

Young-of-the-year sandbar shark, *Carcharhinus plumbeus* (Nardo, 1827) (Carcharhiniformes: Carcharhinidae), caught in Iskenderun Bay

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Abstract

On 26th of December 2019, a sandbar shark, *Carcharhinus plumbeus* (Nardo, 1827), was incidentally captured by a stationary-net, deployed nearly 40 m of depth, off Arsuz coast. Because of the presence of a partially healed birth mark, examined sandbar shark was considered as young-of-the-year specimen. Arsuz coast and in a broad perspective Iskenderun Bay can be served as a nursery ground for *C. plumbeus*, a promising possibility for the survival of an endangered shark species in the Mediterranean Sea. The leucism seen on the examined specimen was one of the very rare examples of an atypical character reported for *C. plumbeus*.

Keywords: Sandbar shark, Juvenile, Levantine Sea, Nursery, Leucism.

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Introduction

The sandbar shark, *Carcharhinus plumbeus* (Nardo, 1827), is one of the 8 species of the genus *Carcharhinus*, occurring in the Mediterranean Sea (Otero et al. 2019), and in most tropical oceans (Ebert and Stehmann 2013). Its presence in Turkish waters is confined to south Aegean and Mediterranean waters (Kabasakal 2020). It is the only carcharhinid shark, of which the reproductive biology has been extensively investigated in the Mediterranean waters, and the subsequent research effort on this critical issue has been started with the pioneering study by Capapé (1984). Regarding the reproduction and survival of the Mediterranean sandbar shark populations, studies dealing with the new-born and young-of-the-year (YOY) specimens have special significance (Lipej et al. 2000, 2008; Consoli et al. 2004; Bradaï et al. 2005; Saïdi et al. 2005; Capapé et al. 2018), in order to mapping both the nursery grounds and spatio-temporal distribution of the young sandbar sharks. Consequent upon these studies, today Gulf of Gabès, southern Tunisian waters, is considered as an active nursery of the sandbar shark (Capapé 1984; Bradaï et al. 2005; Saïdi et al. 2005; Capapé et al. 2018), and moreover, the Adriatic Sea (Lipej et al. 2000, 2008; Consoli et al. 2004) and Boncuk Cove in southern Aegean Sea, Turkey (Filiz 2018) are suggested as critical regions for the reproduction of *C. plumbeus*, in the Mediterranean Sea. In the present work, authors report on the capture of a YOY sandbar shark in Iskenderun Bay, an important fishing ground and a suggested nursery ground of *C. plumbeus*, in the northeastern Levantine waters.

Material and Methods

Since *C. plumbeus* is an endangered shark species in the Mediterranean Sea (Otero et al. 2019), considered as a protected species in the inventory of Turkish Fisheries Act Marine Protected Species (Öztürk 2018), sampling strategy of the present article was one of the many examples of the typical opportunistic research, consisting in dead animal sampling (Jessup 2003). Total length and selected biometric measurements were recorded by the third author on site, to the nearest millimeter by a measurement tape. Biometrical measurements follow Ebert and Stehmann (2013). Specimen was weighed by an electronic scale to the nearest gram. Species identification and taxonomic nomenclature follow Ebert and Stehmann (2013). Taxidermied sample is being preserved in the



Figure 1. Lateral view of the examined juvenile sandbar shark, 68 cm of TL.



Figure 2. Approximate locality of capture (*) of the examined specimen.

personal collection of the third author. Photographs of the examined specimen are being kept in the digital archives of the authors, and available for further inspection on request.

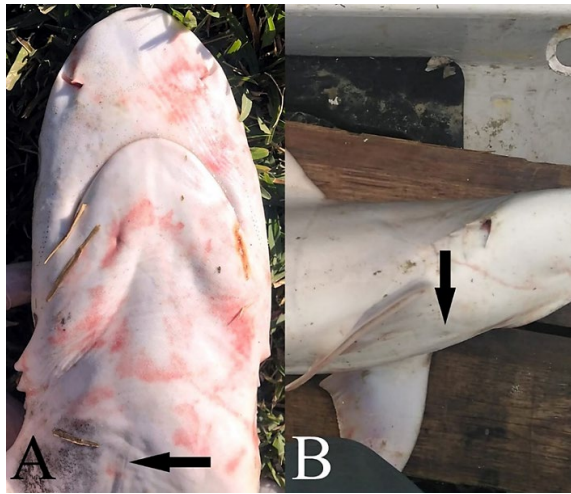
Results

On 26th of December 2019, a female sandbar shark (Fig. 1) was incidentally captured by a stationary-net, deployed nearly 40 m of depth, off Arsuz coast (Fig. 2). Species of the examined shark was identified as *C. plumbeus* based on the following descriptive characters, which are coincided with those stated by Ebert and Stehmann (2013): A fairly stocky body, with a short and broadly rounded snout; eyes circular and moderately large; first dorsal fin is tall and its origin well over pectoral fin insertion; upper teeth broad, high-cusped and triangular with serrated edges; interdorsal ridge is present; almost whitish light grey above and whitish below; no conspicuous markings on fins; completely unpigmented or very light shaded areas seen on the dorsal surface. The examined specimen and ventral view of head is depicted in Figures 1 and 3. Biometrical measurements of the examined specimen and some selected specimens extracted from several references are presented in Table 1.

An almost healed birth mark or umbilical scar is hardly visible on ventral side, on the midpoint of a line joining origins of the pectoral fins (Fig. 2). Because of the presence of this almost healed birth mark, examined

Table 1. Morphometric measurements of the present specimen and the specimens reported in several references.

Measurement	Present specimen		Lipej et al. (2000) Specimen 1		Lipej et al. (2000)		Consoli et al. (2004)		Lipej et al. (2008)		Capapé et al. (2018)	
	cm	% of TL	cm	% of TL	cm	% of TL	cm	% of TL	cm	% of TL	cm	% of TL
Total length	68	-	71	-	81.5	-	75	-	70.5	-	89	-
Head length	16.7	24.6	19	26.8	21	25.8	17.5	23.3	17.3	24.5	17	19.1
Eye length	0.9	1.3	0.9	1.3	1.2	1.5	1.1	1.5	1	1.4	1.1	1.2
First dorsal length	12	17.6	11.6	16.3	12.3	15.1	12.4	16.5	12.5	17.7	-	-
Second dorsal length	5.4	7.9	5.1	7.2	5.8	7.1	6.5	8.7	5.6	7.9	-	-
Pectoral anterior margin	9.2	13.5	12	16.9	13.3	16.3	13.2	17.6	12.3	17.4	14	15.7
Pelvic length	5.8	8.5	5.4	7.6	6.5	8.0	6.2	8.3	6	8.5	-	-
Anal length	5.3	7.8	5.4	7.6	6	7.4	5.9	7.9	5.5	7.8	-	-
Caudal fork length	6	8.8	6.1	8.6	6.2	7.6	6	8.0	6.2	8.8	-	-

**Figure 3.** Ventral view (A) and ventro-lateral view (B) of the head of the examined specimen. Arrows denote the partially healed umbilical scar.

sandbar shark was considered as young-of-the-year (YOY) specimen.

Discussion

Carlson (1999) and Bradai et al. (2005) define sandbar sharks with an open or partially healed umbilical scar, as neonates and YOY. According to Ebert and Stehmann (2013), size at birth of sandbar sharks ranged from 56 to 75 cm. The size of birth of *C. plumbeus*, occurring in the Mediterranean Sea, ranging from 45 cm (Bradai et al. 2005; Saïdi et al. 2005) and 65 cm (Capapé 1984; Bradai et al. 2005; Saïdi et al. 2005); however, in western Atlantic waters, the maximum size at birth recorded was 72 cm (Carlsson 1999), for overall north Atlantic is 75 cm (Ebert and Stehmann 2013). Size at birth ranges of *C. plumbeus*, reported in several references is summarized in Table 2. Due to the total length of the examined specimen (68 cm) and the presence of a partially healed umbilical scar (Fig. 2), it was considered as a YOY specimen. In addition to Gulf of Gabès waters, new-born, YOY or juvenile sandbar sharks have recorded elsewhere throughout the Mediterranean Sea. Consoli et al. (2004) reported on a juvenile specimen (75 cm of TL) caught in southern Tyrrhenian Sea. Two juvenile sandbar sharks (71.0 and 81.5 cm of TL), which entangled in entangling nets deployed in Gulf of Trieste waters (northern Adriatic), were reported by Lipej et al. (2000), followed by the occurrence of a further third specimen (70.5 cm of TL) in the same region (Lipej et al. 2008). In the northeastern limit of the Mediterranean Sea, Başusta (2016) and Başusta et al. (1998) reported several juvenile sandbar sharks (>54.5 cm of TL) in waters of Iskenderun Bay. During the first 12 months of sandbar shark monitoring in Turkey, Filiz and Gülşahin (2015) and Filiz (2016) observed newborn or juvenile sandbar sharks, accidentally caught in coastal longline or gill-net fishery in the vicinity of Boncuk Cove, where year-round aggregations of adult

sandbar sharks were recorded (Filiz 2018).

In the majority of the studies, it has found that catches of juvenile sandbar sharks were significantly higher from spring to summer, then gradually lowering from autumn to winter (Capapé 1984; Carlson 1999; Bradaï et al. 2005). According to Capapé (1984), in waters of Gulf Gabès, highest number of the juveniles of *C. plumbeus* (n=140) was observed in summer months. Bradaï et al. (2005) and Saïdi et al. (2005) stated that, while the neonates were captured from July to October in the waters of Gulf of Gabès, significantly higher catches of juveniles were recorded from May to September. Similarly, abundance and size of young sandbar sharks varied with season in northeastern Gulf of Mexico, where first neonates were first capture in June and YOY sandbar sharks continued to be caught through October (Carlson 1999). Sporadic captures of juvenile sandbar sharks (n = 3; ≥ 70 cm of TL) in Gulf of Trieste, were recorded in mid to late October (Lipej et al. 2000, 2008). Consoli et al. (2004) reported on the capture of juvenile sandbar shark (75 cm of TL) in December. In the Gökova Bay, juvenile or newborn sandbar sharks are randomly caught with longlines and gillnets during spring and early summer in the middle (unprotected area) of the Gokova Bay (Filiz 2016). Boncuk Cove in the Gökova Special Environmental Protection Area (SEPA), is a critical habitat for sandbar shark since the cove has been used as a nursery area by this species (Filiz and Gülşahin 2015). Furthermore, Filiz (2018) observed a peak in the aggregations of adult females in May and June, followed by a decrease in July and August, then peaked again in September, then a gradual decrease till December. Based on his two-year observations in cove waters, Filiz (2018) hypothesized that in July and August females may leave the cove to give birth in deeper parts of the Boncuk Cove or to other unknown areas. The examined specimen was captured in late December, which coincides with the capture dates of YOY sandbar sharks, elsewhere in the Mediterranean.

According to Carlson (1999), neonate sandbar sharks (<age 1) usually reside in primary nursery areas, where they were born through the first summer; and same authors emphasized that it's unlikely that YOY individuals underwent significant migrations to another area. Despite this fact, in an extensive research on the distribution and movement of young sandbar sharks in Delaware Bay, Merson and Pratt, Jr. (2001) found that tagged juveniles can move as far as nearly 950 km from the release location. Based on the information given by Carlson (1999) and Merson and Pratt, Jr. (2001), it can be assumed that the present specimen either was born and resided off Arsuz coast or born elsewhere and migrated from another area. For the moment, available data do not allow us to give a reasonable answer to these questions; however, based on the occurrence of a specimen with a partially healed umbilical scar, as well as previous data (Başusta 2016; Başusta et al. 1998), provides further evidence that Arsuz coast and in a broad perspective Iskenderun Bay, can be served as a nursery ground for *C. plumbeus*, a promising possibility for the survival of an endangered shark species in the Mediterranean Sea.

Last but not least, the coloration of the present specimen is contrasting with the statements of Ebert and Stehmann (2013), of which the authors stated the coloration of *C. plumbeus* as grey-brown above. Although the coloration of the present specimen was almost whitish light grey above, the presence of large unpigmented areas on dorsal surface suggested leucism, an atypical character which was also observed on an embryo sandbar shark, caught in Gulf of Gabès (Saïdi et al. 2006). Since one of the main discrepancies between leucism and true albinism is the red or pinkish coloration of eyes in albinos, and dark pigmented eyes in leucistic animals (Clark 2002; van Grouw 2006), the sighted specimen was considered as a 'leucistic' sandbar shark, because of the presence of dark pigmented eyes (Fig. 1). According to Saïdi et al. (2006), the color of the Gulf of Gabès specimen was grey; however, large completely unpigmented areas were observed in the spaces between the first and second dorsal fins and both flanks. The leucism seen on the examined specimen was one of the very rare examples of an atypical character reported for *C. plumbeus*.

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