

# First records of two species of snake eels, *Aplatophis chauliodus* and *Ophichthus hyposagmatus* (Actinopterygii: Anguilliformes: Ophichthidae), from Mexico

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## Abstract

We report herewith the presence of two species of rare snake eels, *Aplatophis chauliodus* Böhlke, 1956 (499 mm in total length [TL]) and *Ophichthus hyposagmatus* McCosker et Böhlke, 1984 (486 mm TL), in Mexican waters of the Gulf of Mexico. Both species were caught using bottom longline at a depth of 50 to 100 m in sandy bottoms in Veracruz, Mexico. Both records are the first for Mexico and the westernmost in the Gulf of Mexico.

## Keywords

first country record, Gulf of Mexico, range extension, snake eel, taxonomy, western Atlantic

## Introduction

The family Ophichthidae includes fishes commonly known as worm eels, sand eels, shrimp eels, and snake eels (McCosker 2002; Robertson et al. 2023). They prefer coastal habitats in tropical and temperate waters around the world, from the intertidal zone to depths approximating 1300 m. They are mainly marine organisms but some species can also be found in a freshwater environment. They are associated with sandy, muddy bottoms and coral reefs (McCosker 2010; Nelson et al. 2016). The family is characterized by an elongated, cylindrical body, lack of scales,

subterminal or lower mouth, pointed or rounded snout, presence of lateral line, separate nostrils, and the anterior nostril in tube shape (McCosker 2002), as well as other diagnostic features: numerous branchiostegal rays and overlapping in the midventral region, united supraorbital canals, presence of supratemporal canals, in adults the frontals fused along their entire length, only the first basibranchial is ossified, first epibranchial connected to the second infra-pharyngobranchial by a strip of cartilage, the third hypobranchial is usually cartilaginous, reduction or absence of neural spines, without palatines and pterygoids separated from vomer (McCosker 1977; McCosker et al. 1989).

The ophichthids are one of the most diverse families within the order Anguilliformes and are usually captured for human consumption with some being used as ornamental species (McCosker 2002; Owfi et al. 2014). The family is represented by 62 genera and 364 valid species worldwide (Fricke et al. 2024), and in the Gulf of Mexico, 15 genera with 33 species have been recorded, of which the largest number of species have been recorded in the northern part representing the USA (McEachran and Fechhelm 1998; McEachran 2009). In the western Atlantic, the family was reviewed by McCosker et al. (1989). Several of the recorded species, such as *Aplatophis chauliodus* Böhlke, 1956 and *Ophichthus hyposagmatus* McCosker et Böhlke, 1984 are known from few specimens and much of their biology is unknown.

The fangtooth snake eel, *Aplatophis chauliodus*, was described based on two specimens collected in the Bay of Mayagüez, Puerto Rico, and one specimen from Panama (Böhlke 1956). Subsequently, there were a few records from the Caribbean, to Suriname, including the northern Gulf of Mexico (McCosker et al. 1989; Cervigón 1991; McEachran and Fechhelm 1998). On the other hand, the other species, the faintsaddled snake eel, *Ophichthus hyposagmatus*, has a few records, and is known mainly from the type series; the holotype was collected on the north of the Gulf of México (McCosker and Böhlke 1984). In this paper, we report the presence of these two species in the Mexican area for the first time.

## Materials and methods

During the period from January 2021 to October 2023, several catches of anguilliform fish were made in the coastal area of southern Veracruz, near Barra de Sontecomapan. These specimens are used as bait for shark fishing in the region. The fishing gear used is a bottom longline, with a length of 1500 m, and 5 m snood, with 500 number 8 hooks that operate between 50 and 100 m of depth. Two specimens of snake eels were found during this fishing operation and were determined by species with specialized keys (McCosker et al. 1989; McEachran and Fechhelm 1998; McCosker 2002).

Basic morphological measurements were taken from each specimen by calipers based on measurements outlined by Böhlke (1989) and expressed as percentage of total length [% of TL] or head length [% of HL] for comparison with previously published species information (McCosker et al. 1989; Cervigón 1991; Sampaio et al. 2017). The vertebral number was counted on X-ray images. The vertebral formula and cephalic pores were followed by Böhlke (1989) and McCosker et al. (1989). Specimens were fixed with formalin (10%) and preserved in ethyl alcohol (70%) within the Ichthyological Collection of the Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México under catalog numbers CIFI-1909 and CIFI-2391.

## Results

### Family Ophichthidae Subfamily Ophichthinae Genus *Aplatophis* Böhlke, 1956

#### *Aplatophis chauliodus* Böhlke, 1956

English common name: fangtooth snake eel

Spanish common name: Culebra colmilluda

Fig. 1; Table 1

*Aplatophis chauliodus* Böhlke, 1956.—Böhlke (1956): 3 (Type locality: Mayagüez pier, Puerto Rico).

**Material examined.** CIFI-2391, 1 specimen (499 mm TL); ca. 8.5 km to the North of Barra de Sontecomapan, Catemaco, Veracruz, Mexico; 18°37'58"N, 094°58'38"W (Fig. 2); 15 Sep. 2023; Armando Campos Pérez leg.

**Description.** Morphometric data presented in Table 1. Body elongated, cylindrical, without scales. Head length 10.6% of TL, its dorsal margin concave towards snout region; mouth large, with opening angle >90 degrees; tongue black and fleshy; lower jaw length 40.6% of HL; both jaws thin and elongated, bearing large canines; lower jaw with three anterior teeth; upper jaw with four on each side, vomer with one tooth, maxillary teeth in two rows. Snout short and pointed, length 11.7% of HL. Eyes small with diameter 2.9% of HL. Nostrils together, with anterior one tubular, situated in front and below eyes; posterior one elliptical. Trunk large and robust, length 37.5% of TL, with its tail rigid, length 47.8% of TL. Pectoral fin small, length 14.8% of HL, slightly larger than gill slit. Cephalic pores: preoperculomandibular 6 + 2, infraorbital 4 + 2, supraorbital 1 + 2. Total vertebrae 108, predorsal vertebrae 15, preanal vertebrae 54.

**Coloration (fresh).** Mottled whitish brown, with stronger tonality in dorsal and cephalic region, while more whitish in ventral region. Oral cavity, tongue, and lower jaw dark. In distal portion edges of dorsal and anal fins black.

### Genus *Ophichthus* Ahl, 1789

#### *Ophichthus hyposagmatus* McCosker et Böhlke, 1984

English common name: faintsaddled snake eel

Spanish common name: Lairón menor

Fig. 3; Table 1

*Ophichthus hyposagmatus* McCosker et Böhlke, 1984.—McCosker and Böhlke (1984): 24 (Type locality: Gulf of Mexico, South of Destin, Florida.)

**Material examined.** CIFI-1909, 1 specimen (486 mm TL); ca. 8.1 km to the North of El Carrizal, Catemaco, Veracruz, Mexico; 18°37'15.6"N, 094°55'01.0"W (Fig. 4); 7 Oct. 2021; Armando Campos Pérez leg.

**Table 1.** Comparative morphometrics data of *Aplatophis chauliodus* and *Ophichthus hyposagmatus* collected in Mexico with previous records.

Character	<i>Aplatophis chauliodus</i>				<i>Ophichthus hyposagmatus</i>	
	Mexico <i>n</i> = 1	Western Atlantic <i>n</i> = 10	Venezuela <i>n</i> = 3	Brazil <i>n</i> = 1	Mexico <i>n</i> = 1	Western Atlantic, Type series <i>n</i> = 6
<b>Absolute values [mm]</b>						
Total length (TL)	499.0	168.0–804.0	566.0–847.0	670.0	486.0	357.0
Predorsal length	130.7	—	—	180.0	64.8	53.0
Head length	72.8	—	—	103.6	51.7	40.0
Trunk length	187	—	—	342.0	168.0	122.0
Tail length	239	—	—	—	268.0	195.0
Preanal length	263	—	—	370.0	218.0	—
Snout length	8.5	—	—	22.5	10.6	9.5
Upper jaw length	30.5	—	—	40.9	22.7	—
Lower jaw length	32.4	—	—	42.3	21.0	—
Orbital diameter	2.1	—	—	4.1	6.2	5.2
Interorbital width	8.5	—	—	—	7.8	4.1
Pectoral fin length	10.8	—	—	16	14.3	11.9
Base of pectoral fin	—	—	—	—	4.6	3.3
Body depth at gill opening	26.2	—	—	32.6	21.3	11.0
Body depth at level of pectoral fins	23.6	—	—	38.6	20.9	—
Body depth at anus	25.2	—	—	38.3	20.3	13.0
Body width at anus	—	—	—	—	16.8	11.2
Gill opening length	—	—	—	—	8.9	6.8
<b>Relative values [% of TL]</b>						
Head length	14.6	14.0–16.0	14.4–16.0	15.5	10.6	11.0–12.0
Trunk length	37.5	34.0–39.0	—	—	34.6	31.0–35.0
Tail length	47.9	46.0–49.0	—	—	55.1	53.0–57.0
Predorsal length	26.2	25.0–28.0	—	—	13.3	14.0–16.0
Body depth (pectoral fins)	4.3	—	5.4–5.6	5.8	4.3	—
Body depth (gill openings)	5.3	—	—	—	4.4	2.9–4.5
Body depth (anus)	5.1	—	4.8–5.1	5.7	4.2	—
Snout length	1.7	—	2.3–2.7	3.3	2.2	—
Orbital diameter	0.4	—	0.3–0.8	0.6	1.3	—
Upper jaw length	6.1	—	8.2	6.1	4.7	—
Lower jaw length	6.5	—	9.4	6.3	4.3	—
Pectoral fin length	2.2	—	2.3–2.6	2.4	2.9	—

Mexico = this study, Western Atlantic (for *Aplatophis chauliodus*) = McCosker et al. (1989), Venezuela = Cervigón (1991), Brazil = Sampaio et al. (2017), Western Atlantic (for *Ophichthus hyposagmatus*) = McCosker and Böhlke (1984); McCosker et al. (1989).

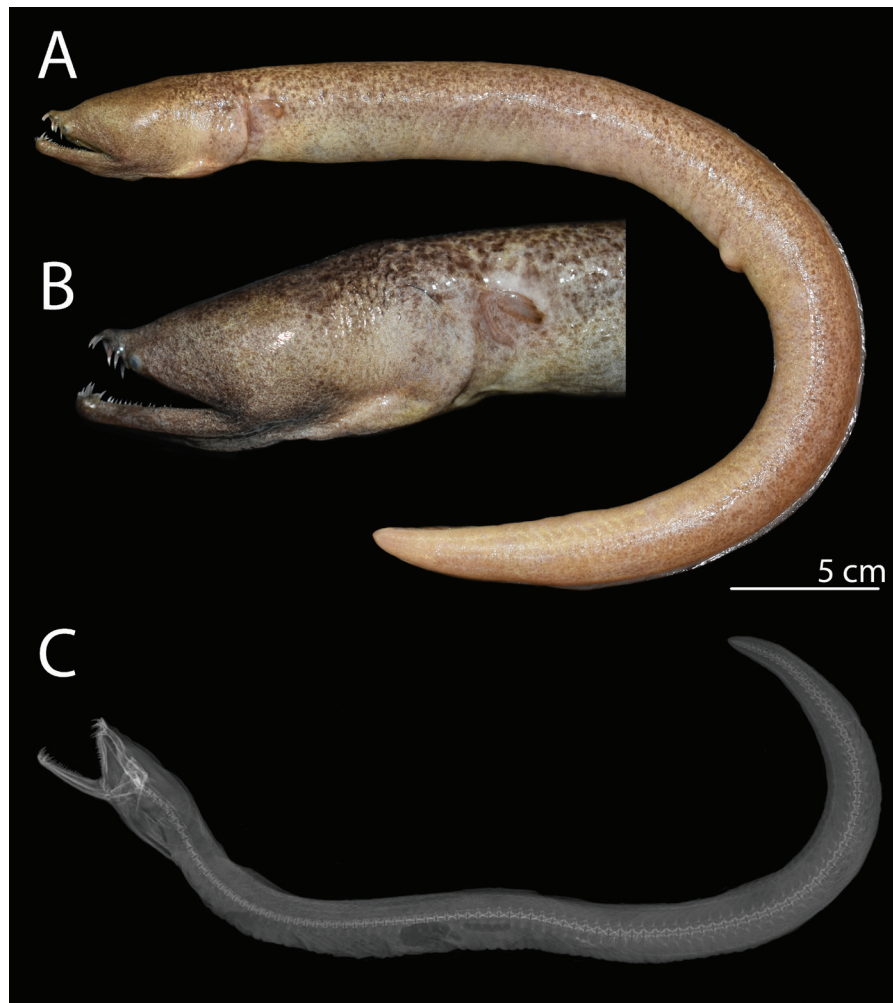
**Description.** Morphometric data presented in Table 1. Elongated body, without scales and cylindrical body on transverse axis; trunk shorter than tail region (34.6% of TL); tail length 55.1% of TL. Head length moderate, 10.6% of TL; snout conical, length 20.5% of HL, larger than eye diameter; eyes large, length 12.0% of HL; interorbital region flat, its width 15.1% of HL. Two nostrils, with anterior nostril tubular and posterior nostril covered by a flap. Mouth inferior, upper jaw slightly larger than snout, length 43.9% of HL; both jaws with two rows of subequal conical teeth; series of vomerine teeth. Dorsal-fin origin above posterior part of pectoral fins, predorsal distance 13.3% of TL; pectoral fins elongated and larger than eye, length 27.7% of HL. Cephalic pores: preoperculo-mandibular 6 + 3, infraorbital 4 + 2, supraorbital 1 + 3. Total vertebrae 138, predorsal vertebral 12, preanal vertebral 55.

**Coloration (fresh).** Body yellowish brown, with whitish shades in ventral region and with greater intensity on

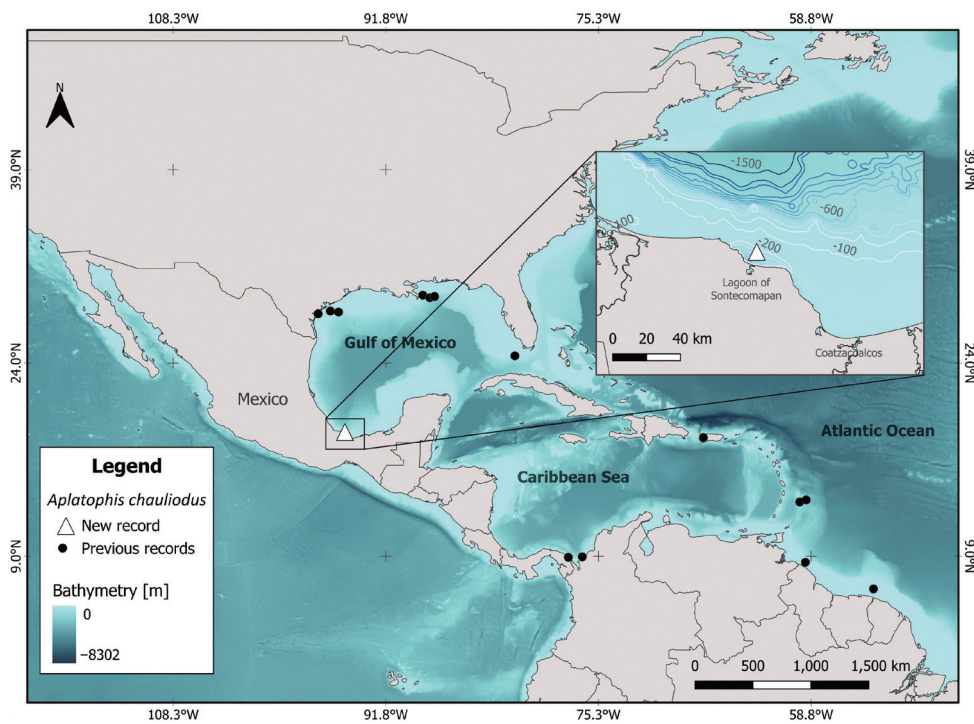
dorsum; 16 brown bars that contrast as saddles on dorsum; dorsal region of snout and interorbital space dark brown. Pectoral and dorsal fins translucent, with light brownish shades.

## Discussion

The morphology and measurements of both species are consistent with the diagnoses reported for each of them in the western Atlantic (Table 1). Except for the snout length of the *Aplatophis chauliodus* specimen, which was smaller than that in previous reports (1.7 vs. 2.3%–3.3% of TL). This may be a natural variation within the population, due to the extensive modification of the upper jaw (McCosker et al. 1989). This is also one of the possible explanations for the variations observed in the specimen reported from Brazil (Sampaio et al. 2017). The number of total vertebrae observed in this specimen was lower than that reported for

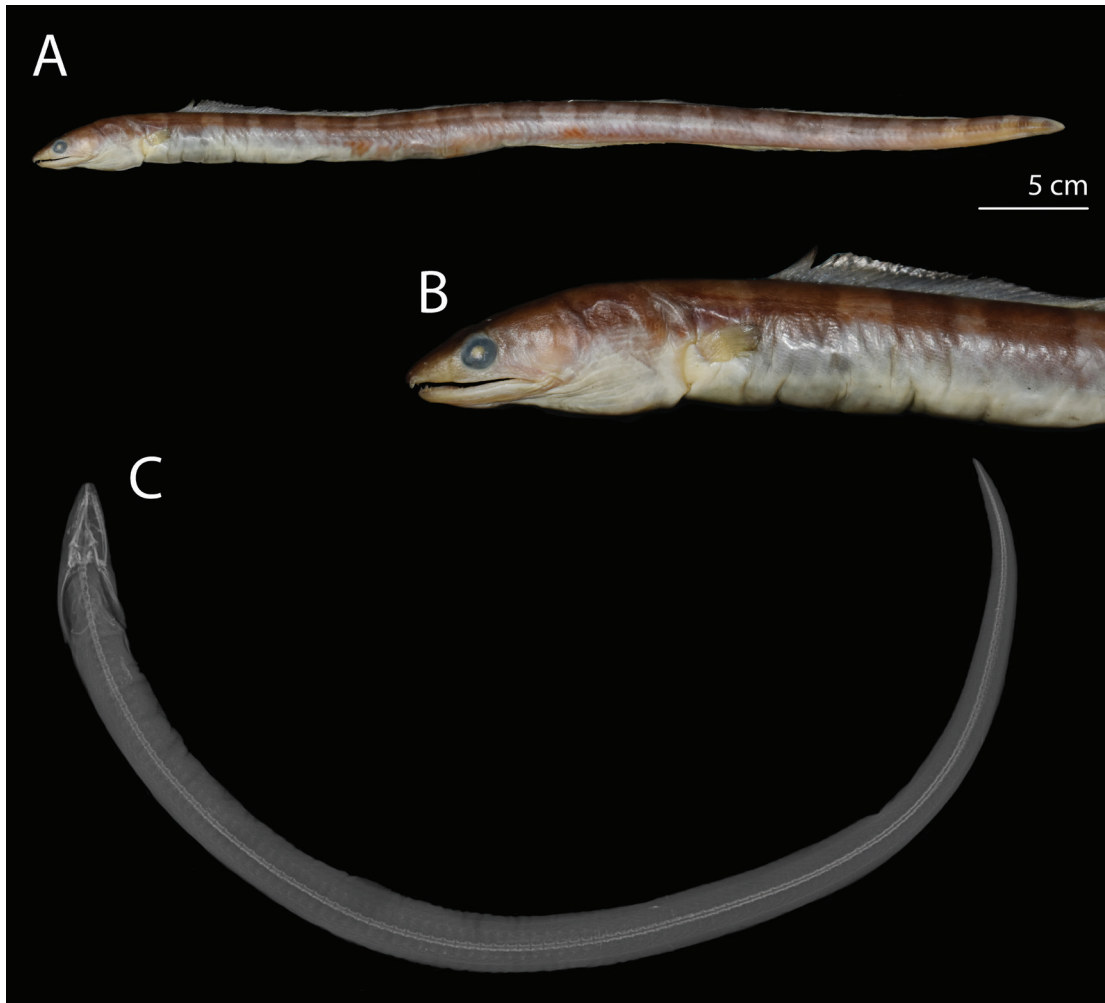


**Figure 1.** *Aplatophis chauliodus* (CIFI-2391, 499 mm TL) collected off the coasts of Mexico. (A) Freshly caught specimen. (B) A close-up of the cephalic region. (C) X-ray of the entire specimen.

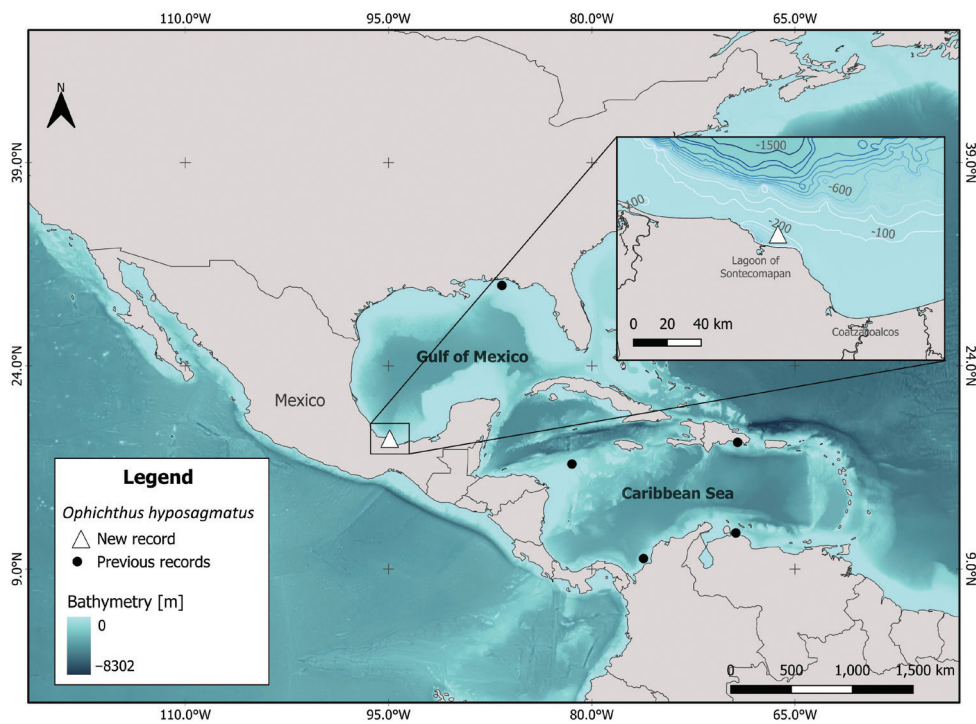


**Figure 2.** Map showing the distribution in previous records (circles) in the western Atlantic and new record (triangle) of *Aplatophis chauliodus* in Mexico.





**Figure 3.** *Ophichthus hyposagmatus* (CIFI-1909, 486 mm TL) collected off the coasts of Mexico. (A) Preserved specimen. (B) A close-up of the cephalic region. (C) X-ray of the entire specimen.



**Figure 4.** D Map showing the distribution in previous records (circles) in the western Atlantic and new record (triangle) of *Ophichthus hyposagmatus* in Mexico.

the species (108 vs. 110–115) by McCosker et al. (1989), so it is necessary to evaluate possible morphological variation throughout its geographic distribution.

In the case of *Ophichthus hyposagmatus*, so far only six specimens are known to have been captured in the western Atlantic, at depths ranging from 88 to 293 m (McEachran and Fechhelm 1998). According to previous reports of its morphometry, a shorter head length was observed, which may be related to allometric growth, as has been reported in some species of the family Ophichthidae (see Sangun et al. 2007).

The presently reported specimens of *O. hyposagmatus* are smaller than 386 mm TL, indicating that a mature male and female have been found smaller than 400 mm TL (McCosker and Böhlke 1984; McCosker et al. 1989). The Mexican specimen represents a new record in size (486 mm TL) and represents a mature individual. It also represents the second record from the Gulf of Mexico, because the

holotype was captured south of Destin, Florida, 29°56'N, 086°38'W (McCosker et al. 1989). Therefore, the Mexican record increases its range by about 1500 km to the Southwestern Gulf of Mexico. In the case of the Mexican record of *A. chauliodus* the range increases by almost 1035 km to the Southeast, from the known records in Texas, USA (McCosker et al. 1989). This shows how little is known about the biology, distribution, and ecology of both species.

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