

## NOTA CIENTIFICA

Presence of *Hexanchus vitulus* (Hexanchiformes, Hechanchidae) in shallow waters off the northeastern Campeche Bank, Mexico

Presencia de *Hexanchus vitulus* (Hexanchiformes, Hechanchidae) en aguas poco profundas frente a la costa noreste del Banco de Campeche, México

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### ABSTRACT

**Background.** The Atlantic bigeye sixgill shark *Hexanchus vitulus* is found throughout the central Atlantic Ocean, including the Gulf of Mexico and the Caribbean Sea, and is rarely observed in the Mediterranean Sea. **Objective.** This paper reports the presence of a juvenile female specimen of *H. vitulus* in the shallow water's northeast of the Campeche Bank, Mexico. In Mexico, records of *H. vitulus* are scarce. There are records from Tamaulipas, Veracruz, Tabasco, and the Campeche Sound. **Methods.** During a semi-industrial fishing fleet sampling campaign, carried out on May 5, 2025, in Progreso, Yucatan, the presence of a sixgill shark (*H. vitulus*) was recorded. Biometric data was collected from the specimen using an ichthyometer and digital scale. The captain of the vessel was interviewed, providing information about the capture of the specimen, such as: geographical location, depth, and type of bait. **Results.** The sixgill shark was a female measuring 101 cm in total length and weighing 2.4 kg after evisceration. It was captured with a long bottom longline with circular hooks on April 29, 2025. The capture point was approximately 139 km from Río Lagartos, Yucatán, and 55 meters deep. It represents the second shortest specimen of *H. vitulus* recorded in the southern Gulf of Mexico. Furthermore, this is the first record of the species in shallow waters (depths less than 80 m). **Conclusion.** This new record of *H. vitulus* in shallow waters off the northeastern Campeche Bank expands the spatial and ecological distribution of the species in the southern Gulf of Mexico.

**Keywords:** bigeye sixgill shark; Campeche bank; cow shark; juvenil, shallow waters.

### RESUMEN

**Antecedentes.** El tiburón seis branquias del Atlántico, *Hexanchus vitulus* se encuentra en todo el océano Atlántico central, incluyendo el Golfo de México y Mar Caribe, y rara vez se observa en el mar Mediterráneo. En México, los reportes de *H. vitulus* son pocos. Estos reportes son en Tamaulipas, Veracruz, Tabasco y Sonda de Campeche. **Objetivo.** Este artículo informa la presencia de un juvenil hembra de *H. vitulus* en las aguas someras al noreste del banco de Campeche, México. **Métodos.** Durante una campaña de muestreo de la flota de pesca semi industrial llevada a cabo el 5 de mayo de 2025 en Progreso, Yucatán, se detectó la presencia de un tiburón seis branquias. Se tomaron datos biométricos al espécimen, con apoyo de un ictiómetro y balanza digital. Se entrevistó al capitán de la embarcación donde se obtuvo información sobre la captura del ejemplar, como lo son: posición geográfica, profundidad y tipo de carnada. **Resultados.** El tiburón seis branquias era una hembra que medía 101 cm de longitud total y pesaba 2,4 kg tras ser eviscerada. Fue capturado con un palangre de fondo y anzuelos circulares el 29 de abril de 2025. El punto de captura se encontraba aproximadamente a 139 km de Río Lagartos, Yucatán, y a 55 metros de profundidad. Se trata del segundo ejemplar más pequeño de *H. vitulus* registrado en el sur del Golfo de México. Además, se trata del primer registro de la especie en aguas poco profundas (profundidades inferiores a 80 m). **Conclusión.** Este nuevo registro de *H. vitulus* en aguas poco profundas frente al noreste del Banco de Campeche amplía la distribución espacial y ecológica de la especie en el sur del Golfo de México.

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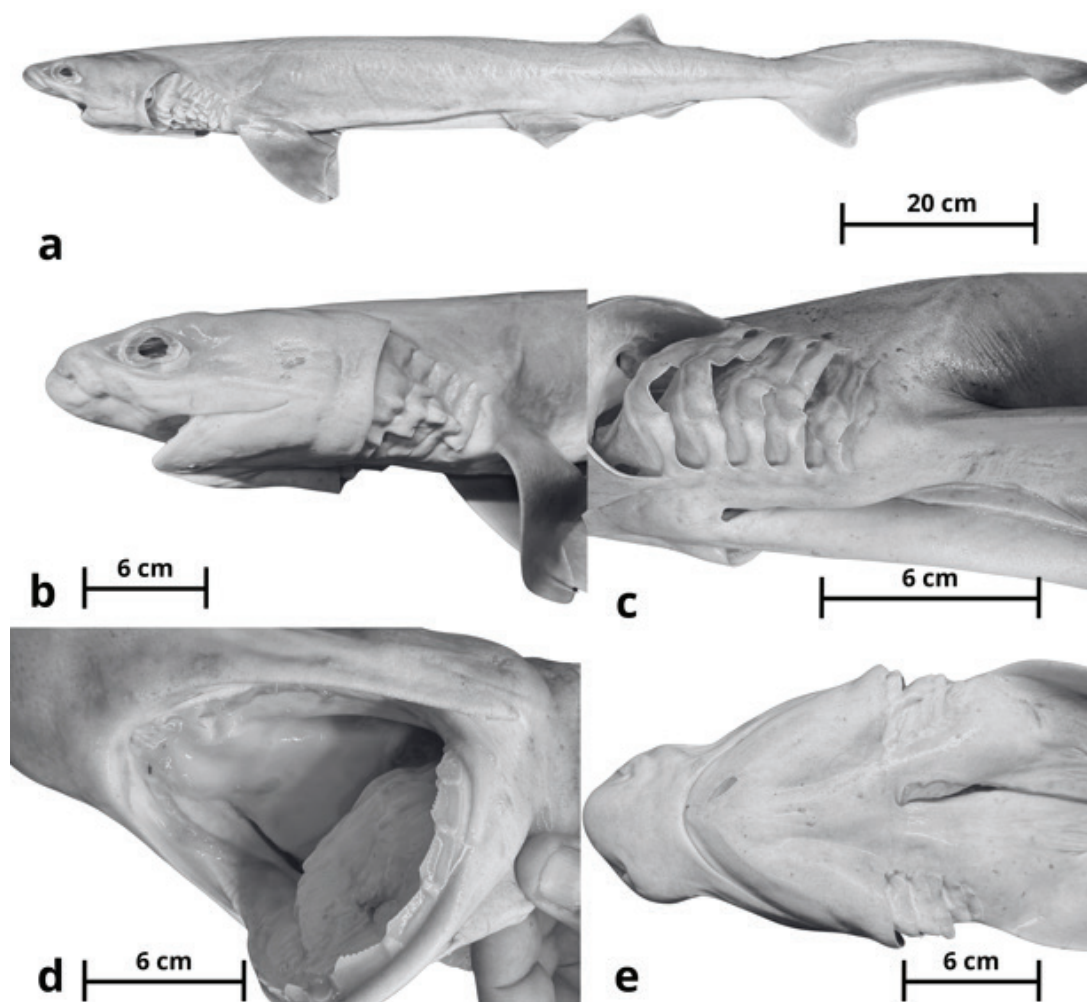
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**Palabras clave:** aguas someras; Banco de Campeche; juvenil; tiburón ojón seis branquias; tiburón vaca.

Bigeye sharks of the genus *Hexanchus* (cow sharks) are distinguished by their six gill slits, a poorly calcified skeleton, and a dorsal fin, primitive characteristics that place them among the oldest evolutionary lineages of vertebrates (Castro, 2011; Daly-Engel *et al.* 2019). These sharks have fang-shaped teeth in the upper jaw, while the lower jaw has rectangular teeth with serrated edges (Castro, 2011). Currently, two valid species are recognized in this genus: the Atlantic bigeye sixgill shark, *Hexanchus vitulus* (Springer & Waller, 1969), distributed in the central Atlantic Ocean, including the Gulf of Mexico and the Caribbean Sea; and the bluntnose sixgill shark, *H. griseus* (Bonnaterre, 1788), with a worldwide distribution except in polar regions (Ebert *et al.* 2021). The distinction between *H. vitulus* and *H. griseus* was originally established by Springer & Waller (1969) based on morphological features.

Knowledge about cow sharks and their occurrence is limited because they are often caught incidentally in commercial fisheries

(Daly-Engel *et al.* 2019, Ebert *et al.* 2021, Finucci *et al.* 2024). While most cow shark species are classified as vulnerable (Ebert *et al.* 2021), *H. vitulus* is considered Least Concern (Finucci *et al.* 2024). In Mexico, the Fishery Management Plan for Sharks and Rays in the Gulf of Mexico and the Caribbean Sea (PMPTR, acronym in Spanish), through a productivity and susceptibility analysis applied to *H. vitulus*, indicated low biological productivity, low susceptibility to capture, moderate vulnerability, and low risk for this species (DOF, 2022). However, this species could face increased capture risk as regional fisheries expand into deeper waters (Finucci *et al.* 2024). In Mexico, records of *H. vitulus* are scarce. There are records from Tamaulipas (Bonfil 1997), Veracruz (Moral-Flores *et al.* 2022), Tabasco (DOF, 2022), and the Campeche Sound (González-Acosta *et al.* 2017). The Global Biodiversity Information Facility (GBIF) and Ocean Biodiversity Information System (OBIS) databases report records from Veracruz and the northwestern region of the Campeche Bank, respectively. This paper reports the first occurrence of a *H. vitulus* specimen captured in the northeastern area of the Campeche Bank.



**Figure 1.** Female specimen of the Atlantic bigeye sixgill shark (*Hexanchus vitulus*): A) lateral view, B) lateral view of the head, C) close-up view of the six gill slits and C) buccal cavity, showing the arrangement of the teeth E) Ventral view of the head.

The capture of *H. vitulus* took place on April 29, 2025, using a 23 km long bottom longline and 2,100 circular hooks, size 13/0. The capture point was approximately 139 km from Río Lagartos, Yucatán, and 55 meters deep (22.638°N, 87.404°W). The specimen was identified as *H. vitulus* following the criteria of Daly-Engel *et al.* (2019) and Ebert *et al.* (2021). The shark had six gill slits, a single dorsal fin, five large and wide saw-like teeth on each side of the lower jaw with a small central tooth at the symphysis. The upper teeth were long and pointed. The coloration was pale grayish brown on top with a lighter underside (Fig. 1). The sex of the specimen was female, determined by direct observation of the absence of claspers. The total length was measured using an ichthyometer, which was 101 cm and the gutted weight of the specimen was 2.40 kg using VINSON brand digital scale (SD 0.005 kg).

The specimen was deposited in the Ichthyological Collection of the Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México, with the identification number CIFI 2501.

This organism represents the second shortest specimen recorded in the southern Gulf of Mexico. Furthermore, this is the first record of the species in shallow waters (depths less than 80 m).

Female *H. vitulus* reaches sexual maturity at a total length of 142 cm (Ebert *et al.* 2021; Finucci *et al.* 2024), therefore, the smaller specimen collected can be considered a juvenile. This and other records of juvenile individuals suggest a recurring presence of immature specimens in the region (González-Acosta *et al.* 2017; Moral-Flores *et al.* 2022). Sixgill sharks have been documented to undertake diel vertical migrations associated with foraging behavior, being more active during the night and occupying shallower waters, particularly in coastal environments (Speed *et al.* 2010), which may explain the depth and time at which the specimen was captured. Additionally, the absence of adults in these records supports the possibility of spatial segregation among maturity stages (Daly-Engel *et al.* 2019; Avalos-Castillo *et al.* 2020), likely driven by ontogenetic dietary shifts, as smaller prey are more abundant in shallower areas and may be preferentially exploited by juveniles (Carrier *et al.* 2022; Speed *et al.* 2010).

This new record of *H. vitulus* in shallow waters off the northeastern Campeche Bank expands the spatial and ecological distribution of the species in the southern Gulf of Mexico. Repeated captures of juvenile *H. vitulus* in Mexican waters, where prey availability is high, indicate that some coastal environments may play a significant role in supporting the species' early developmental stages. Given the expansion of fisheries into deeper areas and the limited information available on the biology and ecology of *H. vitulus*, it is essential to strengthen monitoring and research efforts to assess its population status, potential connectivity in the Gulf of Mexico and the Caribbean Sea and possible threats from bycatch due to fleet expansion. These efforts will contribute to the conservation of its populations.

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