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ADDITIONAL RECORDS OF A RARE ELASMOBRANCH SPECIES, SHARPNOSE SEVEN-GILL SHARK *HEPTRANCHIAS PERLO* (HEXANCHIDAE) OFF THE NORTHERN TUNISIAN COAST (CENTRAL MEDITERRANEAN)

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ABSTRACT

*Four sharpnose seven-gill sharks *Heptranchias perlo* were captured off the northern Tunisian coast between 2007 and 2014: two males, one juvenile and one adult, and two females, one juvenile and one adult. *H. perlo* is considered as a rare species, probably threatened but still present in the area. Additionally, the occurrence of a sustainable population in waters surrounding the Eskerkis Bank remains a suitable hypothesis which cannot be ruled out.*

Key words: Chondrichthyes, description, measurements, deep sea waters, threatened population

SEGNALAZIONI AGGIUNTIVE DI UNA SPECIE RARA DI ELASMOBRANCHI, LO SQUALO MANZO *HEPTRANCHIAS PERLO* (HEXANCHIDAE), AL LARGO DELLA COSTA TUNISINA SETTENTRIONALE (MEDITERRANEO CENTRALE)

SINTESI

*Quattro esemplari di squalo manzo *Heptranchias perlo* sono stati catturati al largo della costa tunisina settentrionale tra il 2007 e il 2014: due maschi, un adulto e un esemplare giovanile, e due femmine, un adulto e un esemplare giovanile. *H. perlo* è considerata una specie rara, probabilmente minacciata, ma ancora presente nell'area esaminata. Inoltre, la presenza di una popolazione sostenibile nelle acque che circondano Eskerkis, rimane una valida ipotesi che non può essere esclusa.*

Parole chiave: Condroitti, descrizione, misurazioni, acque marine profonde, popolazione minacciata

INTRODUCTION

Sharprnose seven-gill shark *Heptranchias perlo* (Bonaterre, 1788) is known as a semi cosmopolitan species, occurring in temperate and warm temperate waters (Boeseman, 1984). The species is reported in the western Pacific from Japan to South Australia and New Zealand (Tanaka & Mizue, 1977; Compagno, 1984), and in the eastern Pacific, off northern Chile (Compagno, 1984). *H. perlo* is known in the western Atlantic from Carolina (USA), Caribbean Sea (Bigelow & Schroeder, 1948), Gulf of Mexico (Amorim *et al.*, 1998), and southward to Brazil and Argentina (Compagno, 1984). The occurrence of *H. perlo* was reported also from the Great Meteor Seamount, in the central Atlantic by Frenzel-Beyme & Köster (2002) who locally noted the presence of a sustainable population. Off the eastern Atlantic, Wheeler (1969) considered as a suitable hypothesis the presence of *H. perlo* off the British Isles, which was further confirmed by records from the north of the Bay of Biscay (Quéro *et al.*, 1988; Henderson & Williams, 2001). Southward, *H. perlo* is reported of Spain (Ortea & De La Hoz, 1979) and Portugal (Albuquerque, 1945-1956). South the Strait of Gibraltar, *H. perlo* is continuously reported from the coast of Morocco (Collignon & Aloncle, 1972; Lloris & Rucabado, 1998) to the South African coast (Bass *et al.*, 1975; Compagno, 1984).

The occurrence of sharprnose seven-gill shark is well documented throughout the Mediterranean Sea (Capapé, 1980; Boeseman, 1984), it is also known in the Adriatic Sea (Lipej & Dulčić, 2010) and in the eastern Levant Basin (Golani, 2005). De Maddalena *et al.* (2002) recorded *H. perlo* in Sicilian waters (central Mediterranean), based on the capture of 7 specimens. Schembri *et al.* (2003) reported the species as rather frequent in Maltese waters. However, they noted that the local status of the species is difficult to assess, because some specimens sold in Maltese fish markets probably originated from other areas of the Sicilian Channel. Additionally, Maliet (*pers. comm.*) informed us that some specimens were regularly caught off Corsica by local fishermen. Although the species was considered as rare in Turkish waters, the species occurs in both northern and southern Aegean coast (Filiz & Mater, 2002; Öziç & Yilmaz, 2006; Kabasakal & Ince, 2008).

In the Tunisian waters, captures of *H. perlo* appear to be rather restricted in northern areas, such as the Eskerkis Bank, off Tabarka, city close to the Algerian border, and around Jalta Island (Quignard & Capapé, 1971; Capapé, 1980). Additionally, Bradai (2000) reported the capture in the Gulf of Gabès of a free-swimming specimen having 390mm total length and weighing 138 g, on 4 February 1991, this finding constituting to date the southernmost extension range of *H. perlo* from the Tunisian coast. Investigations conducted since 2006 off the northern Tunisian coast, including the Lagoon of Bizerte allow us to provide some papers about species occurring in the area, concerning their distribution (El Kamel

et al., 2009) and also some traits of their food and feeding habits (Mnasri *et al.*, 2012; El Kamel-Moutalibi *et al.*, 2013a) and their reproductive biology (El Kamel-Moutalibi *et al.*, 2013b, Capapé *et al.*, 2014).

In this paper, we report additional captures of *H. perlo*, off the northern Tunisian coast, and the distribution of the species in the area, and in the Mediterranean Sea is commented and discussed. These records allow us to complete and assess the real status of the elasmobranch species in the region, in order to prepare a national plan for elasmobranchs in the same region as well.

MATERIAL AND METHODS

Two specimens, a male and female were collected in the fish market of Zarzouna, city close to Bizerte on 1 April 2007 and 15 July 2008, respectively. However, a limited information was provided about the site of capture, which occurred off the northern coast of Tunisia.

Additionally, two other specimens were kindly given to us by a fisherman on 21 May 2014. Both specimens

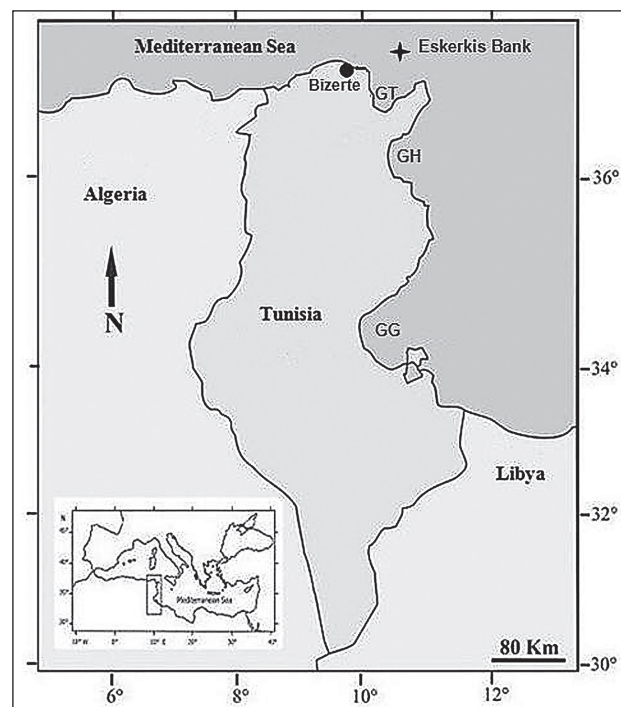


Fig. 1: Map of the Mediterranean showing Tunisia and map of the coast of Tunisia with black star pointing out the capture site of *Heptranchias perlo* in waters surrounding the Eskerkis Bank. GG: Gulf of Gabès, GH: Gulf of Hammamet, GT: Gulf of Tunis.

Sl. 1: Zemljevid tunizijske obale v Sredozemskom morju, na katerem je označena lokaliteta v vodah, ki obkrožajo Eskerkis Bank, kjer so bili ujeti morski psi sedmeroškrgarji. GG: Gabèški zaliv, GH: Hammametski zaliv, GT: Tuniški zaliv

Tab. 1: Morphometric measurements in mm and as % total length (% TL), meristic counts and total body masses recorded in male and female *Heptranchias perlo* caught off the northern Tunisian coast.**Tab. 1: Morfometrične meritve, izražene v mm in kot delež celotne dolžine (% TL), meristični podatki in celotna telesna masa samic in samcev morskih psov sedmeroškrgarjev, ujetih ob severni tunizijski obali**

Reference	FSB Hep-per.01		FSB Hep-per.02	
	Male		Female	
Sex				
Morphometric measurements	mm	% TL	mm	% TL
Total length	700	100.00	790	100.00
Precaudal length	492	70.29	550	69.62
Fork length	554	79.14	610	77.22
Pre-first dorsal length	354	50.57	380	48.10
Prepectoral length	147	21.00	170	21.52
Head length	145	20.71	168	21.27
Prebranchial space	115	16.43	130	16.46
Preoral length	34	4.89	37	4.70
Pelvic fin length	85	12.17	72	9.11
Second dorsal-caudal length	96	13.67	93	11.77
Prepelvic length	285	40.71	320	40.51
Preanal length	388	55.43	425	53.80
Pelvic-anal length	55	7.90	47	5.95
Pelvic-caudal length	158	22.57	175	22.15
Anal-caudal length	62	8.84	76	9.62
Snout-vent length	315	45.00	340	43.04
Vent-caudal length	175	25.00	170	21.52
Prenasal length	16	2.34	22	2.78
Intergill length	7	1.00	10	1.24
Eye width	25	3.54	26	3.29
Eye height	13	1.87	15	1.90
Internasal length	22	3.17	22	2.73
Mouth width	53	7.56	63	7.97
First dorsal height	28	3.93	40	5.01
First dorsal base	44	6.27	52	6.58
First dorsal inner margin	13	1.83	15	1.85
First dorsal anterior margin	50	7.17	57	7.19
Pectoral height	66	9.36	80	10.13
Pectoral inner margin	36	5.17	38	4.85
Pectoral anterior margin	79	11.24	89	11.28
Caudal anterior margin	210	30.00	238	30.13
Caudal terminal lobe	34	4.91	40	5.06
Insertion dorsal -anal insertion	40	5.71	42	5.27
Trunk height	82	11.71	87	11.05
Caudal peduncle height	28	4.06	33	4.23
Clasper length	54	7.66	-	-
First gill slit length	55	7.79	55	7.01
Fifth gill slit length	23	3.26	24	3.09
Counts				
Teeth rows upper jaw	9+9		9+9	
Teeth rows lower jaw	5+1+5		5+1+5	
Total body mass	1000		1280	

were caught by trawling off the Eskerkis Bank at depth between 150 and 300 m, on rocky bottoms, by 37° 45' N and 10° 49' 59.99" E (Fig. 1). They were delivered at the laboratory where they were carefully studied. They were measured to the nearest millimetre and weighed to the nearest gram. Morphometric measurements, including percents of total length followed Capapé (1980) and Compagno (1984), and are presented in Table 1. Both specimens were preserved in 10 % buffered forma-

lin and preserved in the Ichthyological Collection of the Faculté des Sciences of Bizerte (Tunisia), under the catalogue numbers FSB Hep-per.01 and FSB Hep-per.02, respectively (Fig. 2A, B).

RESULTS AND DISCUSSION

All specimens were identified following Capapé (1980), Boeseman (1984) and Compagno (1984), with

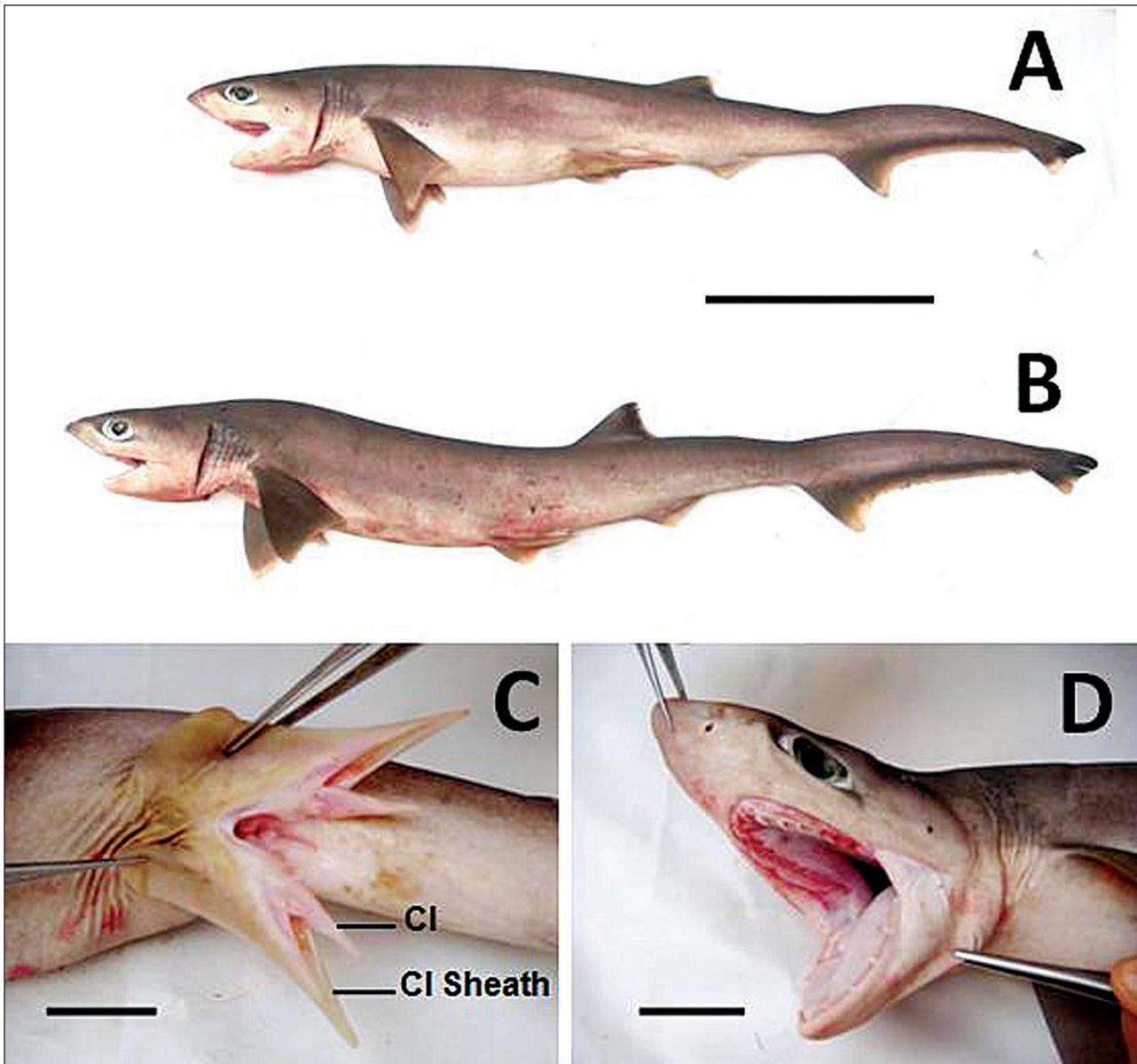


Fig. 2: *Heptranchias perlo*. (A) Male specimen (ref. FSB Hep-per.01); (B) female specimen (ref. FSB Hep-per.02), with scale bar = 200 mm for both specimens; (C) clasper (CI) and clasper sheath (CI Sheath), scale bar = 50 mm; (D) mouth opening, scale bar = 20 mm.

Sl. 2: *Heptranchias perlo*. (A) Samec (ref. FSB Hep-per.01); (B) samica (ref. FSB Hep-per.02), merilo = 200 mm velja za oba primerka; (C) klasper (CI) in klasperjeva guba (CI Sheath), merilo = 50 mm; (D) razprta usta, merilo = 20 mm

main characters as follows: body slender, with seven gill-slits broadly separated, narrow head, with long, pointed and conical snout, eyes very large, minute nostrils, a single dorsal fin with base before that of anal fin, caudal fin with moderate lower lobe, pectoral fins rather short and triangular, pelvic fins are displaying a sexual dimorphism, those are short and triangular, those of males exhibit an expansion which entirely surround the clasper as a sheath (Fig. 2C), however no viscous substance was secreted by the internal surface of the clasper. Teeth are different in shape on each jaw. Teeth of upper jaw, from the median region present a single cusp rather strong and oblique, while in the lateral region, teeth exhibited minute cusplets on both sides of the cusp. Teeth of lower jaws are large, comblike, with a large anterior cusp preceded by a few smaller ones, and followed by 7 or 8 distal cusplets (Fig. 2D). Colour brown-grey, with small lighter spots, belly beige to whitish.

Captures remain very rare and during three decades and records were not reported in the area. Such pattern could be due to the fact that no survey focusing on elasmobranch species was conducted in the area between 1990 and 2006. *H. perlo* inhabits deep sea waters, on rocky bottoms, where it is not easy to catch them with usual fishing gears. Frentzel-Beyme & Koster (2002) noted the absence or underrepresentation among adult specimens caught from the great Meteor Seamount. They explained this absence with the fact that large specimens, agile and slender, could escape from the trawl. Similar patterns were reported by Garrick & Paul (1971) from New Zealand waters. The species is known for having a poor economical value, and small specimens are generally discarded at sea (Compagno, 1984). In the Tunisian waters, populations of *H. perlo* live in restricted areas, which could be considered as areas, they leave after attaining sexual maturity and becoming adults, as other elasmobranch species (Muñoz-Chapuli, 1984). Frentzel-Beyme & Köster (2002) reported that the smallest free-swimming specimen of *H. perlo* was a female of 390 mm TL, while Bigelow & Schroeder (1948) recorded a new-born caught in Japanese waters of 260 mm TL and Capapé (1980) noted that in Tunisian waters the size at birth occurred at 300 mm TL and the weight of approximately 60 g. Size at sexual maturity occurred between 950 and 1000 mm in females from the western Atlantic (Bigelow & Schroeder, 1948), and between 800 and 1050 mm in those from the Japanese waters (Tanaka & Mizue, 1977). Amorim et al. (1998) noted that off southern Brazil males and females reached maturity at 790 mm and 900 mm TL, respectively. De Maddalena et al. (2002) recorded a mature male in Sicilian waters of 850 mm TL. Kabasakal & Ince (2008) recorded an immature female of 850 mm TL, which weighed 1700 g. Conversely, Henderson & Williams (2001) that a female having 1010 mm TL was considered as juvenile, and noted that it was surprising that the specimen was totally immature. Intraspecific latitudinal differences could not

be ruled out concerning size at sexual maturity between elasmobranch species (Mellinger, 1989). Additionally, it remains difficult to assess the size at sexual of maturity from a single specimen.

The specimens collected on 1 April 2007 and 15 July 2008 were a male and a female measuring 810 mm and 1100 mm TL, respectively and weighing 3000 g and 5000 g, respectively. Taking in account previous observations of Capapé (1980), both were adults. The two specimens caught on 21 May 2014 were juvenile. Additionally, the fact that no viscous substances were secreted by the internal surface of clasper sheath of the adult specimen enhances such statement (Tanaka et al., 1975; Capapé, 1980; Frentzel-Beyme & Köster, 2002).



Fig. 3: Map of the central Mediterranean Sea pointing out the capture sites of *H. perlo*. 1: northern Tunisian coast (Capapé, 1980; this study); 2: Gulf of Gabès, southern Tunisia (Bradai, 2000); 3: Sicily (De Maddalena et al., 2002); 4: Malta (Schembri et al., 2003).
Sl. 3: Zemljevid osrednjega Sredozemlja z označenimi lokalitetami, kjer so bili ulovljeni morski psi sedme-roškrjarji. 1: severna tunizijska obala (Capapé, 1980; pričujoča raziskava); 2: Gabéški zaliv, južna Tunizija (Bradai, 2000); 3: Sicilija (De Maddalena et al., 2002); 4: Malta (Schembri et al., 2003)

These four records show that *H. perlo* still occurs off the northern Tunisian coast, despite a gap of several years. Such pattern is mainly due to the fact the elasmobranch species were not particularly focused in the area during this period, rather than a lack of captures. Although a decline of captures cannot be totally ruled out, such as in other Mediterranean regions (Paul & Fowler, 2003), however *H. perlo* is probably threatened off the Tunisian coast but not yet extinct since sustainable population, still occurs in restricted area, such as

the Eskerkis Bank, and other regions located in the central Mediterranean (Fig. 3). It remains a suitable hypothesis due to the fact that the species inhabits restricted and deep areas, not usually submitted to an important fishing pressure and with a favourable biological environment. Additionally, *H. perlo* is an active and experienced feeder and its diet displayed a very large spectrum of ingested preys and, consequently the vacuity index exhibited low values whatever the area (Capapé, 1980; Frenzel-Beyme & Koster, 2002).

DODATNI ZAPISI O REDKEM MORSKEM PSU SEDMEROŠKRGARJU *HEPTRANCHIAS PERLO* (HEXANCHIDAE) IZ SEVERNIH TUNIZIJSKIH VODA (OSREDNJE SREDOZEMLJE)

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POVZETEK

Štirje primerki morskih psov sedmeroškrgarjev *Heptranchias perlo* so bili ujeti ob obalah severne Tunizije v obdobju med letoma 2007 in 2014. Dva sta bila samca, eden mladostni primerek in eden odrasel, druga dva pa samici, od katerih je bila ena mladostni primerek, druga pa odrasla. Sedmeroškrgarja danes obravnavajo kot redko in verjetno ogroženo vrsto, ki pa je še vedno prisotna v danem okolju. Avtorji menijo, da hipoteze, da v vodah okoli Eskerkis še vedno domuje stabilna populacija sedmeroškrgarjev, ne gre kar tako ovreči.

Ključne besede: Chondrichthyes, opis, meritve, globokomorsko okolje, ogrožena populacija

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