years, both feeding and reproducing cannot be excluded in the area but need further observations.

Nevertheless, the belief that the Mediterranean Sea can be considered a potential reproductive area has been given a boost by records of the second Mediterranean filter feeding species, the devil ray *Mobula mobular*

reported by Capapé & Zaouali (1976), Bradaï & Capapé (2001) and Hemida et al. (2002a). Moreover, the ray is even considered a Mediterranean endemic species (Notarbartolo di Sciarra & Bianchi, 1998). In this area, these two species probably found sufficient resources to reproduce as well as to develop, just as other pelagic teleost fishes (Kartas, 1981; Chavance et al., 1986; Bradaï, 2000).

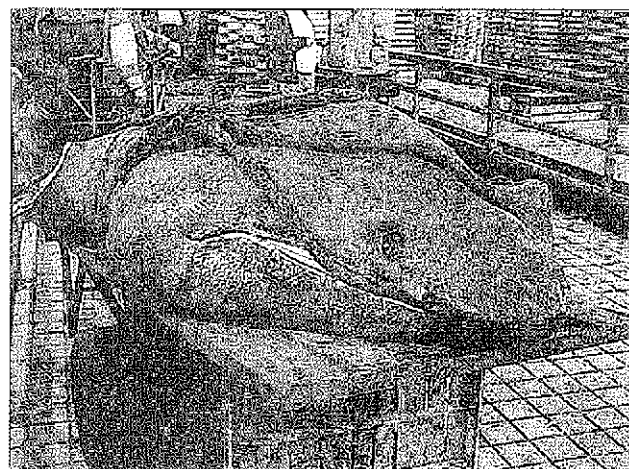


Fig. 3: Head of a male shark caught off Annaba, Algerian coast (for details see record 21 in Table 1). (Photo: F. Hemida)

Sl. 3: Glava samca, ujetega v bližini Annabe ob alžirski obali (o podrobnostih glej zapis št. 21 v tabeli 1). (Foto: F. Hemida)

POJAVLJANJE MORSKEGA PSA ORJAKA, *CETORHINUS MAXIMUS* (GUNNERUS, 1756)
(CHONDRICHTHYES: CETORHINIDAE), V BLIŽINI MAGHREBSKEGA OBREŽJA
(JUŽNO SREDOZEMLJE): PREGLED

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POVZETEK

V pričujočem prispevku avtorji navajajo starejše in novejše podatke o ujetju morskih psov orjakov *Cetorhinus maximus* v bližini Maghrebskega obrežja (v alžirskih in tunizijskih vodah) in jih primerjajo s podatki o pojavljanju populacije teh morskih psov v drugih delih Sredozemskega morja.

Ključne besede: Chondrichthyes, Cetorhinidae, *Cetorhinus maximus*, Maghrebsko obrežje, Alžirija, Tunizija, Sredozemsko morje

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