- SHORT COMMUNICATION -

New Record of *Carcharhinus brevipinna* (Müller & Henle, 1839) from Mersin Bay, the Northeastern Mediterranean

Deniz Ayas¹, Nuray Çifçi¹, Hasan Deniz Akbora¹,²*

¹Faculty of Fisheries, Mersin University Yenişehir Campus, 33160, Mersin, Turkey
²Department of Biological Sciences, Faculty of Arts and Sciences, Eastern Mediterranean University, Famagusta 99628, North Cyprus via Mersin 10, Turkey

Abstract

In this study, it was aimed to present the morphometric and meristic data of *Carcharhinus brevipinna* (Müller & Henle, 1839) which caught from Mersin Bay (coordinate: 36°13'44.8"N 34°01'42.1"E, 36°14'28.2"N 34°02'19.6"E) in February 2019. The total length of this shark specimen, which caught from a depth of 20 m, is 115 cm, and its weight is 11.5 kg. Morphometric measurements of the individual made, its photographs were taken and given the catalog number (MEUFC-19-11-104) and recorded in the Museum of the Systematic, Faculty of Fisheries, Mersin University.

Keywords: *Carcharhinus brevipinna*, Mersin Bay, Northeastern Mediterranean Sea

Article history:

Received 16 September 2019, Accepted 23 October 2019, Available online 30 October 2019

Introduction

*Carcharhinus brevipinna* belongs to the Carcharhinidae family of Carcharhiniformes. De Maddalena & Della Rovene (2005) have stated that there are twelve species of *Carcharhinus* “*C. altimus, C. brachyurus, C. brevipinna, C falciformis, C. limbatus, C. obscurus, C. plumbeus, C. acarenatus, C. longimanus, C. melanopterus, C. signatus, and C. amboinensis*” in the Mediterranean Sea. However, the presence of eight species of *Carcharhinus* in the Mediterranean reported by Notarbartolo di Sciara and Bianchi (1998) and Serena (2005). Even though *C. melanopterus* and *C. longimanus* are recorded in the Mediterranean (Tortonese, 1951; Fergusson, 1994; Barrull & Mate, 2002), there is no evidence to prove the existence of these species. Some researchers argue that the presence of these species in the Mediterranean is questionable (Garrick, 1982; Fergusson, 1994; Golani et al., 2002; Moreno, 2004; Serena, 2005). *C. acarenatus* was

* Corresponding Author: Hasan Deniz Akbora, E-mail: hasan.deniz@emu.edu.tr
reported to be the synonym of *C. brachyurus* (Serena, 2005). There were errors in taxonomic identification between *C. brevipinna* and *C. limbatus*. By investigations, morphological differences of both species determined, and mistakes in the definition were corrected (Branstetter, 1982).

Since sharks are difficult to sample, studies on their populations are quite limited. Studies have shown that *C. plumbeus* has a wide distribution from the Northern Mediterranean to the Southern Mediterranean, from Algeria to the Aegean Sea and has been caught by the nets of professional fishermen (Hemida & Labidi, 2001a, 2001b). *C. brevipinna, C. brachyurus, C. limbatus*, and *C. obscurus* from the East and West Mediterranean Sea, *C. altimus*, and *C. falciformis* were recorded from the Western Mediterranean (Golani et al., 2002). *C. brevipinna* was observed and photographed in 1998 during an amateur diving in Gökova Special Environmental Protection Area (Filiz & Kabasakal, 2015). *C. falciformis* has been reported as only irregular in the Western Mediterranean, as limited from the Alboran Sea, Algeria, Southern Spain, and the Eastern Atlantic (Barrull & Mate, 2002; Hemida et al., 2002; Moreno, 2004).

While *C. brevipinna* offspring live near the shore, adults live in groups near the coast. (Castro, 1993; Carlson & Brusher, 1999; Thorpe et al., 2004; White & Potter, 2004; Reid et al., 2011). For this reason, it has been reported that the fishing pressure in the coastal waters can easily affect them. Although it has been listed as a threatened species by the IUCN (Burgess, 2009), the studies indicate that there is no change in the stocks of the species (Carlson et al., 2012). It has been stated that the knowledge of the stock density of coastal sharks, including *C. brevipinna*, was insufficient (Carlson et al., 2009). While the presence of *C. brevipinna* in the Mediterranean is suggested to be caused by the connection of the Mediterranean to Atlantic, the species also included in the list of Lessepsian species of the Mediterranean Sea (Ben-Truvia, 1985).

*C. brevipinna* mostly feeds with shark, rays, skates, cephalopods, and crustaceans (Allen & Cliff, 2000). The maximum total length of the species reported in the literature is 300 cm (Sanches, 1991), and the maximum weight is 87.9 kg (IGFA, 2001).

In this study, the record of a juvenile specimen of *C. brevipinna*, caught at a depth of 20 m in the Mersin Bay in February 2019, is recorded. Morphometric and meristic measurements of the species were made to contribute to the ichthyological records of this study.

**Material and Methods**

A female juvenile sample of *C. brevipinna* was caught in an 80-mm trammel net during commercial fishing around 5 am, at a depth of 20 m from the Taşucu coast in the Gulf of Mersin, (coordinates: 36°13′44.8″N, 34° 01′42.1″E and 36°14′28.2″N, 34°02′19.6″E) in February 2019. The site of the capture of *C. brevipinna* is shown in Figure 1. The information given in Compagno (1984) was used to identify the species. Sioueiros (1990)'s morphometric measurements were revised, and the measurements of the specimen made its photographs taken, and catalog number (MEUFC-19-11-104) given. The juvenile *C. brevipinna* specimen was preserved in 4% formaldehyde and was deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University (Figure 2).
Results

In the study, one juvenile specimen of *C. brevipinna* caught as a by-catch in Mersin Bay. Some morphometric measurements of the captured sample were determined (Table 1). According to the reported maximum length in the literature, it is determined that the individual was a juvenile. Some morphometric characters reported in the literature used in the identification of the species. The first dorsal fin located behind the pectoral fin. The first dorsal fin is perpendicular to the body, and the end is round. The height of the first dorsal fin is 10.6 cm, and the snout to the eye is 11.8 cm. The interspace between the first and second dorsal fin base/first dorsal-fin base length was determined to be 2.3. The eye diameter is 1.8 cm. The height of the first gill is 3.8 cm. The eye diameter is
56% of the first gill. The width of the spiracle was 0.3 cm, and its ratio to the eye diameter was 16.6%.

Table 1. Some morphometric measurements (cm) of *C. brevipinna*

| Measurement                                      | Value  |
|-------------------------------------------------|--------|
| Total length                                     | 115    |
| Fork length                                      | 91     |
| Standard length                                  | 82     |
| Head length                                      | 22     |
| Eye diameter                                     | 1.8    |
| Preorbital length                                | 10.3   |
| Postorbital length                               | 15.7   |
| Interorbital distance                            | 13.3   |
| Spiracle length                                  | 1.4    |
| Spiracle width                                   | 0.3    |
| Distance between spiracle                        | 7.1    |
| Mouth width                                      | 10.9   |
| Snout to mouth                                   | 9.3    |
| Snout to eye                                     | 11.8   |
| Snout to first gill-slit                         | 14     |
| Snout to first dorsal                            | 31     |
| Snout to pelvic                                  | 52     |
| Snout to spiracle                                | 6      |
| Predorsal length                                 | 37     |
| First Dorsal-fin base length                     | 11     |
| First Dorsal-fin height                          | 10.6   |
| First dorsal fin width                           | 0.8    |
| Second Dorsal-fin base length                    | 4.2    |
| Second dorsal fin width                          | 0.08   |
| Interspace between first and second dorsal fin base| 25    |
| Second dorsal to upper caudal                    | 7.8    |
| Pectoral length                                  | 20.2   |
| Pelvic-fin base length                           | 6.2    |
| Pre-pelvic length                                | 58     |
| Anal-fin base length                             | 4.5    |
| Pelvic to anal                                   | 9.3    |
| Anal to lower caudal                             | 6      |
| Caudal peduncle length                           | 58     |
| Peduncle depth                                   | 4.7    |
| Upper caudal legend                              | 32.8   |
| Lower caudal legend                              | 15     |
| Body depth                                       | 16     |
| Body width                                       | 13     |
| Total tooth row in upper/lower jaws              | 1/2    |
| Total teeth in upper/lower jaws                  | 32-35/31-34 |
Discussion

In this study, the total length of the caught female individual measured as 115 cm. According to size information given in Compagno (1984), the specimen is a juvenile.

The similarity of *C. brevipinna* with *C. limbatus* caused taxonomic errors. However, as a result of the studies conducted with both species, morphometric differences between these two species determined, and taxonomic errors corrected (Branstetter, 1982). The most compelling character that separates *C. brevipinna* from *C. limbatus* is the position of the dorsal fin and the pectoral fin. The first dorsal fin of *C. brevipinna* located on the posterior of the pectoral fin. The first dorsal fin of *C. limbatus* situated in the anterior or near anterior of the pectoral fin (Branstetter, 1982). In this study, the first dorsal fin of the specimen located behind the pectoral fin. The other distinctive character is a relative difference in the dorsal fin height. The first dorsal fin height was found to be equal to the snout to eye distance in *C. brevipinna* and longer in *C. limbatus* (Casey, 1964; Schwartz and Burgess, 1975). In the sample, the first dorsal fin height and the snout to eye distance are equal. Another character was the comparison of the gap between the two dorsal fins with the length of the first dorsal fin. In *C. brevipinna*, the distance between the two dorsal fins was found to be 2.2 times more than the first dorsal fin height and less in *C. limbatus* (Bass et al., 1973; Compagno, 1978). This ratio in our sample was determined to be 2.3. Dorsal fin shape is also distinctive in these species. The first dorsal fin posterior part of *C. brevipinna* is perpendicular to the body axis, and the end is round, while in *C. limbatus* the first dorsal fin is slightly sickle in the posterior (Branstetter, 1982). In this case, the first dorsal fin is perpendicular to the body axis, and the posterior part is quite round (Figure 2).

Another characteristic feature is the eye diameter. The eye diameter of *C. brevipinna* is smaller than *C. limbatus*. The diameter eye of the specimen in this study is 1.8 cm. The eye diameter of *C. brevipinna* was less than 25% of the length of the first gill, and it was found to be more than 33% in *C. limbatus* (Bigelow and Schroeder 1948; Casey, 1964; Schwartz and Burgess, 1975). This sample, which caught from Mersin Bay, was found to be compatible with the definition of the species in the reference literature.

The species belonging to the Carcharhinidae family are circumglobal. *C. brevipinna* found in the Northeastern Mediterranean cartilaginous fish list reported from the Turkish coast (Turan et al., 2018). However, no specific studies conducted in this region relating to *C. brevipinna*. For this reason, the morphometrics given in this study will contribute to the ichthyological records.

Acknowledgment

This study was supported by the Research Fund of Mersin University in Turkey with Project Number: 2017-2-AP2-2353.

References

Allen, B. R. & Cliff, G. (2000). Sharks Caught in the Protective Gill Nets Off Kwazulu-Natal, South Africa. 9. the Spinner Shark *Carcharhinus brevipinna* (Müller And Henle). *South African Journal of Marine Science*, 22, 199-215.

Ben-Tuvia A. (1985). The Impact of the Lessepsian (Suez Canal) Fish Migration on the Eastern Mediterranean Ecosystem. In: Moraitou-Apostolopoulou M., Kiortsis V. (eds)
Barrull, J. & Mate, I. (2002). Tiburones del Mediterráneo. 290 p. Arenys de Mar: El Set-ciències.

Bass, A. J., D’aubrey J. D. & Kistnasamy. N. (1973). Sharks of the east coast of southern Africa. 1. The genus Carcharhinus (Carcharhinidae). Oceanogr. Res. Inst. (Durban) Invest. Rep. 33.

Bigelow, H. B., & Schroeder, W. C. (1948). Sharks. In: Fishes of the western North Atlantic. Mem. Sears Foundation Mar. Res. 1, Part 1:59.

Branstetter, S. (1982). Problems Associated with the Identification and Separation of the Spinner Shark, Carcharhinus brevipinna, and the Blacktip Shark, Carcharhinus limbatus. American Society of Ichthyologists and Herpetologists (ASIH). 1982(2), 461-465.

Burgess, G.H. (2009). Carcharhinus brevipinna. IUCN Red List of Threatened Species website. Available: http://www.iucnredlist.org/details/39368/0. Accessed 2013 September 7.

Carlson, J.K., Brusher, J.H. (1999). An index of abundance for coastal species of juvenile sharks from the northeast Gulf of Mexico. Mar Fish Rev., 61: 37-45.

Carlson, J.K., Hale, L.F., Morgan, A. & Burgess, G. (2012). Relative abundance and size of coastal sharks derived from commercial shark longline catch and effort data. J Fish Biol80: 1749-1764. doi:https://doi.org/10.1111/j.1095-8649.2011.03193.x. PubMed: 22497406.

Carlson, J. K., Mc Candless, C., Cortés, E., Grubbs, R. D., Andrews, K. I., MacNeil, M. A. & Musick, J. A. (2009). An update on the status of the sand tiger shark, Carcharias taurus, in the northwest Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-585.

Casey, J. G. (1964). Angler's guide to sharks of the northeastern United States-Maine to Chesapeake Bay. US Fish Wild Ser. Circ. 179.

Castro, J.I. (1993). The shark nursery of Bulls Bay, South Carolina, with a review of the shark nurseries of the southeastern coast of the United States. Environ Biol Fishes 38: 37-48. doi:https://doi.org/10.1007/BF00842902.

Compagno, L. J. V. (1978). Sharks. In: FAO species identification sheets-western central Atlantic. Vol. 5. W. Fischer (ed).

Compagno, L. J. V. (1984). Sharks of the World. An annotated and illustrated catalogue of shark species known to date. Part 2: Carcharhiniformes [Internet]. FAO species catalogue. Roma: FAO. Vol. 4, Part 2. FAO Fish. Synop, 125(4/2), 251-655.

De Maddalena, A. & Della Rovene, G. (2005). First Record of the Pigeye Shark, Carcharinus amboinensis (Müller & Henle, 1839), in the Mediterranean Sea. ANNALES Ser. Hist. Nat.,15(2): 209-212.

Fergusson, I. K. (1994). Check-list of sharks species frequenting the Mediterranean Sea. In: Proc. of the 2nd European Shark and Ray Workshop, Peterborough (England) (Fowler S.L. & Earll R.C., eds), pp. 49-51. Joint Nature and Conservancy Council (JNCC).
Filiz, H., & Kabasakal, H. (2015, July). Photographic Record of the Spinner shark, *Carcharhinus brevipinna* (Müller & Henle, 1839), in Gökova Bay (South Aegean Sea, Turkey)/Avvistamento Fotografico Dello Squalo Tissitore, *Carcharhinus brevipinna* (Müller & Henle, 1839), Nel Golfo di Gökova (Mar Egeo Meridionale, Turchia). In *Annales: Series Historia Naturalis* (Vol. 25, No. 2, p. 123). Scientific and Research Center of the Republic of Slovenia.

Garrick, J.A.F. (1982). Sharks of the genus Carcharhinus. NOAA Tech. Rep. NMFS, 445: 1-194.

Golani, D., Orsi-Relini, L., Massut, I. E. & Quignard, J.P. (2002). CIES M Atlas of Exotic Species in the Mediterranean. Vol. 1. Fishes (Briand F., Ed.), 256 p. CIESM Editions.

Hemida, F. & Labidi, N. (2001a). Nouvelle liste commentée des requins de la côte algérienne. *Rapp. Comm. Int. Exp. Sci. Mer Méditr.,* 36, 273.

Hemida, F. & Labidi, N. (2001b). Notes on the Carcharhinids of the Algerian basin. In: Proc. 4th Europ. Elasm. Ass. Meet., Livorno (Italy), 2000 (Vacchi M., La Mesa G., Serena F. & Séret B., eds.): 192.

Hemida, F., Seridji, R., Labidi, N., Bensaci, J. & Capapé, C. (2002). Records of Carcharhinus spp (Chondrichthyes: Carcharhinidae) from off the Algerian coast (southern Mediterranean). Act: Adriat. 43: 83-92.

IGFA, (2009). Database of IGFA angling records until 2009. IGFA, Port Aransas, Texas, USA.

Moreno, J.A. (2004). Guía de los Tiburones de aguas Ibéricas, Atlántico Nororiental y Mediterráneo. 315 p. Barcelona: Ediciones Omega.

Notarbartolo Di Sciara G. & Bianchi I. (1998). Guida degli squali e delle razze del Mediterraneo. Franco Muzzio Ed.: 388 pp.

Reid, D.D., Robbins, W.D. & Peddemors, V.M. (2011) Decadal trends in shark catches and effort from the New South Wales. Australia: Shark Meshing Program. pp. 1950-2010. *Mar Freshw Res*62: 676-693.

Sanches, J.G., (1991). Catálogo dos principais peixes marinhos da República de Guiné-Bissau. Publ. Avuls. Inst. Nac. Invest. Pescas 16:429 p.

Schwartz, F. J., & Burgess, G. H. (1975). Sharks of North Carolina and adjacent waters. Infor. Ser. N. Carolina Dept. Nat Econ. Res.; Div. Mar. Fish.

Serena F.(2005). Field Identification Guide to the Sharks and Rays of the Mediterranean and Black Sea. FAO Species Identification Guide for Fishery Purposes. 97 p.+ 11 colour plates + egg cases. Rome: FAO.

Sioueiros-Beltrones, D. A. (1990). Morphometric analysis of sharks of the genus Carcharhinus Blainville, 1816: C. limbatus (Valenciennes, 1841) and *C. brevipinna* (Muller & Henle, 1841) from Mexican waters. Scientia Marina, 54, 349-358.

Thorpe, T., Jensen, C.F. & Moser, M.L. (2004). Relative abundance and reproductive characteristics of sharks in southeastern North Carolina coastal waters. *Bull Mar Sci* 74: 3-20.
Tortonese, E. (1951). Studi sui Plagiostomi.V. Ulteriori considerazioni sulle specie Mediterranee dei generi Sphyrna e Carcharhinus. *Doriana, 1*(20): 1-8.

Turan, C., Gürlek, M., Başusta, N., Uyan, A., Doğdu, S. A., & Karan, S. (2018). A Checklist of the Non-indigenous Fishes in Turkish Marine Waters. *Natural and Engineering Sciences, 3*(3), 333-358.

White, W.T. & Potter, I.C. (2004). Habitat partitioning among four elasmobranch species in nearshore, shallow waters of a subtropical embayment in Western Australia. *Mar Biol145*: 1023-1032. doi:https://doi.org/10.1007/s00227-004-1386-7.