

An unusual record of the sharpnose sevengill shark, *Heptranchias perlo* (Bonnaterre, 1788), in waters of Slovenia (northern Adriatic Sea)

(Elasmobranchii, Hexanchiformes, Hexanchidae)

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Authors present a case of an unusual record of a specimen of the sharpnose sevengill shark *Heptranchias perlo* (Bonnaterre, 1788) from the Slovenian waters. The specimen was caught by trammel net in the coastal waters 0.5 NM off Strunjan (Gulf of Trieste, northern Adriatic Sea) on sedimentary bottom at a depth of 20 m on 21st December 2021. This report represents the first record of sharpnose sevengill shark in Slovenia. In addition, this is the first finding after it was last recorded in the Adriatic sea seventy years ago.

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Introduction

Three deep water demersal shark species of the family Hexanchidae were up to date recorded in the Adriatic Sea: the bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788), the bigeyed sixgill shark, *Hexanchus nakamurai* Teng, 1962, and the sharpnose sevengill shark, *Heptranchias perlo* (Bonnaterre, 1788) (Kovačić et al. 2020). *H. nakamurai* was only recently reported at the entrance of the Adriatic Sea (Bakiu et al. 2018).

The sharpnose sevengill shark is a less known shark species with a wide geographic distribution, being found in tropical and temperate regions (Boeseman 1984, Ebert et al. 2013). It is a medium-sized benthic shark mostly found on the bottom of the outer continental and insular shelves and upper slopes in depths of 100 to 400 m (Compagno 1984, Castro 2011), but also deeper down to 1000 m (Barrull & Mate 2002). There are some evidences that the sharpnose sevengill shark possibly aggregates near seamounts (sensu Frentzel-Beyme & Köster 2002). Recently it was filmed at a depth of 718 m in the Bahamas (Phillips et al. 2019). It is considered as a voracious

predator, preying mainly on fish and cephalopods (Braccini 2008), but also on smaller deepwater sharks (Capapé 1980). There are also known cases of cannibalism (Frentzel-Beyme & Köster 2002).

The findings of *H. perlo* are well documented throughout the Mediterranean Sea. During the last two decades the species was recorded in different Mediterranean areas such as in Turkish seas (Kabasakal & Ince 2008, Güven et al. 2012, Ergüden & Bayhan 2015), Tunisian waters (El Kamel-Moutalibi et al. 2014, Rafrafi-Nouira et al. 2015, Capapé et al. 2018), and in waters around Sicily (De Maddalena et al. 2002). In the waters off Sardinia, altogether 31 specimens of sharpnose sevengill shark were collected at depths ranging from 336 to 600 m during the period of 2009–2021 (Mulas et al. 2021). Since captures of this species are rare and the published records scarce, the biology and ecology of the species is poorly known. Specific works which took into account wider biological aspects such as the work of Capapé (1980) are still very rare (Karachle et al. 2020). In addition, the assessment of the population status of *H. perlo* in Mediterranean Sea is also difficult.

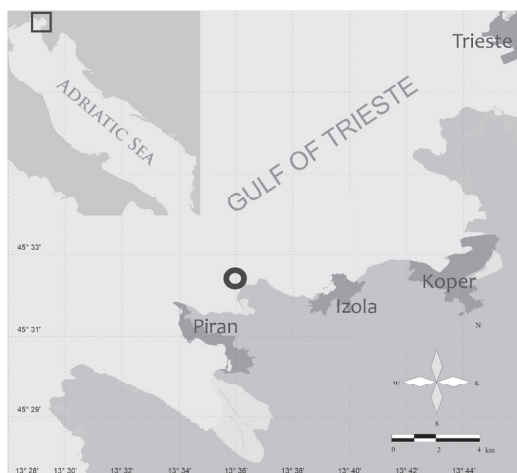


Fig. 1. The location of the sharpnose sevengill shark catch in the Gulf of Trieste.

On the basis of its life-history parameters, the sharpnose sevengill shark is considered a species with a relatively low reproductive output (De Carvalho et al. 2020). According to Başusta (2015), the area of North-eastern Mediterranean Sea (Iskenderun Bay) might be one of the breeding and nursery grounds for this species due to the occurrences of neonates.

The sharpnose sevengill shark was evaluated globally as a species with a IUCN status of near threatened (Finucci et al. 2020), while for the Mediterranean a status of data deficient species was assigned (Dulvy et al. 2016, Otero et al. 2019), due to restricted data on its abundance and distribution.

The scope of this contribution is to report on a case of a sharpnose sevengill specimen, captured in waters off Slovenia including its basic biological data.

Material and methods

The specimen of *Heptranchias perlo* was caught by trammel net in the coastal waters 0.5 NM off Strunjan (45°32'23.99"N, 13°36'5.67"E) (Fig. 1), Gulf of Trieste, northern Adriatic Sea) on the sedimentary bottom at a depth of 20 m on 21st December 2021. The specimen was brought to the Marine Biology Station of the National Institute of Biology in Piran where it was examined. Identification of the species follows Compagno (1984) and Compagno et al. (2001). It was measured to the nearest millimeter and weighed following the procedure recommended by Compagno (1984). A total of 54

Table 1. Biometric measurements in mm and as % total length (% TL) of a specimen of *Heptranchias perlo* with a total body mass of 1010 g.

Morphometric parameter	Abbrev.	Length	% TOT
Total length	TOT	728.00	100.00
Precaudal length	PRC	499.00	68.54
Pre-first dorsal length	PD1	361.00	49.59
Head length	HDL	134.40	18.46
Prebranchial length	PGL	108.81	14.95
Preorbital length	POB	39.46	5.42
Prepectoral length	PP1	136.76	18.79
Prepelvic length	PP2	298.41	40.99
Pectoral-pelvic space	PPS	117.68	16.16
Pelvic-anal space	PAS	52.22	7.17
Pelvic-caudal space	PCA	158.98	21.84
Preal anal length	PAL	392.00	53.85
Prenarial length	PRN	18.90	2.60
Preoral length	POR	35.40	4.86
Eye length	EYL	26.90	3.70
Eye height	EYH	11.80	1.62
Intergill length	ING	39.50	5.43
Pectoral anterior margin	P1A	81.97	11.26
Pectoral posterior margin	P1P	60.52	8.31
Pectoral base	P1B	45.15	6.20
Pectoral inner margin	P1I	32.86	4.51
Pectoral height	P1H	66.83	9.18
First dorsal anterior margin	D1A	56.23	7.72
First dorsal posterior margin	D1P	30.79	4.23
First dorsal base	D1B	48.53	6.67
First dorsal length	D1L	63.38	8.71
First dorsal height	D1H	28.83	3.96
Pelvic anterior margin	P2A	34.07	4.68
Pelvic posterior margin	P2P	47.84	6.57
Pelvic base	P2B	60.50	8.31
Pelvic inner margin length	P2I	8.60	1.18
Pelvic length	P2L	70.15	9.64
Pelvic height	P2H	21.70	2.98
Anal anterior margin	ANA	23.70	3.26
Anal posterior margin	ANP	34.66	4.76
Anal base	ANB	42.47	5.83
Anal length	ANL	51.70	7.10
Anal height	ANH	12.20	1.68
Dorsal caudal margin	CDM	205.91	28.28
Preventral caudal margin	CPV	54.55	7.49
Terminal caudal margin	CTR	38.39	5.27
Terminal caudal lobe	CTL	46.97	6.45
Internarial space	INW	20.40	2.80
Mouth width	MOW	57.78	7.94
Head height	HDH	61.21	8.41
Trunk height	TRH	66.92	9.19
Abdomen height	ABH	49.13	6.75
Tail height	TAH	58.70	8.06
Caudal peduncle height	CPH	30.95	4.25
Interorbital space	INO	22.17	3.05
Head width	HDW	66.87	9.19
Snout to vent length	SVL	338.00	46.43
Vent to caudal length	VCL	394.00	54.12



Fig. 2. Immature female of sharpnose sevengill shark, captured in waters off Slovenia on 21st December 2021 (photo: B. Mavrič).

morphometric measurements were taken. The body surface and the branchial region of the shark were carefully examined for the presence of ectoparasites. Samples of muscle and liver of the shark were preserved for studies on bioaccumulation of pollutants. After that, the specimen was photographed and dissected in order to analyse its stomach contents. The remains of prey items found in the stomach were isolated and rinsed with seawater and preserved in 80% alcohol. The hepatosomatic index (HSI) was calculated by the formula (sensu Capapé 1980): $HSI = (LM/TM) \times 100$, LM is the total liver mass (g) and TM is the total body mass (g). We calculated also the condition factor using the formula of Tanaka & Mizue (1977): $Kc = (TM \cdot 10^3) / (TL)^3$. Kc is the condition index, TM is the total body mass (g) and TL

is the total body length (cm). The specimen was prepared to be housed in the collection of the Natural History Museum of Ljubljana.

Results and discussion

Morphometric measurements are presented in Table 1. The specimen was identified as *H. perlo* due to the presence of seven pairs of gill slits with the first pair longer than the others. Other features were: slender and fusiform body with a unique dorsal fin located backward, long upper lobe of the caudal fin, pointed head and rather large and fluorescent blue



Fig. 3. A close up of head with seven gill slits and large eye of sharpnose sevengill shark (photo: B. Mavrič).

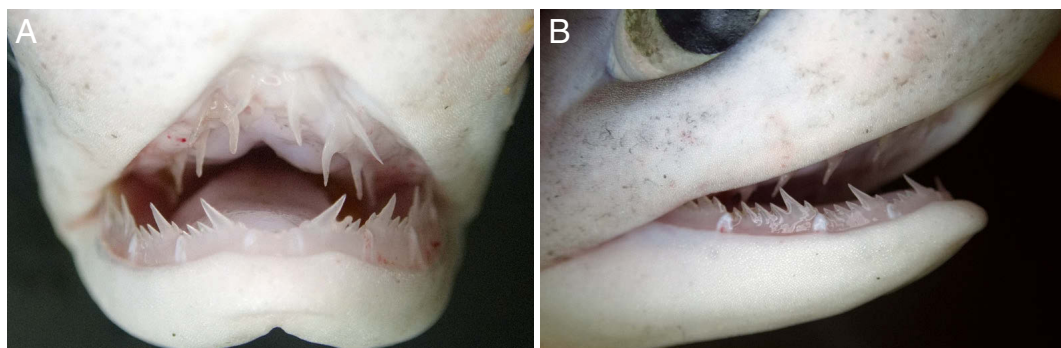


Fig. 4. Teeth in upper and lower jaw: **A.** frontal view and **B.** teeth in lower jaw from the lateral view (photos: B. Mavrič).

eyes (Figs 2 and 3). Teeth in lower jaw comb-like with second (or third) cusp distinctly longer than other 8 to 9 (Fig. 4). The specimen was brownish grey on the dorsal part and light grey on the ventral part. It was an immature female that measured 728 mm in total length and weighed 1010 g. Morphometric measurements fit well with those published in Barull & Mate (2002), El Kamel-Moutalibi et al. (2014); Rafrafi-Nouira et al. (2015), Anguila et al. (2016) and Capapé et al. (2018). The stomach contained two rather large pieces of an unidentified teleost specimen.

The reported size-at-maturity for females is between 95 and 105 cm TL for the species (Tanaka & Mizue 1977, Ebert & Stehmann 2013), with the minimum size record of 87.5 cm (De Carvalho et al. 2020). In addition, the tips of the dorsal fin and the upper lobe of the caudal fin were black, which is typical for immature specimens. The calculated value of the hepatosomatic index was 5.04 which is somewhat lower than the value of around 6 calculated by Capapé (1980) for specimens of the same size range (72 cm).

The calculated condition index was 2.62 which is comparable to the value 2.76, obtained by Kabasakal & Ince (2008) for an immature female, stranded on the coast of Saroz Bay (Aegean Sea), the value of 2.80 obtained by Henderson & Williams (2001) and values of 2.91 (immature male with 70 cm TL) and 2.60 (immature female with 72 cm TL), obtained by El Kamel-Moutalibi et al. (2014) for two specimens of *H. perlo*, captured off northern Tunisian coast (Table 2). The obtained value is slightly lower than estimated for immature females (around 3.0), calculated by Capapé (1980) and Capapé et al. (2018).

Recently, Karachle et al. (2020) prepared a thorough literature review of the sharpnose sevengill shark occurrence in the Mediterranean Sea and provided a database with information on its distribution. The highest numbers of records were obtained from Tunisian and Turkish waters and Sicily. Regarding the presence of this species in the Adriatic Sea, they mentioned 7 published works, however, they are dealing only with two specimens. Brusina (1888) mentioned *H. perlo* as a very rare species in the Adriatic Sea without any specific considerations about its presence and such point of view was expressed also

Table 2. Calculated condition index for immature specimens of sharpnose sevengill shark, obtained from different studies. Legend: TL, total length; Kc, condition index.

Area	TL (cm)	Sex	Kc	Source
Bay of Biscay	101.0	♀	2.80	Henderson & Williams (2001)
Saroz Bay, Aegean Sea	86.1	♂	2.76	Kabasakal & Ince (2008)
Northern Tunisian coast	72.0	♀	2.60	El Kamel-Moutalibi et al. (2014)
Northern Tunisian coast	70.0	♂	2.91	El Kamel-Moutalibi et al. (2014)
Island of Zembra, Tunisia	72.0	♀	3.08	Capapé et al. (2018)
Island of Zembra, Tunisia	72.0	♂	3.02	Capapé et al. (2018)
Waters off Bizerte, Tunisia	70.0	♀	3.18	Capapé et al. (2018)
Balearic Sea	79.6	♀	3.15	Guallart et al. (2019)
Gulf of Trieste	72.8	♀	2.62	this study

by Tortonese (1956), Bini (1967) and Barrull & Mate (2002). Up to date only few substantiated records on the presence of sharpnose seven-gill shark were reported in the Adriatic Sea (Lipej et al. 2004, Lipej & Dulčić 2010). An approximately 80 cm specimen, captured before 1900, is kept in the ichthyological collection of the Trieste Natural History Museum (Lipej et al. 2004). The Venetian Museum of Natural History is housing two females. The first measured 135 cm in length and was caught in 1926 in an unknown place in the Adriatic, while the second measured 108 cm, without detailed information of the locality and date of the catch (Mizzan 1994, Lipej et al. 2004). The last record is dealing with two specimens, caught in the Adriatic Sea in the framework of the Hvar expedition of 1948 (Jukić-Peladić et al. 2001). In the neighbouring Ionian Sea the sharpnose sevengill shark represents 4.4 % of abundance of all fish species at depth range from 300 to 500 m and 1.9 % of abundance at depth range from 500 to 700 m (Mytilineou et al. 2005).

This report represents the first record of sharpnose sevengill shark in Slovenian territorial waters and the first scientifically confirmed record in the Gulf of Trieste. According to the "Key for the determination of vertebrates of Slovenia" 22 shark species are reported in Slovenian marine waters (Lipej 1999). Due to the rarity of records, it was not expected for this species to occur in the shallow waters of the Slovenian waters and Gulf of Trieste. With the inclusion of sharpnose sevengill shark, the total number of shark species increased to 23, while the total number of fish recorded in Slovenian part of the Adriatic Sea, based on the survey of Lipej & Orlando-Bonaca (2019), increased to 248 species. In addition, this shark was found more than seventy years after the last record in the Adriatic Sea.

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