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RESEARCH NOTE

Aplatophis zorro (Anguilliformes: Ophichthidae), a rare fish from the Tropical Eastern Pacific: Morphometric data and range extension

Aplatophis zorro (Anguilliformes: Ophichthidae), un pez raro del Pacífico oriental tropical: Datos morfométricos y extensión de su distribución

Stephanía Rojas-Vélez[1*], Jose Tavera[1] and Arturo Acero-P[2]

[1]Grupo de Investigación en Sistemática, Evolución y Biogeografía Animal, Departamento de Biología, Universidad del Valle, AA 25360, Cali, Colombia
[2]Instituto de Estudios en Ciencias del Mar (CECIMAR), Universidad Nacional de Colombia, sede Caribe, El Rodadero, Santa Marta, Colombia
*Corresponding author: stephania.rojas@correounivalle.edu.co

Abstract.- Ophichthid eel genus *Aplatophis* includes two species restricted to the New World, one distributed in the western Atlantic (*A. chauliodus*) and the other in the tropical eastern Pacific (*A. zorro*). *Aplatophis zorro* is a little-known species that was described in Panama, Gulf of San Miguel, from the collection of a single mature male. This work constitutes the first record of the species in Colombian waters and extends its geographical distribution to more than 483 km south on the American continent. In addition, some morphometric variation of the species, which was only known from the Panamanian holotype, is provided.

Key words: Ophichthid eel, Snaggle-toothed snake-eel, Colombia, geographic range, Panama

INTRODUCTION

Ophichthidae is a family belonging to the order Anguilliformes that includes about 350 valid species, 51 of which were described in the last decade (Fricke *et al*. 2021). Snake eels are distributed in all tropical and temperate oceans of the world, from the shallow coast down to 800 m depth (Robertson & Allen 2015, Nelson *et al*. 2016). They have a variable size (total length usually 0.5-2.5 m) and a rigid tail, characteristics that allow them to move through the sediment and dig quickly to make their burrows (Nelson *et al*. 2016). It is distinguished from other families of the order by having posterior nostrils that cross inside the upper lip, and a gill bag expanded and reinforced by 15-49 rays called "jugostegalia" (McCosker & Rosenblatt 1995). In the tropics of the New World, about 89 species are distributed in 28 genera (Robertson & Allen 2015, Robertson *et al*. 2019). For this region, one of the less diverse genera is *Aplatophis* Böhlke, 1956, as it contains only two species, one of them distributed in the western Atlantic (*Aplatophis chauliodus* Böhlke, 1956) and the other in the tropical eastern Pacific (*Aplatophis zorro* McCosker & Robertson, 2001). Unlike *A. chauliodus*, which has a wide distribution ranging from the Gulf of Mexico to French Guiana, *A. zorro* is reported only from Gulf of San Miguel, Panama, based on the collection of a single mature male from which the species was described (McCosker & Robertson 2001).

The aim of this work has been to report the extent of the distribution range of *A. zorro*, based on the record of individuals captured in Colombian waters and, to provide morphometric data of this little-known species.

Materials and methods

Two individuals of *A. zorro* were collected on July 15, 1979, in Malaga Bay (3°57'33"N, 77°20' 08"W), located on the Pacific coast of Colombia (Fig. 1), between 5 and 10 m deep, on a bottom of dead vegetation (leaves) and mud. The individuals were deposited in the Reference Ichthyological Collection of Universidad del Valle with the catalog number CIR-UV 79071, under the erroneous identification of *Myrichthys tigrinus* Girard, 1859. Forty-one years later, after the review of the deposited material, its identification was corrected following the information system of Robertson & Allen (2015), the original description of the species (McCosker & Robertson 2001), and the description of the genus *Aplatophis* made by Rosenblatt & McCosker (1970).

Measurements were based on McCosker & Robertson (2001). The following measurements were considered: Total length (TL), head length (HL), eye diameter, interorbital distance, pre-anal length, post-anal length, pre-dorsal length, body depth at gill opening, body width at gill opening, body depth, body width, snout length, upper-jaw length, gill-opening length, pectoral-fin length, and pectoral-fin base length (Table 1). Measurements of total length, pre-anal length, post-anal length, and pre-dorsal length were made with a 1 mm gradation ruler. For the remaining measurements a dial caliper with precision of 0.1 mm was used. Then the measurements were compared with those described in the species holotype (USNM-360118) from Panama.

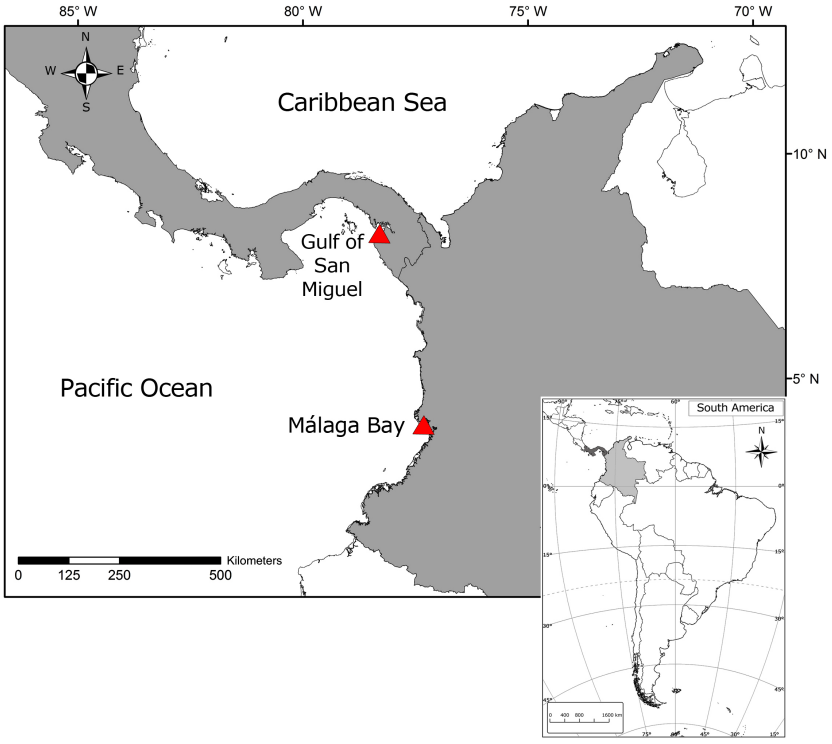

Figure 1. *Aplatophis zorro* collection locations in the eastern Pacific. Holotype collected in Gulf of San Miguel, Panama (8°12'21.6"N; 78°19'34.8"W) and two individuals collected in Málaga Bay, Colombia (3°57'33"N; 77°20'8"W) / Localidades de colecta de *Aplatophis zorro* en el Pacífico oriental. Holotipo colectado en el golfo de San Miguel, Panamá (8°12'21,6"N;78°19'34,8"O) y dos individuos colectados en bahía Málaga, Colombia (3°57'33"N; 77°20'8"O)

Table 1. Morphometric measurements for holotype specimen and two individuals of *Aplatophis zorro* at two locations in the eastern tropical Pacific / Medidas morfométricas del espécimen holotipo y de dos individuos de *Aplatophis zorro* en dos localidades del Pacífico oriental tropical

Measurements (mm)	HOLOTYPE* USNM-360118	CIR-UV 79071**	
	Punta Patiña, Panama	Málaga Bay, Colombia	
		Specimen 1	Specimen 2
Total length	1039	777	662
Head length	155.5 (6.7)	113.81 (6.8)	96.9 (6.8)
Pre-anal length	534 (1.95)	376 (2)	328 (2)
Post-anal length	505	401	334
Pre-dorsal length	223	176	154
Body depth at gill opening	46 (23)	41.61 (18.6)	36.4 (18.1)
Body width at gill opening	43	26.9	29.4
Body depth	46	33.1	35.9
Body width	41	32.2	29.5
Snout length	28.4	23.7	21.5
Upper jaw length	53.7	36.2	37.6
Gill opening length	29	15.6	11.8
Pectoral fin length	27.7	23.8	18.9
Pectoral fin base length	11	10.5	7.8
Eye diameter	4.7	3.4	4.2
Interorbital distance	23	21.1	17.7

*Holotype data (USNM-360118) taken from McCosker & Robertson (2001)
**CIR-UV: Reference Ichthyological Collection of Universidad del Valle

Results and discussion

According to McCosker & Robertson (2001), *A. zorro* is distinguished by having a long and fat head, with a hump over and behind the eye; front teeth of both jaws like fangs extending far beyond the mouth when closed and a line of white dots on the sides of the head forming a letter Z on the right-side view (Fig. 2A-C). Measurements of the collected specimens compared to holotype are shown in Table 1.

Although most of the measurements and proportions are similar to the holotype, head measures have larger values in the individuals presented in this work. For example, the range of variation of the eye diameter with respect to head length is extended (2.98-4.33% of HL *vs.* 3% in the holotype). Similarly, the interorbital distance increased to 18% of HL compared to 14% found in the holotype. Other head-associated measurements such as snout length (20-22% of HL in the Colombian material *vs.* 18% of HL in holotype) and upper jaw length (31-38% of HL *vs.* 34% in the holotype) tend also to be larger in Colombian individuals. In addition, one specimen has bigger teeth compared to the holotype since the longest tooth comprises 1.7 the diameter of the eye *vs.* 1.5 in the holotype. Because the measurements were made in a similar way to the description of the species, it is likely that the differences shown here correspond to intraspecific morphological variation. However, to address this variation in detail it is necessary to measure a larger number of individuals, which are hard to find, unlike its sister species in the western Atlantic.

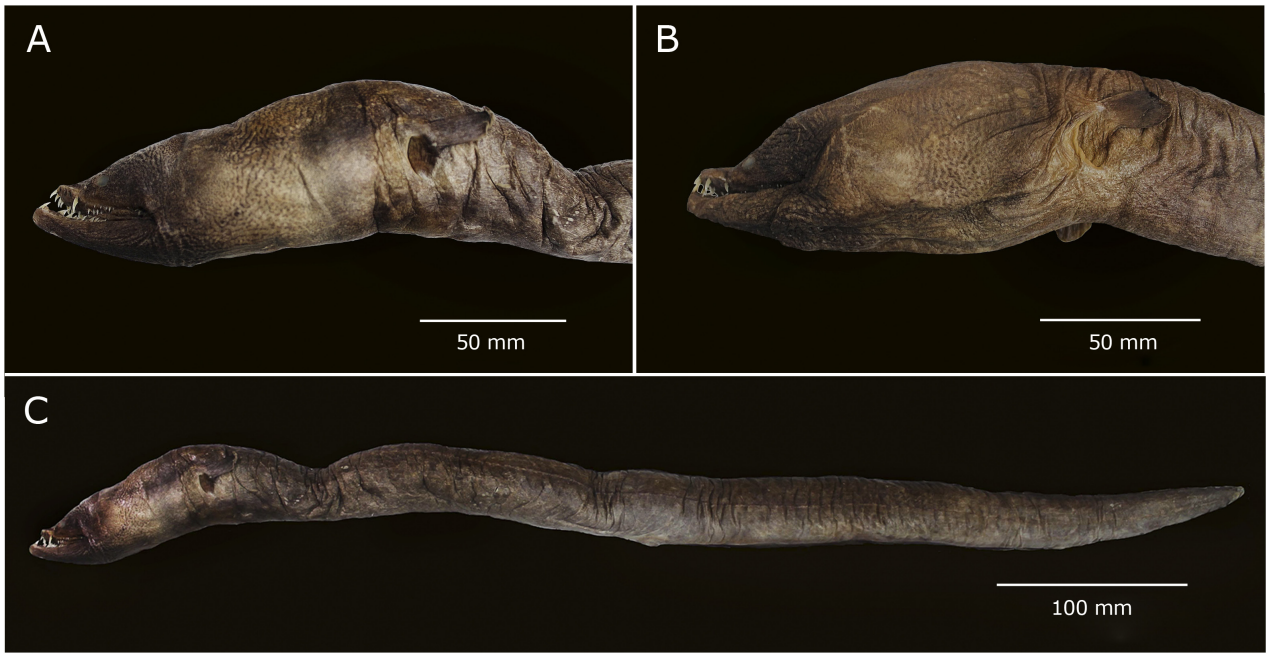

Figure 2. *Aplatophis zorro* collected in Málaga Bay, Colombian Pacific (CIR-UV 79071). A) Head and pectoral fin of specimen 1 (777 mm TL), B) Head and pectoral fin of specimen 2 (662 mm TL), C) Complete body of specimen 1. Photographs by Stephanía Rojas-Vélez / *Aplatophis zorro* colectados en bahía Málaga, Pacífico colombiano (CIR-UV 79071). A) Cabeza y aleta pectoral de espécimen 1 (777 mm TL), B) Cabeza y aleta pectoral de espécimen 2 (662 mm TL), C) Cuerpo completo de espécimen 1. Fotografías de Stephanía Rojas-Vélez

Several specimens of *A. chauliodus* collected in Puerto Rico, Panama, Gulf of Mexico, Colombia, Venezuela, and French Guiana have been deposited in museums (Böhlke 1956, Cervigón 1966, Uyeno *et al*. 1983, McCosker *et al*. 1989). Nevertheless, there was only one specimen of *A. zorro* deposited at United States Natural Museum USNM-360118. Given its morphological uniqueness, McCosker & Robertson (2001) indicated it is unlikely that additional specimens of *A. zorro* were misidentified in biological collections. However, the two specimens reported in this paper are an example of a previous mistake in the identity of this snake eel. This record precedes the description of the species by 22 years and information and specific references to this and other species in the region were scarce or unavailable to the authors that collected and identified the species in the first place, two decades before.

The wide diversity in adaptations and ecology of these eels may be the reason why few individuals of *A. zorro* have been collected to date. For example, the burrowing behavior of snake eels can make it difficult to capture individuals and to understand their distribution (McCosker & Robertson 2001).

The report of these specimens indicates that much remains to be known about the marine fish fauna of this region and that the soft-bottom fauna needs to be explored further. These data add more information about these rare snake eel species, but there are at least another six cases of New World ophichthids that are still known from a single specimen which deserves further attention (McCosker & Robertson 2001). For example, it is recommended to support morphological analyzes with molecular data that allow validating the identity of these species.

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