

FIRST RECORD OF *ETHADOPHIS BYRNEI* (ACTINOPTERYGII: ANGUILIFORMES: OPHICHTHIDAE) IN CONTINENTAL WATERS OF THE GULF OF TEHUANTEPEC, MEXICO: THE SOUTHERNMOST OCURRENCE IN THE EASTERN PACIFIC

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Abstract. The ordinary eel, *Ethadophis byrnei* Rosenblatt et McCosker, 1970, is newly recorded from the Mexican south Pacific coast, based on a single specimen captured inside a tropical coastal lagoon in the Gulf of Tehuantepec. It was previously known only from Puertecitos, Baja California, northwest Mexico, from a specimen collected in 1967. Therefore, the new specimen represents the first record of the ordinary eel from the Panamic Province of the eastern Pacific, extending its known range approximately 2750 km southeast from Puertecitos. The diagnosis of the specimen was made by comparison with the holotype measurements and environmental information is provided from the collection area. The importance of this record is highlighted due to the scarce knowledge about the ordinary eel.

Keywords: biogeography, coastal lagoon, Gulf of Tehuantepec, ophichthids, Panamic Province, Tropical Eastern Pacific

INTRODUCTION

The family Ophichthidae is comprised of 62 genera and 345 valid species (Fricke et al. 2019) distributed around the world in coastal areas from tropical to warm temperate oceans (Nelson et al. 2016). In the Tropical Eastern Pacific (TEP), from southern Baja California Peninsula, Mexico to northern Peru, this family is represented approximately by 20 genera and 40 species (Robertson and Allen 2015). The eel genus *Ethadophis* Rosenblatt et McCosker, 1970 comprises five species, each known from few specimens, distributed in the western Atlantic, eastern Atlantic, and the eastern Pacific (McCosker and Böhlke 1984). In the particular case of the TEP, this genus has a very restricted distribution area (Robertson and Allen 2015). The only known record of the ordinary eel, *Ethadophis byrnei* Rosenblatt et McCosker, 1970, corresponds to a single specimen collected in 1967 from Puertecitos (30°21'N, 114°38'W), Gulf of California, Mexico (Rosenblatt and McCosker 1970).

In marine-coastal environments of the southern Mexican state of Chiapas, ophichthids are represented by eight species (González-Acosta et al. 2018). However, only two species had been reported in continental coastal waters: *Myrichthys xysturus* (Jordan et Gilbert,

1882) and *Ophichthus zophochir* Jordan et Gilbert, 1882 (see Velázquez-Velázquez et al. 2016). In coastal lagoons, the eel records have come from artisanal fishing activities, principally as bycatch (Hernández-Roque et al. 2018). Herein, we present a new and recent record of *Ethadophis byrnei*, collected in the Mar Muerto coastal lagoon, Chiapas, Mexico. This record is the first evidence of its presence in a continental environment and the southernmost record for this species in the eastern Pacific.

MATERIAL AND METHODS

A new specimen of *Ethadophis byrnei* (Fig. 1) was collected using a modified fyke-net (locally called “copo”; frame 6 × 1.7 m, length 10 m, mesh size 1.9 cm), during a study on discarded fish in an artisanal shrimp fishery in the Mar Muerto coastal lagoon, north of the Gulf of Tehuantepec (Chiapas, Mexico). In November 2017 (dry season), the fyke-net was deployed overnight for approximately 6 h at a depth ranging between 0.74 and 1.74 m. For more specifications on the sampling details see Hernández-Roque et al. (2018). The sampling site (15°59.432'N, 93°57.129'W), locally known as “La Barra”, was in a shallow tidal channel located 560 m west of the lagoon mouth (Fig. 2).

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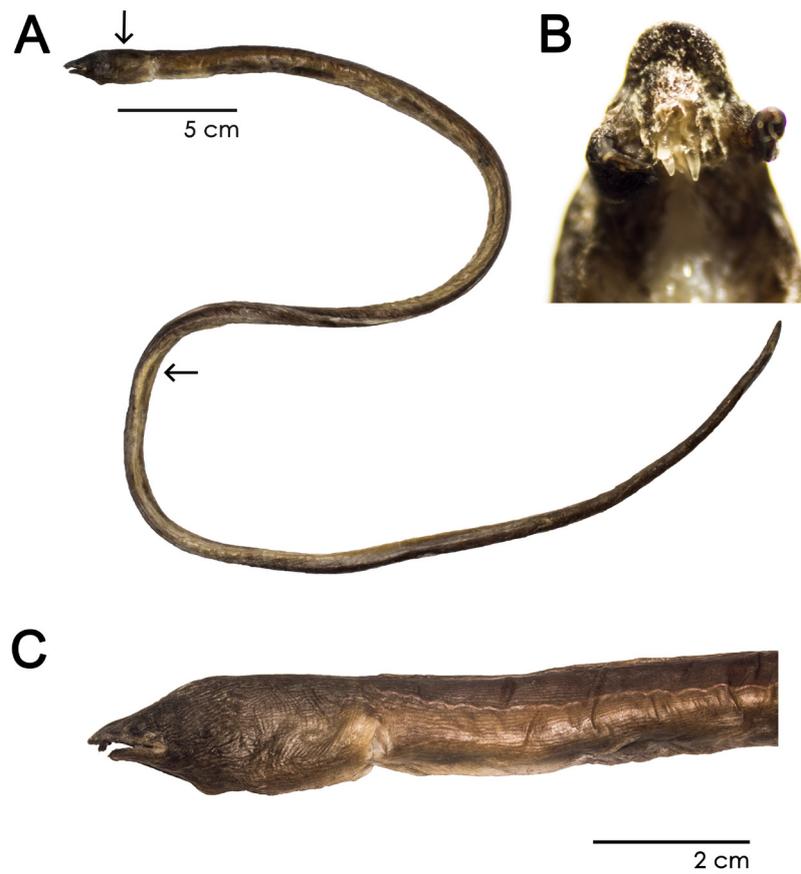


Fig. 1. Preserved specimen of *Ethadophis byrnei* caught in a coastal lagoon of the Gulf of Tehuantepec, Mexican south Pacific, MZ-P-UNICACH 7295; (A) complete specimen, 747 mm TL, upper arrow indicates the start of the dorsal fin, lower arrow indicates the location of the anus; (B) detail for the dentition pattern; (C) head region

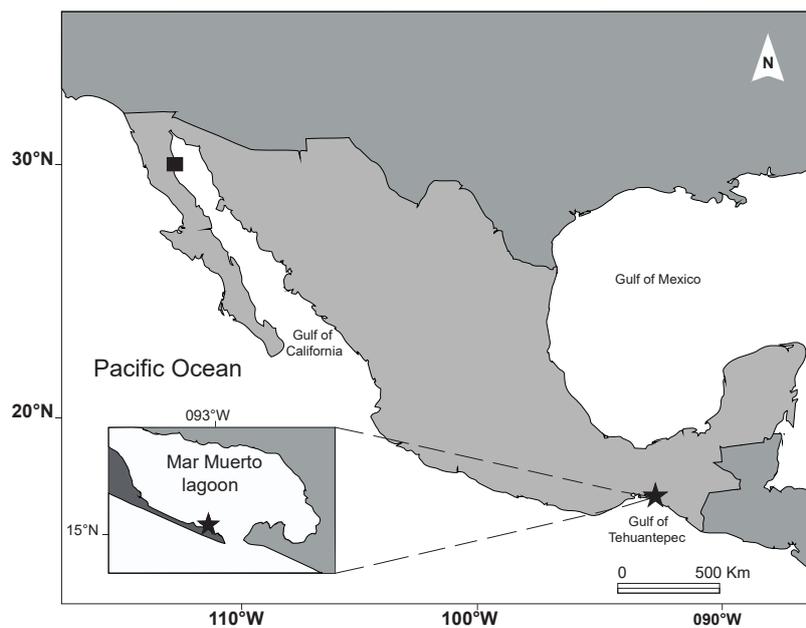


Fig. 2. Map showing records of *Ethadophis byrnei*, with the inset depicting the south eastern part of the Mar Muerto coastal lagoon, Mexican south Pacific and sampling site; black square indicates the original description site, SIO 67-31; black star indicates the present new record described site, MZ-P-UNICACH 7295

The specimen was placed on ice immediately after collection and transported to the laboratory for measurements. Later, it was fixed in 10% formalin and finally preserved in 70% ethanol. The specimen was deposited in the ichthyological collection of the MZ-P-UNICACH Museum of Zoology (Tuxtla Gutiérrez, Mexico), with the catalogue number 7295. The taxonomic identification, counts and measurements were made according to Rosenblatt and McCosker (1970). The known distribution and current information of the species was reviewed with databases available on the shore fishes of the eastern Pacific online information system (Robertson and Allen 2015), Global Biodiversity Information Facility (Anonymous 2017), FishBase (Froese and Pauly 2019), and the Marine Vertebrate Collection of the Scripps Institution of Oceanography*.

RESULTS

Identification. According to Robertson and Allen (2015), there are two valid species of the genus *Ethadophis* in the northern limits of the TEP: *Ethadophis merenda* Rosenblatt et McCosker 1970 and *Ethadophis byrnei*. Using the description and keys proposed by Rosenblatt and McCosker (1970), our specimen clearly agrees with the characteristics of *E. byrnei* in having the following features: body depth at anus more than 70 times in total length (vs. body depth at anus 56 times in total length in *E. merenda*), lateral-line canal looped upward between pores (Fig. 1C) (vs. lateral-line canal nearly straight between pores in *E. merenda*) and intermaxillary tooth patch exposed when jaw is closed (Fig. 1B) (vs. only first intermaxillary tooth exposed when jaw is closed in *E. merenda*). Besides the features aforementioned, and considering the physical condition of the specimen, we also could corroborate these characteristics: total vertebrae 178, preanal vertebrae 87, five pores along the mandible, lateral line beginning on head, dorsal fin disappears slightly more than a snout length before tail tip, and anal fin disappears slightly before dorsal. When the specimen was recently collected, its body had a pink colour. The weight and total length of this eel were 49.7 g and 747 mm, respectively; comparison between measurements and proportions of the holotype of *E. byrnei* and our specimen are presented in Table 1.

Distribution range. *Ethadophis byrnei* was only known by a single specimen collected at the type locality (holotype SIO 67-21, 508 mm TL) on 23 March 1967 in Puertecitos, Baja California, Northwest Mexico (Rosenblatt and McCosker 1970). Our present report of *E. byrnei* in the Mar Muerto coastal lagoon, Chiapas, represents an important range extension for the species (ca. 2750 km). Furthermore, and from a biogeographic perspective, the previous known distribution of this species places it within the Cortez Biogeographic Province, so our record extends the distribution of this species to the Panamic Biogeographic Province in the TEP.

Table 1

Measurements (expressed in absolute and relative values) for *Ethadophis byrnei* from a coastal lagoon of the Gulf of Tehuantepec, Mexican south Pacific, MZ-P-UNICACH 7295, compared with the holotype (see Rosenblatt and McCosker 1970)

Parameter	This study MZ-P- UNICACH 7295		Rosenblatt and McCosker 1970 SIO 67-31	
	[mm]	[%TL]	[mm]	[%TL]
Total length (TL)	747.0		508.0	
Head	37.2		37.5	
Trunk	342.0		223.0	
Tail	364.0		248.0	
Predorsal	37.8		20.5	
Body depth at gill opening	10.8		7.8	
Body depth at anus	8.7		6.8	
Snout	5.7		5.3	
Tip of snout	11.5		10.6	
Eye diameter	1.9		1.2	
Gill opening height	4.2		2.7	
Isthmus width	3.5		3.3	
Depth at anus		85.5		75
Head and trunk		1.9		1.9
Head		20.0		13.0

Ecological remarks. The specimen herein reported was collected in a fyke-net at a mean depth of 1.2 m over a tidal channel with mixed sandy-muddy substrate, close to the mouth of the lagoon. The sampling site presents a marine-type hydrological behaviour during November (Tapia-García et al. 2011). Although during our study no hydrological parameters were measured, water temperature and salinity ranges of 27–30°C and 30‰–40‰, respectively have been reported for the same month and area of collection (Tapia-García unpublished**). The most abundant accompanying fish species in the sampling site were *Eucinostomus currani* Zahuarenc, 1980 (Gerreidae), *Eucinostomus gracilis* (Gill, 1862) (Gerreidae), and *Amphilophus trimaculatus* (Günther, 1867) (Cichlidae) (see Hernández-Roque et al. 2018). The area where the specimen was caught is an important small-scale fishing ground, in which the main target species is the Pacific white shrimp (*Penaeus vannamei*). *Ethadophis byrnei* is included as a “data deficient” taxon by de IUCN because of the lack of biological and ecological information for this species (McCosker et al. 2010).

DISCUSSION

Although the lagoon-estuarine systems of the Mexican south Pacific have been poorly studied in terms of ichthyofaunal richness, new records of fish have recently been reported (Velázquez-Velázquez et al. 2016, Hernández-Roque et al. 2018, Romero-Berny et al. 2018).

* <https://scripps.ucsd.edu/collections>.

** Tapia-García M. 1997. Estructura e interacciones ecológicas de las comunidades de peces de la plataforma continental y la Laguna del Mar Muerto, en el Golfo de Tehuantepec al sur del Pacífico Mexicano. Doctoral thesis, UNAM, México DF, Mexico.

The intensification of samplings and the analysis of bycatch and landings from artisanal fisheries in specific intertidal environments (e.g., lagoon mouths, channels, mangroves, and swamps) could increase the known richness of the fish fauna. The only information available for *E. byrnei*, to date, came from the holotype (SIO 67-21). With our results we can add new knowledge about the distribution, biology and ecology of this eel. With respect to the holotype, Rosenblatt and McCosker (1970) pointed out that the normal habitat of the ordinary eel was unknown. Here, we recognize that this species can reach larger sizes and that is able to live in tropical estuarine environments with shallow waters (vs. marine; demersal and subtropical environments) (Fricke et al. 2019). The new record of *E. byrnei* from the Gulf of Tehuantepec also demonstrates the presence of this species in continental aquatic environments, and in the Panamic Biogeographic Province, which could indicate a wider distribution throughout the TEP.

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