

**First record of the fangtooth snake-eel, *Aplatophis chauliodus* Böhlke 1956 (Anguilliformes: Ophichthidae), from the Caribbean coast of Costa Rica, Central America**

**Primer registro del tieso colmilludo, *Aplatophis chauliodus* Böhlke 1956 (Anguilliformes: Ophichthidae), en el Caribe de Costa Rica, América Central**

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**ABSTRACT**

The presence of *Aplatophis chauliodus* is reported for the first time in the southern Caribbean coast of Costa Rica. The record is based on a specimen of 590 mm in total length, captured at a depth of 10 m. This report extends the known distribution range of the species in the Caribbean Sea by more than 400 km to the west. Morphometric and meristic data are provided and discussed for comparison purposes.

**Keywords:** Atlantic Ocean, marine fish, Neotropics, new record, distribution range extension



**RESUMEN**

Reportamos la presencia de *Aplatophis chauliodus* en la costa Caribe sur de Costa Rica. Este nuevo registro está basado en un único ejemplar de 590 mm de longitud total, capturado a una profundidad de 10 m. Con este reporte ampliamos en más de 400 km hacia el oeste la distribución conocida para la especie en el Caribe. Se presentan y discuten, además, datos morfométricos y merísticos, con fines comparativos.

**Palabras clave:** extensión del ámbito de distribución, Neotrópico, nuevo registro, océano Atlántico, pez marino.

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## INTRODUCTION

The anguilliform family Ophichthidae comprises about 365 species (in 62 genera), which are commonly known as snake eels, worm eels, sand eels, or shrimp eels (McCosker, 2002; Robertson *et al.* 2024). These fishes are distributed in all tropical and temperate oceans, as well as some freshwater environments, from the intertidal zone to depths up to 1,300 m. They are usually found in areas with sandy or muddy substrates, as well as in coral reefs (Nelson *et al.* 2016; Del Moral Flores *et al.* 2024; Robertson *et al.* 2024). Snake eels vary greatly in size (0.5-2.5 m) and are distinguished from other anguilliform taxa by having 1) posterior nostrils that cross inside the upper lip, and 2) a gill pouch expanded and reinforced by 15-49 rays, *i.e.*, the “jugostegalia” (McCosker, 1977; McCosker & Rosenblatt, 1995; McCosker, 2002; Robertson & Van Tassell, 2023).

The neotropical genus *Aplathis* Böhlke, 1956 includes two valid species: 1) *A. chauliodus* Böhlke, 1956, and 2) *A. zorro* McCosker & Robertson, 2001. These species are differentiated from other members of Ophichthidae by having 1) a large, oblique mouth with elongated jaws and the lower jaw projecting, 2) the front teeth developed as very large fangs, extending outside the mouth when closed, and 3) a tongue developed as a fleshy

lure (Robertson & Van Tassell, 2023; Robertson *et al.* 2024). The species *A. chauliodus* is distributed in the Western Atlantic, showing a discontinuous distribution from southern Florida (U.S.A.) to northeastern Brazil, including the Gulf of Mexico and the Caribbean Sea (McCosker *et al.* 1989; Robertson & Van Tassell, 2023; Del Moral Flores *et al.* 2024); *A. zorro*, in contrast, has a rather limited distribution in the Eastern Pacific, which includes relatively few records from Costa Rica, Panama, and Colombia (Robertson *et al.* 2024).

In this paper we report for the first time the presence of *A. chauliodus* in the Caribbean coast of Costa Rica. The closest verified occurrence records for this species are from Panama, Colombia, Puerto Rico and the coast of Veracruz, Mexico (Robertson & Van Tassell, 2023; Del Moral Flores *et al.* 2024). Morphometric and meristic data are provided, compared and discussed.

## MATERIALS AND METHODS

The specimen supporting this new record (Figs. 1 and 2) was collected in 2012 off the Caribbean coast of Costa Rica (Fig. 3), near the mouth of the Banano River in the area known as Westfalia (9.963876, -83.023625), at approximately 10 m depth. Sampling was done using a small-scale shrimp trawl net of 8



Fig. 1. *Aplatophis chauliodus* (UCR 2916-011, 590 mm TL), preserved specimen collected off the Caribbean coast of Costa Rica. (A) Entire specimen. (B) Close-up of the cephalic region

Fig. 1. *Aplatophis chauliodus* (UCR 2916-011, 590 mm TL), espécimen preservado recolectado en la costa Caribe de Costa Rica. (A) Espécimen completo preservado. (B) Acercamiento a la región cefálica

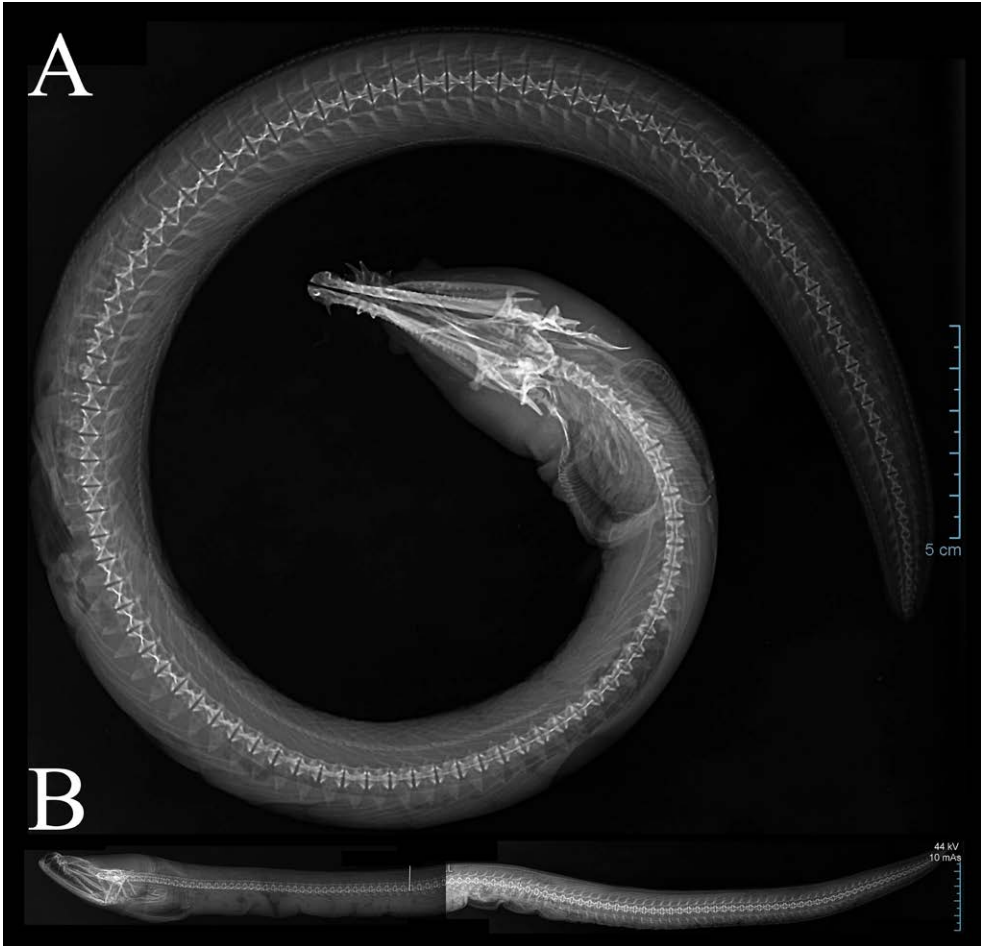


Fig. 2. *Aplatophis chauliodus* (UCR 2916-011, 590 mm TL), entire specimen X-ray. (A) Dorsal view. (B) Lateral view

Fig. 2. *Aplatophis chauliodus* (UCR 2916-011, 590 mm TL), radiografía del espécimen completo. (A) Vista dorsal. (B) Vista lateral

m of mouth and 10 m length, hauled by hand from a fiberglass outboard motor skiff. After collection, the specimen was fixed in 10% formalin, preserved in 70% ethanol, and deposited in the fish collection of the Museo de Zoología of the Universidad de Costa Rica (UCR), in

San José, Costa Rica. The following catalog number was assigned to the specimen: UCR 2916-011.

Identification of the specimen followed McCosker (2002) and Robertson & Van Tassell (2023). Measurements, presented in Table 1, were obtained according to Böhlke (1989).

Vertebrae counts were done from X-ray images (Fig. 2). Information on distribution, including museum records (verified by visual inspection of photographs available online, as well as the corroboration of anatomical descriptions, when available), as presented in

Fig. 3, was extracted from the scientific literature (*i.e.*, McCosker *et al.* 1989; Santos-Sampaio *et al.* 2017; Robertson & Van Tassell, 2023; Del Moral-Flores *et al.* 2024) and the FishNet2 (FishNet2, 2024) and GBIF (GBIF, 2024) databases.

Table 1. Morphometric data of *Aplatophis chauliodus*, new record (UCR 2916-011) and comparative material

Cuadro 1. Datos morfométricos de *Aplatophis chauliodus*, nuevo registro (UCR 2916-011) y material comparativo

Measurements in mm (% of TL)	Santos-Sampaio <i>et al.</i> (2017) Brazil	Del Moral-Flores <i>et al.</i> (2024) México	UCR 2916-011 Costa Rica
Total length (TL)	670	499	590
Head length (HL)	103.6 (15.5)	72.8 (14.6)	95.6 (16.2)
Snout length	22.5 (3.3)	8.5 (1.7)	13.3 (2.3)
Upper jaw length	40.9 (6.1)	30.5 (6.1)	37.4 (6.3)
Lower jaw length	42.3 (6.3)	32.4 (6.5)	42.5 (7.2)
Orbital diameter	4.1 (0.6)	2.1 (0.4)	5.1 (0.9)
Interorbital width	-	8.5 (1.7)	16.5 (2.8)
Trunk length	342 (51.0)	187.0 (37.5)	215.0 (36.4)
Tail length	-	239.0 (47.9)	282.0 (47.8)
Predorsal length	-	130.7 (26.2)	145.0 (24.6)
Preanal length	370 (55.2)	263.0 (52.7)	322.0 (54.6)
Pectoral fin length	16 (2.4)	10.8 (2.2)	15.1 (2.5)
Body depth (behind branchial opening)	32.6 (4.9)	26.2 (5.3)	30.9 (5.2)
Body depth (to the level of pectoral fins)	38.6 (5.8)	23.6 (4.7)	30.6 (5.2)
Body depth (to the level of anus)	38.3 (5.7)	25.2 (5.1)	27.0 (4.6)

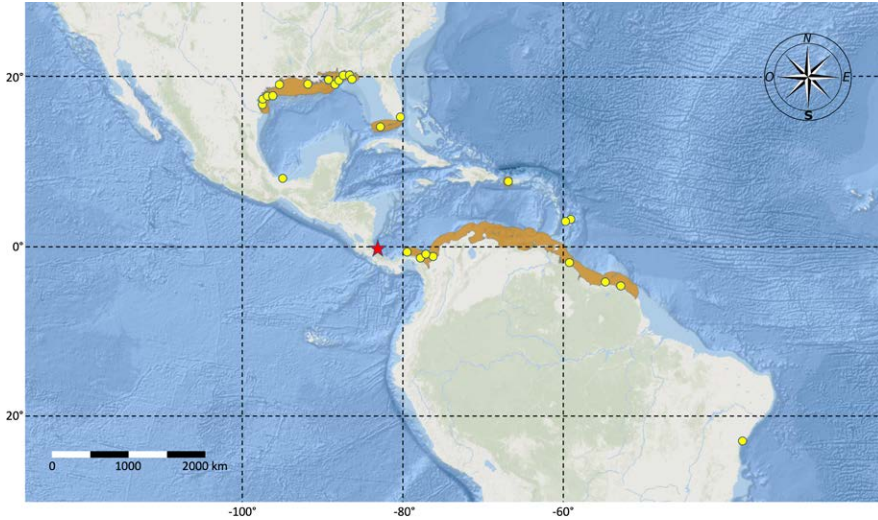


Fig. 3. Known distribution range of *Aplatophis chauliodus* in the western Atlantic; museum records and records previously published retrieved from FishNet2 (2024) and GBIF (2024) are presented as yellow circles; the red star represents the new record reported here

Fig. 3. Ámbito de distribución conocido para *Aplatophis chauliodus* en el Atlántico occidental; los registros publicados previamente y de museos, obtenidos de FishNet2 (2024) y GBIF (2024), se presentan como círculos amarillos; la estrella roja indica el nuevo registro aquí reportado

## RESULTS

The identity of the specimen, as *A. chauliodus*, was corroborated based on the following combination of distinctive characteristics: 1) body stout, not very elongate, compressed at rear; 2) head and trunk slightly longer than tail (52.6% of TL); 3) head relatively long (16.2% of TL) and deep behind branchial opening (32.3% of HL); 4) snout relatively short (13.9% of HL), upper head profile concave; 5) jaws elongate (upper 36.3% of HL; lower 44.4% of HL), the lower one projecting beyond the upper; 6) front

teeth on both jaws developed as very large fangs extending outside of the mouth when closed; 7) jaw teeth in two rows; 8) tongue developed as a fleshy lure; 9) front and rear nostrils tubular, the rear nostril located anterior and ventral the eye; 10) eye relatively small (5.3% of HL), low on head, located above and a little before the middle of the mouth; 11) a short barbel present below the eye; 12) gill opening vertical and elongate, located on the sides; 13) lateral line complete, the lines of each side of the head connected by two canals across the top of the head; 14) pectoral fins pointed, with a

narrow base; 15) dorsal fin origin located behind the pectoral tips; 16) tail tip blunt and finless; and 17) total vertebrae: 108, with 15 predorsal and 55 preanal (Fig. 2). Additional morphometric and comparative data are presented in Table 1.

## DISCUSSION

Morphometric data from the analyzed specimen agree with those reported by recent authors (*e.g.*, Santos-Sampaio *et al.* 2017; Robertson & Van Tassell, 2023; Del Moral-Flores *et al.* 2024). The interorbital width is the only anatomical feature that differs substantially from recent literature; however, McCosker *et al.* (1989) report interorbital widths of 13-18% HL, which is consistent with that observed in our specimen (17.2% HL). Moreover, preserved coloration (*i.e.*, anterior and medial portion of the head dark brown, opercular region and caudal tip whitish brown; body/trunk grayish brown, paler in the ventral region and darker on the dorsum; pectoral and dorsal fins whitish, with light brownish shades; overall body with small brown spots and freckles) and vertebrae counts also are in agreement with previous descriptions of the species (*i.e.*, McCosker *et al.* 1989; Santos-Sampaio *et al.* 2017; Del Moral-Flores *et al.* 2024). Therefore, all sources of information support the species designation.

In the Western Atlantic region, *A. chauliodus* has been reported from the coasts of Panama, Colombia, Puerto Rico, Veracruz (Mexico), the southern portion of the United States and the northeastern portion of Brazil (McCosker *et al.* 1989; Santos-Sampaio *et al.* 2017; Robertson & Van Tassell, 2023; Del Moral-Flores *et al.* 2024). The discovery of an additional specimen of this species in Costa Rican waters not only increases the knowledge about the marine ichthyological diversity of that country but also provides evidence of a broader distributional pattern for the species in the Caribbean region. With this information we are now able to fill a gap of about 1,900 km between the closest verified records in the middle of its distribution and expand the known range by about 440 km to the west.

Currently, there are 27 nominal records of *A. chauliodus* in Fishnet2 (2024), with 68 individuals in total, which were collected since 1934. These numbers may suggest, as stated by McCosker *et al.* (1989), that *A. chauliodus* may be a relatively uncommon species along its distribution range. This apparent scarcity contributes to the lack of knowledge in several aspects of the biology of the species (McCosker *et al.* 1989; Santos-Sampaio *et al.* 2017; Del Moral-Flores *et al.* 2024). In fact, from the relatively little that is known, we only can assume that this species lives in permanent or

semi-permanent burrows at depths between 1 and 100 m, with only the snout and eyes exposed (McCosker *et al.* 1989; Robertson & Van Tassell, 2023). Moreover, it is known that this species feeds on other fishes and crustaceans (neither dissections nor stomach content analyses were carried out in this study to corroborate this) which it may attract by using its highly modified tongue as a lure (McCosker *et al.* 1989; McCosker & Robertson, 2001; Robertson & Van Tassell, 2023).

The collection of the Costa Rican specimen at 10 m depth agrees with the known vertical distribution range for the species (1-100 m as detailed above), even though most of the reported captures have been made at depths between 33 and 91 m (McCosker *et al.* 1989). The absence of this species in previous samplings on the Caribbean coast of Costa Rica could be due to: 1) this intrinsic rarity, as discussed above, and 2) sampling bias. The latter has been widely recognized by previous studies and reviews (*e.g.*, Cortés, 2009) that have found the demersal environments that this species usually inhabits (McCosker & Robertson, 2001; Robertson & Van Tassell, 2023) to be among the most difficult to sample. Future studies seeking to address this gap could enhance our understanding of fish diversity in this type of environment, country, and region, as well as provide deeper insights into the biology of the species that inhabit it.

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## REFERENCES

- Böhlke, E. B. (1989). Methods and terminology. In E. B. Böhlke (Ed.), *Fishes of the Western North Atlantic, Orders Anguilliformes and Saccopharyngiformes* (pp. 1-7). EE. UU.: Sears Foundation for Marine Research, Yale University.

- Cortés, J. (2009). A history of marine biodiversity scientific research in Costa Rica. In *Marine Biodiversity of Costa Rica, Central America* (pp. 47-80). Netherlands: Springer.
- Del Moral-Flores, L. F., Wakida-Kusunoki, A. T., Ramos-Hernández, R. & George-Zamora, A. (2024). First records of two species of snake eels, *Aplatophis chauliodus* and *Ophichthus hyposagmatus* (Actinopterygii: Anguilliformes: Ophichthidae), from Mexico. *Acta Ichthyol. Piscat.*, 54, 103-108. <https://doi.org/10.3897/aiep.54.119085>
- FishNet2. (2024). FishNet2 online Database. <https://www.fishnet2.net>
- GBIF. (2024). Global Biodiversity Information Facility. <https://www.gbif.org>
- McCosker, J. E. & Robertson, D. R. (2001). *Aplatophis zorro*, a new species of eastern Pacific snake-eel, with comments on New World ophichthid distributions (Anguilliformes: Ophichthidae). *Rev. Biol. Trop.*, 49, 13-19.
- McCosker, J. E. & Rosenblatt, R. H. (1995). Ophichthidae. In W. Fischer, F. Krupp, W. Schneider, C. Sommer, K. E. Carpenter & V. H. Niem (Eds.), *FAO species identification guide for fishery purposes: Eastern Central Pacific* (pp. 1326-1341). Italy: FAO.
- McCosker, J. E. (1977). *The osteology, classification, and relationships of the eel family Ophichthidae*. *Proc. Calif. Acad. Sci.*, ser 4, 41(1), 1-123.
- McCosker, J. E. (2002). Ophichthidae. Snake eels (shrimp eels, worm eels, and sand eels). In K. E. Carpenter (Ed.), *The living marine resources of the Western Central Atlantic* (pp. 724-733). Italy: FAO.
- McCosker, J. E., Böhlke, E. B. & Böhlke, J. E. (1989). Family Ophichthidae. In E. Böhlke (Ed.), *Fishes of the Western North Atlantic: Orders Anguilliformes and Saccopharyngiformes* (pp. 254-412). EE. UU.: Sears Foundation for Marine Research, Yale University.
- Nelson, J. S., Grande, T. C. & Wilson, M. V. H. (2016). *Fishes of the World*. EE. UU.: John Wiley and Sons, Inc.
- Robertson, D. R. & Van Tassell, J. (2023). Shorefishes of the Greater Caribbean: online information system. Version 3.0. Panama: Smithsonian Tropical Research Institute. <https://biogeodb.stri.si.edu/caribbean/en/pages>
- Robertson, D. R., Allen, G. R., Peña, E. C. & Estape, A. (2024). Peces Costeros del Pacífico Oriental Tropical: sistema de Información en línea. Versión 3.0. Panama: Smithsonian Tropical Research Institute. <https://biogeodb.stri.si.edu/sfep/es/pages>
- Santos-Sampaio, C. L. S., Lopes, P. R. D. & de Oliveira-Silva, J. T. (2017). First record of *Aplatophis chauliodus* (Actinopterygii: Ophichthidae) for the northeastern coast of Brazil, with expansion of its geographic range. *Rev. Bras. Zool.*, 18(2), 119-122.

