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First record of the big nose shark, *Carcharhinus altimus* (Springer, 1950) from Mersin Bay

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Abstract

The total length of this shark specimen, which caught from a depth of 25 m, is 65.2 cm, and its weight is 2.2 kg. In this study, juvenile *C. altimus* species are more likely to be born in the Levant basin than the immigration. Their parents are highly likely to be found in the deep waters of the northeastern Mediterranean. This finding may indicate that this circumglobal species may also spread in the Northeast Mediterranean. Thus, continuous studies are needed in this region for further investigation and monitoring of these species. This research will make a significant contribution to many researchers working in this field in the future.

Keywords: *Carcharhinus altimus*, Carcharhinidae, Mersin coast, Northeastern Mediterranean Sea, morphometric data

1. Introduction

The bignose shark, *Carcharhinus altimus* (Springer, 1950), is a shark species belonging to order Carcharhiformes and family Carcharhinidae [1]. This shark species have been reported to live at a depth of 12-810 m [2] and more common 80-220 m [3] in continental shelves and benthic areas of continental slopes and young individuals may common occur at 25 m [2]. The maximum total length of *C. altimus* is known to be 300 cm. Males reach reproductive maturity at a total length of 216-267 cm [4], while females reach maturity at 226-282 cm [5] and reproduction occurs between August and September [4]. Their main prey are bony fishes, other sharks, stingrays, and cuttlefish [1]. They distributed in a very wide geography. They found in tropical, subtropical, and warm waters of all oceans and seas [6]. However, it reported that the species is rare in the western and eastern Mediterranean waters and not found in the Black Sea. They caught during long-line fishing at pelagic and benthic zones along the coast of Algeria [7]. *C. altimus* is a circumglobal species but has irregular distribution in the Mediterranean [6]. No record found in the Cloflam region, but Golani [8] identified the species and added it to the list of species that can found in the region [4]. Sperone *et al.* [9] reported the registration of *C. altimus* on the coast of Italy and also mentioned that the species had previously recorded in the western Mediterranean. The species has been reported from the Mediterranean Sea [10] the Arabian Sea [11], and the Pacific Ocean [12]. There are two records of *C. altimus* in the northeastern Mediterranean. One of them was Golani [8], and the other was Basusta and Erdem [13] and reported an individual having a total length, TL of 64.3 cm in the Gulf of Iskenderun. Citation made to this individual in the check-list of the Turkey coast [14-16].

In one study, it was stated that *C. altimus* could be synonymous or misdiagnosed with *Carcharhinus radamae*, *Carcharhinus obscurus*, *Carcharhinus plumbeus*, and the characteristics of these species [4] No detailed morphometric measurements of *C. altimus* have found in the literature.

In this study, it is aimed to report a juvenile individual belonging to *C. altimus* captured from Mersin Bay. Giving first detailed morphometric measurements of the individual as well as identifying the species is also aimed.

2. Materials and methods

2.1 Study area

The present study was first confirmed occurrence of *C. altimus* in Mersin Bay, Turkey (Fig. 1) during trawl survey.

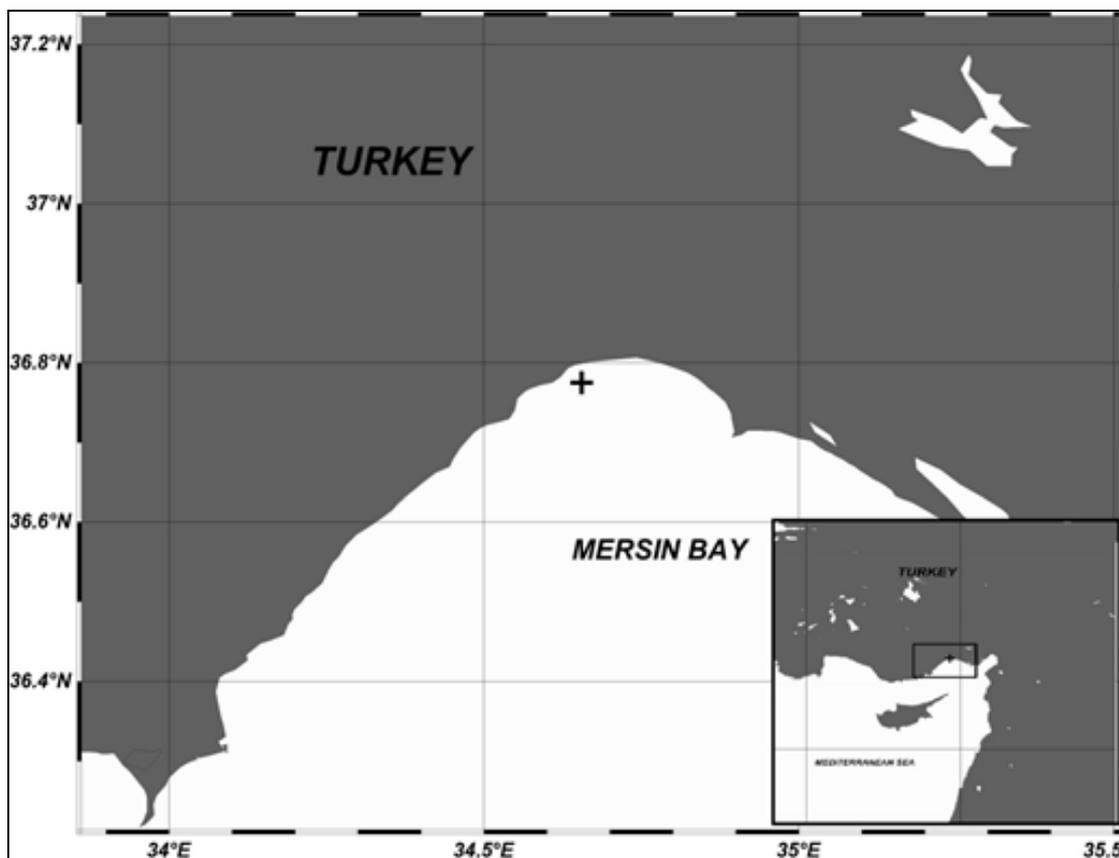


Fig 1: Coordinates of the sampling area

2.2 Fish sampling

One juvenile specimen belongs to *C. altimus* was caught in trammel net during commercial fishing at a depth of 25 m on 20 July 2019 from Mersin Bay (Coordinate: 36°46'334"N / 34°39'211"E). MEDITS protocols were used to prepare trawl equipment [17].

2.3 Morphological examination

After the capture, the fresh juvenile of *C. altimus* specimen was identified, photographed, measured to the nearest mm, and weighed to the nearest g. All diagnostic characteristics and color patterns agree with the descriptions of Compagno [1] and Serena [4]. The specimen preserved in 4% formaldehyde and deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University (Catalog number: MEUFC-19-11-106), (Fig. 2).

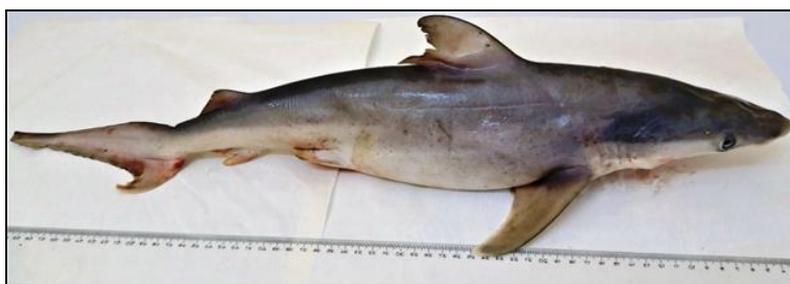


Fig 2: The juvenile specimen of the *Carcharhinus altimus*

3. Results

In the study, an individual with a total length of 65.2 cm and weighing 2200 g caught. The identification of the specimen was carried out using the characteristics of the species given by Compagno *et al.* [18] and Serena [4]. Body is cylindrical with a large, snout is long and broad and long nasal flaps and high, mouth is broadly curved and lacks obvious furrows at the corners. saw-edged upper teeth is triangular, interdorsal ridge high and prominent; pectoral and dorsal fins are large and straight. The caudal fin has a large lower lobe and a strong

ventral notch near the tip of the upper lobe Morphometric measurements of the species presented in Table 1, and its photograph shown in Fig. 2, Fig. 3 and Fig. 4. Although detailed morphometric measurements of *C. altimus* caught from this study is shown in Table 1 with some values from a previous study. The related values are similar in both studies but there are not enough value to make a good discussion. Also, some records of *C. altimus* in the Mediterranean Sea were given in the Table 2.

Table 1: Some morphometric measurements (cm) of *Carcharhinus altimus* compared with values of another study

Measurements	This study		Moftah <i>et al.</i> [20]	
	Values (cm)	TL %	Values (cm)	TL %
Total length	65.2	100	-	100
Fork length	53.0	81.3	52.4	80.4
Standard length	48.5	74.4	-	-
Head length	15.8	24.2	14.2	21.8
Eye diameter	0.9	1.4	-	-
Preorbital length	5.8	8.9	-	-
Postorbital length	8.8	13.5	-	-
Interorbital distance	6.5	10.0	-	-
Spiracle length	1.0	1.5	-	-
Spiracle width	0.3	0.5	-	-
Distance between spiracle	3.6	5.5	-	-
Mouth width	5.6	8.6	-	-
Snout to mouth	4.8	7.4	-	-
Snout to eye	5.6	8.6	-	-
Snout to first gill-slit	13.5	20.7	-	-
Snout to first dorsal	21.0	32.2	-	-
Snout to pelvic	34.8	53.4	-	-
Snout to spiracle	3.4	5.2	-	-
Predorsal length	21.0	32.2	18.3	28.0
First Dorsal-fin base length	7.0	10.7	-	-
First Dorsal-fin height	6.4	9.8	-	-
First dorsal fin width	9.6	14.7	-	-
Second Dorsal-fin base length	2.1	3.2	-	-
Second dorsal fin width	4.5	6.9	-	-
Interspace between first and second dorsal fin base	14.3	21.9	-	-
Second dorsal to upper caudal	4.3	6.6	-	-
Pectoral length	10.5	16.1	-	-
Pre-pectoral fin length	13.5	20.7	12.8	19.6
Pelvic-fin base length	2.8	4.3	-	-
Pre-pelvic length	34.5	52.9	32.5	49.8
Pre-caudal fin length	43.0	66.0	47.5	72.9
Pre-anal fin length	37.5	57.5	-	-
Anal-fin base length	2.4	3.7	-	-
Pelvic to anal	5.3	8.1	-	-
Anal to lower caudal	10.8	16.6	-	-
Caudal peduncle length	4.3	6.6	-	-
Peduncle depth	2.6	4.0	-	-
Upper caudal legend	16.0	24.5	-	-
Lower caudal legend	6.2	9.5	-	-
Body depth	10.1	15.5	8.5	13.1
Body width	7.7	11.8	-	-
Total tooth row in upper/lower jaws	1/2	-	-	-
Total teeth in upper/lower jaws	10/26	-	-	-

Table 2: Some historical records of *Carcharhinus altimus* from Mediterranean Sea

Location	Country	N	Total Length (cm)	Total Weight (kg)	Year	References
Mersin Bay	Turkey	1	65.2	2.2	2019	Present study
Levant Sea	Israel	1	44.0	-	1996	Golani [8]
Yumurtalık Coast of N.E. Mediterranean Sea	Turkey	1	64.3	-	1994-1996	Basusta and Erdem [13]
Algerian Coast of Southern Mediterranean Sea	Algeria	41	Females: 132-214 Males: 115-282	Females: 7.2-39 Males: 12.5-114	1996-2002	Hemida <i>et al.</i> [7]
Mediterranean Sea	Greece	-	-	-	Until 2005	Zenetos <i>et al.</i> [10]
Southern Italy Central Mediterranean Sea	Italy	1	280	-	2000-2009	Sperone <i>et al.</i> [9]
Alexandria coast of Egyptian Mediterranean Sea	Egypt	14	54.62- 160.82	-	2017-2018	Azab <i>et al.</i> [29]

4. Discussion

In this study, a juvenile individual belonging to *C. altimus* species caught in Mersin Bay (Northeastern Mediterranean, Turkey). Although detailed morphometric measurements of the individual were made and presented in Table 1. Due to the

lack of morphometric measurements in the existing recording studies, these measurements could not be compared with the literature.

Carcharhinus altimus and *C. plumbeus*, are known to be very closely related [19]. Moftah *et al.* [20] stated in their study some

difficulty in using matching engines to distinguish between the two closely related species *C. altimus* and *C. plumbeus*. However, Serena [4] has reported that *C. altimus* may be synonymous with *C. radamae*, *C. obscurus*, *C. plumbeus* or errors may be made in the identification of the species. Two characteristics distinguish *C. altimus* from other species of *Carcharhinus* genus. One is that the first dorsal fin starts at the middle or end of the pectoral fin (Fig. 3). Another distinguishing feature is that the nose is long, and the distance between the nostrils (externally) is equal to or wider than the mouth width and long triangular upper teeth (Fig. 4). The characteristics that distinguish *C. altimus* from other species explained below.



Fig 3: Position of the 1st dorsal-fin relative to the pectoral-fin



Fig 4: The upper and lower teeths of *C. altimus*

Carcharhinus brachyurus has a large nose; in *Carcharhinus brevipinna* the gap between the nostrils is short and narrower than the mouth width. In *Carcharhinus falciformis*, the width between the nostrils is equal to or less than the width of the mouth. When we look at *Carcharhinus limbatus*, the gap between the nostrils is narrower than the width of the mouth and that there are marked black spots on the tip of the fins. For *Carcharhinus melanopterus*, the nose is round, the distance between the nostrils is shorter than the mouth width, and the end of the dorsal fin has a black spot. While considering *C. obscurus*, the first dorsal fin located behind the pectoral fin, the nose is round, and the distance between the nostrils is narrower than the mouth width. In *C. plumbeus*, the first dorsal fin is longer and semifalcate, and the distance between the nostrils is narrower than the mouth width [4].

Although the bignose shark *C. altimus* is a circumglobal species, its distribution in the Mediterranean is limited, and its migration occurs from the Strait of Gibraltar. It occurs mainly on the edge of continental shelves in deep water ranging from 12-430 m (more common 80-220 m), but it is very occasional captures in shallower water [21].

The bignose shark *C. altimus* is occasionally taken as bycatch in bottom trawl nets in the Mediterranean Sea [22]. Hemida *et al.* [7] and Fowler *et al.* [23] stated that this species is also taken as bycatch in the deepwater pelagic longline fishery operating in the eastern Algerian ports. The species has more records in

the western and central Mediterranean compared to the Northeast Mediterranean. Only two records have been reported from the northeastern Mediterranean [8, 13]. The species reported in this study is the first which have morphometric recordings. This specimen is a juvenile individual according to the maximum total length reported in the literature. The previously reported [13] bignose shark species from Turkey is known to have a 64.3 cm total length. These species are few and flock behind the shoals alone, so they are caught by chance in the nets of commercial fishermen. These are rare species for fishermen due to this behavior. Both of the specimens caught by chance in Turkey (this study and Basusta and Erdem) [13] were juveniles. It shows that these specimens came to shallow waters while following small bony fish shoals. These two juvenile individuals belonging to the *C. altimus* species are more likely to be born in the Levant basin than the immigration. Their parents are highly likely to be found in the deep waters of the northeastern Mediterranean. This finding may indicate that this circumglobal species may also spread in the Northeast Mediterranean.

The number of cartilaginous fish is less than that of bony fishes since they reach later reproductive maturity and give fewer offspring at one time. Under normal conditions, they belonging to off-target catch. However, the catch of these species to off-target fishing equipment endangers their generations. Therefore, fishermen should be informed about this issue and individuals who caught the fishing equipment should be left to the sea immediately.

Also, according to the International Union for Conservation of Nature (IUCN) Red List records, the global population trend of this species is unknown [24]. To know the population trend of a species is very important for the sustainability of their generation. For this, the population trend of the species should controlled through data sharing and long-term marking studies worldwide.

5. Conclusion

The study suggested that this species rare occurrence from Eastern Mediterranean and Turkey waters. Also the bignose shark *C. altimus* has been assessed as a data deficient "DD" species and placed on the International Union for Conservation of Nature (IUCN) Red List of the in the Global list [25] and Mediterranean list [26] and up to date not evaluated in the CITES [27] and CMS [28]. Thus, this species may be re-considered for Mediterranean waters and Levantin basin, and immediately identified as a high priority for conservation of this species in the region. Besides, continuous studies are needed in this region for further investigation and monitoring of these species. This research will make a significant contribution to many researchers working in this field in the future.

6. Acknowledgement

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