

First record of the bluntnose sixgill shark, *Hexanchus griseus* (Elasmobranchii, Hexanchiformes, Hexanchidae), from the southwestern Gulf of Mexico

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Abstract

We report an adult male bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788), of 326 cm in total length and 197 kg, which was captured by longline at a depth of about 120 m off Veracruz, Mexico. It was characterized by having six gills, six rows of large, serrated comb-shaped teeth on each side of the lower jaw. This record is the first for the southern Gulf of Mexico and the first confirmed for Mexican waters of the Gulf of Mexico and the Caribbean Sea.

Keywords

Distribution, morphometric, range extension, western Atlantic

Introduction

The genus *Hexanchus* Rafinesque, 1810 is represented by three species: the bigeye sixgill shark, *Hexanchus nakamurai* Teng, 1962, the Atlantic sixgill shark, *Hexanchus vitulus* Springer et Waller, 1969, and the bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788) (see Daly-Engel et al. 2019; Fricke et al. 2025). The bluntnose sixgill shark is a large species, reaching 480 cm total length (TL). It is an aplacental viviparous species, sexual maturity in females is greater than 400 cm and in males between 310 and 330 cm TL, and they can have more than 50 offspring (Ebert et al. 2021). It feeds

on a wide variety of prey, including fishes (Ebert 1986, 1994) and marine mammals (Ruiz-García et al. 2023). Although it is caught incidentally in deep fisheries in its distribution range (Ebert 1986), there are indications of extirpation of local populations due to overfishing (Ebert et al. 2021). It is listed as near threatened by the IUCN (Finucci et al. 2020).

The distribution of *H. griseus* is global (except for the Antarctic and Arctic), but patchy (Ebert et al. 2021). Its bathymetric distribution is wide, reaching depths of 2500 m, but most commonly 200 to 1000 m (Ebert et al. 2021). At higher latitudes it is more common in shallower water (Carey and Clark 1995). Although its distribution

is wide in the western Atlantic, from Nova Scotia, Canada (Gilhen and Coad 1989), to Brazil (Santander-Neto et al. 2023) and Argentina (Cuevas et al. 2023), records are scarce. Records in the Gulf of Mexico are limited to the northern part (McEachran and Fechhelm 1998; McEachran 2009). In Mexico, despite reports of its presence on this coast and the Caribbean Sea (Del Moral-Flores et al. 2015), there were no voucher specimens. Therefore, this paper presents the first voucher of a male *H. griseus* for the southern Gulf of Mexico with data on its morphology.

Materials and methods

On 21 July 2024 a six-gill shark was captured at a depth of 120 m using an artisanal longline with number 3 hooks baited with bonito (*Euthynnus alletteratus*), in southern Veracruz, approximately 20.4 km north of the community of Salinas Roca Partida (Fig. 1). During its capture, it was filmed on low-resolution video by the fishermen for registration (Fig. 2). The specimen was identified based on taxonomic keys and specialized guides (Espinosa-Pérez et al. 2004; Ebert and Dando 2024).

The shark was weighed on a commercial scale (rounded to the nearest kg) and morphological measurements were done using a measuring tape (total length was rounded to the nearest cm) following the protocols of Ebert et al. (2013). They were compared with pre-

viously published data for the species (i.e., Branstetter and McEachran 1986; Lipej et al. 2022). Due to its large size, only the cephalic region and the mixopterygians were preserved in the Ichthyological Collection of the Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México under catalog number CIFI-2400.

Results

Family Hexanchidae Gray, 1851

Hexanchus griseus (Bonnaterre, 1788)

English common name: bluntnose sixgill shark

Spanish common name: tiburón leche

(Figs. 2–3; Table 1)

Material examined. CIFI-2400, 3260 mm TL, male; ca. 20.4 km to the North of Salinas Roca Partida, Veracruz, Mexico (Fig. 1); 21 Jul. 2024; Armando Campos Pérez leg.

Description. Table 1. Robust body, large and broad head, head length (HL) 14.7% of TL. Snout wide (27%HL), big mouth and ventral arched with symphyseal tooth on both jaws and six rows of large, serrated comb-shaped teeth on each side of lower jaw. Ten teeth on each side of upper jaw with hooked cusp, not counting smallest and molariform ones. Six large gill slits not inserted on pectoral fins. Eye small (13.3%HL),

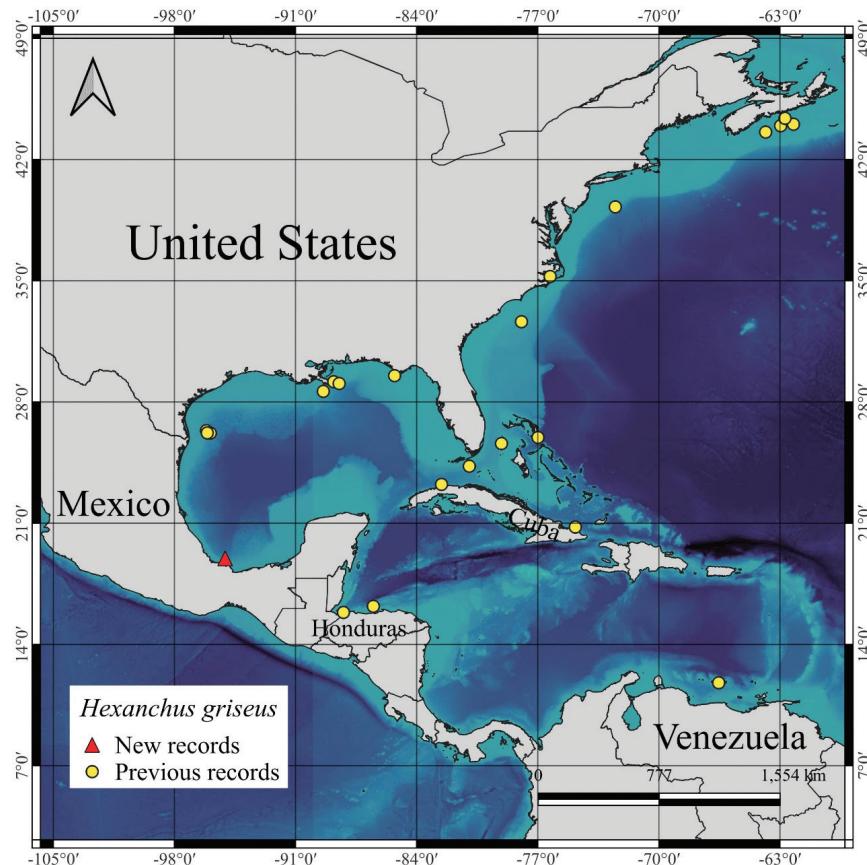


Figure 1. Previous records (yellow circles) based on GBIF records (GBIF 2024) and new record (red triangle) of *Hexanchus griseus* in the southwestern Gulf of Mexico.



Figure 2. Stills from the video of the *Hexanchus griseus* captured in the southwestern Gulf of Mexico.

pupil dark with white rim, prominent tapetum lucidum giving a fluorescent greenish coloration in life. Single dorsal fin originating ahead of anal fin insertion. Short caudal peduncle (8.3%TL). Asymmetric caudal fin. For all measurements see Table 1. Specimen sexually mature, testes elongated, vascularized, with well-developed vas deferens and, along with seminal vesicles, filled with sperm. Clasper calcified, mobile, and presented several hematomas.

Coloration. The live specimen had green eyes, the dorsolateral region greyish in color with brown tones, and pale grey in the ventrally (Fig. 2). After its capture, while frozen and fresh, the dorsolateral coloration was darker brown, and the ventral region grayish (Figs. 3, 4).

Discussion

Records of *Hexanchus griseus* in Mexico correspond to the northeastern Pacific on the western coast of Baja California and the Gulf of California (Castro-Aguirre and García-Domínguez 1988; Castro-Aguirre et al. 2003; Ruiz-Campos et al. 2010; Becerril-García et al. 2017; Whitehead and Gayford 2024), where there is a greater effort to study the composition of deep-water sharks compared to other coasts of the country. The first record of *H. griseus* inside the Gulf of Mexico was of a female 433 cm TL captured on 27 October 1962 in Alabama, USA (Springer and Waller 1969). Following this, a male specimen 325 cm TL was captured in February 1984 in Port Isabel, Texas (Branstetter and McEachran 1986). This record is the closest to Mexican territory, although Castro-Aguirre and García-Domínguez (1988) mentioned a possible but unsupported report from Tamaulipas. This latest record confirms distribution of the species to more than 822 km to the southwest of the Gulf of Mexico.

Local fishermen have reported capturing the species on several occasions, however the specimens were



Figure 3. Male *Hexanchus griseus* (CIFI-2400) from the southwestern Gulf of Mexico. A) Lateral view; B) cephalic dorsoventral view; C) pelvic fins and claspers.

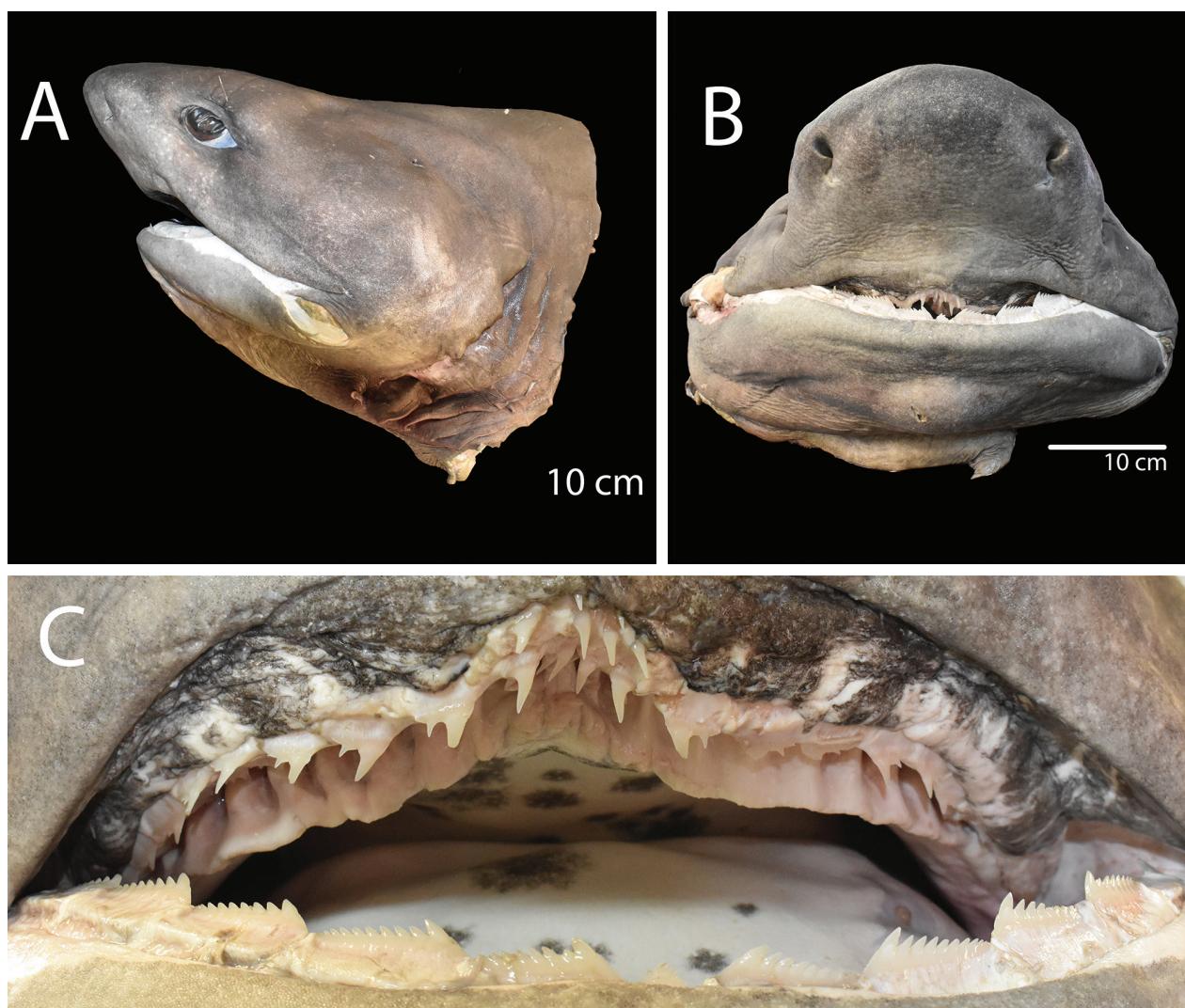


Figure 4. Head of *Hexanchus griseus* (CIFI-2400) from the southwestern Gulf of Mexico. **A)** Lateral cephalic view; **B)** front cephalic view; **C)** oral view.

released since the flesh is bland and not well appreciated due to its consistency. It also has a large amount of fat which is considered toxic. For this reason, species of the genera *Hexanchus* and *Heptranchias* have been dubbed milk sharks by local fishermen (Del Moral-Flores et al. 2022). Although the species is routinely captured elsewhere in deep-water fishing (Ebert et al. 2021), its capture is incidental and of no great economic importance, as in Tunisia (Ben Amor et al. 2019). This is probably due to the meat being considered ichthiosarcotoxic owing to its high concentration of oil (Capapé et al. 1975; Ben Amor et al. 2019).

Hexanchus griseus generally occur deeper than 100 m (Ebert et al. 2021), although they often approach the coastal areas as juveniles (Ebert 1986; Dunbrack and Zielinski 2003). The individual captured in the southern Gulf of Mexico is mature, with evidence of previous mating with the morphology of the claspers similar to that reported by Branstetter and McEachran (1986). Its presence in the region may correspond to the contin-

uous deepwater adjacencies around the capture area that allow access to feeding grounds. This coincides with the recent records of other benthic-demersal chondrichthyans in the Los Tuxtlas region. (Del Moral-Flores et al. 2022). Bathymetric migration to shallower waters at night for feeding (Andrews et al. 2009), appears to influence the capture and incidence of sixgill sharks in various longline fisheries (Celona et al. 2005). Studies of stable isotopes have determined that adult sixgill sharks typically undertake ontogenetic migrations, and adult females will approach the outer coastal edge to give birth (Reum et al. 2020).

Studies indicate that males reach sexual maturity between 309 and 330 cm TL (Ebert 2002; Ebert et al. 2013), while in the Mediterranean they mature at a smaller size, around 300 cm TL (Capapé et al. 2004). There are possible regional variations in their population variables. Although most records suggest that it is a solitary species, there is evidence of possible mating aggregations (Ben Amor et al. 2019).

Table 1. Biometric data of *Hexanchus griseus* collected in the southwestern Gulf of Mexico and comparative data with other records.

Character	Veracruz, Mexico (This study)	Texas, USA (Branstetter and McEachran 1986)	Gulf of Trieste, Slovenia (Lipej et al. 2022)
Sex	Male	Male	Female
Absolute morphometric values [cm]			
Total length	326.0	325.0	217
Precaudal length	230.0	234.0	154.4
Prenarial length	4.0	—	4.2
Preoral length	8.0	14.5	10.5
Preorbital	13.0	14.0	8.8
Prespiracle length	38.0	—	—
Pregill length	48.0	—	31.0
Prepectoral length	71.0	65.0	44.7
Prepelvic length	149.0	160.0	101.1
Predorsal length	182.0	196.0	121.3
Dorsal-caudal space	27.0	—	—
Preanal length	202.0	197.5	133.6
Pectoral-pelvic space	60.0	—	—
Pelvic-anal space	18.0	—	—
Anal-caudal space	18.0	—	—
Pelvic-caudal length	51.0	—	—
Eye length	6.4	4.3	5.5
Eye height	5.0	—	3.1
Interorbital length	29.0	—	19.4
Anterior nasal flap	2.0	—	—
Spiracle length	1.8	—	—
Eye-spiracle length	19.5	—	—
Mouth length	22.3	—	—
Mouth width	47.0	—	27.5
Upper labial furrow	9.0	—	—
Lower labial furrow	5.5	—	—
1st gill height	25.0	23.5	—
2nd gill height	23.0	21.0	—
3rd gill height	21.0	19.0	—
4th gill height	19.0	17.5	—
5th gill height	18.5	16.0	—
6th gill height	17.0	13.0	—
Head height	46.5	—	—
Head width	57.0	—	—
Trunk height	33.0	—	—
Trunk width	52.0	—	—
Caudal peduncle height	16.0	—	—
Caudal peduncle width	13.0	—	—
Pectoral length	41.0	—	22.5
Pectoral anterior margin	43.0	40.0	24.0
Pectoral base	26.0	29.0	14.7
Pectoral height	40.0	—	17.5
Pectoral inner margin	15.0	12.5	8.4
Pectoral posterior margin	33.0	—	17.5
Pelvic length	51.0	—	22.0
Pelvic anterior margin	28.0	18.0	8.9
Pelvic base	33.0	—	19.5
Pelvic height	24.0	—	7.2
Pelvic inner margin	26.0	—	3.1
Pelvic posterior margin	45.0	—	18.5
Outer clasper length	20.0	—	—
Inner clasper length	24.0	—	—
Clasper base	5.0	—	—
Dorsal fin length	32.0	—	17.3
Dorsal fin anterior margin length	27.0	—	13.7
Dorsal fin base length	24.0	25.0	13.1
Dorsal fin height	15.5	14.8	8.8
Dorsal fin inner margin length	8.0	8.3	—

Table continues on next page.

Table 1. Continued.

Character	Veracruz, Mexico (This study)	Texas, USA (Branstetter and McEachran 1986)	Gulf of Trieste, Slovenia (Lipej et al. 2022)
Dorsal fin posterior margin length	20.0	—	9.8
Anal fin length	23.0	—	16.9
Anal fin anterior margin	15.0	—	9.4
Anal fin base	16.0	19.0	12.8
Anal fin height	11.5	13.5	7.0
Anal fin inner margin	6.5	7.0	—
Anal fin posterior margin	17.0	—	12.4
Dorsal caudal margin	93.5	93.0	61.5
Preventral caudal margin	27.0	—	14.3
Lower postventral caudal margin	14.0	—	5.5
Upper postventral caudal margin	56.0	—	38.5
Subterminal caudal margin	12.0	—	6.6
Terminal caudal margin	14.0	—	10.2
Terminal caudal lobe	19.0	—	12.7
Caudal fork length	95.0	—	18
Dorsal-anal fin origin	20.0	—	—
Dorsal-anal fin insertion	12.0	—	—
Weight [kg]			
Weight	197.0	211.4	52.0

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