

A NEW SPECIES OF SAND EEL GENUS *BASCANICHTHYS* (ANGUILLIFORMES: OPHICHTHIDAE) FROM THE CARIBBEAN

Fabián Moreno¹, Arturo Acero P.² and Marcela Grijalba-Bendeck³

1 Universidad Santo Tomás Villavicencio, Ciencias Básicas, Villavicencio, Colombia. fabianmorenor@usantotomas.edu.co

2 Universidad Nacional de Colombia Sede Caribe, Cecimar, El Rodadero, Santa Marta, Colombia. aacerop@unal.edu.co

3 Universidad de Bogotá Jorge Tadeo Lozano, Facultad de Ciencias Naturales e Ingeniería, Programa de Biología Marina, Grupo de Investigación Dinámica y Manejo de Ecosistemas Marino Costeros (DIMARCO), Mundo Marino, El Rodadero, Santa Marta, Colombia. marcela.grijalba@utadeo.edu.co

ABSTRACT

A new species of the sand eel genus *Bascanichthys* (Anguilliformes: Ophichthidae) is described from specimens found inside the stomachs of mature female numbfish *Narcine bancroftii*. These rays were collected as bycatch in local fisheries, using beach seines in shallow waters (5 to 10 m) in Gaira Bay (Santa Marta, Colombian Caribbean). *Bascanichthys gaira* n.sp., is described from three specimens and can be distinguished from other species of the genus by its minute pectoral-fin base (12.3-24.7% of gill-opening length) and its vertebral number (189).

KEY WORDS: Endemic sand eel, Anguilliformes, Ophichthidae, Colombia, Southern Caribbean.

RESUMEN

Una nueva especie de anguila de arena del género *Bascanichthys* (Anguilliformes: Ophichthidae) del Caribe. Nueva especie de anguila de arena del género *Bascanichthys* (Anguilliformes: Ophichthidae) es descrita a partir de ejemplares encontrados en el contenido estomacal de hembras maduras de la raya eléctrica *Narcine bancroftii*. Estas rayas fueron colectadas como parte del bycatch en las pesquerías locales, usando chinchorros playeros en aguas superficiales (5 a 10 m) de la bahía de Gaira (Santa Marta, Caribe colombiano). *Bascanichthys gaira* sp. n. es descrita a partir de tres ejemplares colectados y es fácilmente diferenciable de otras especies del mismo género debido a su diminuta aleta pectoral (su base representa entre 12.3-24.7% de la longitud de la apertura branquial) y su número de vértebras (189).

PALABRAS CLAVES: Anguila de arena endémica, Anguilliformes, Ophichthidae, Colombia, Caribe sur.

INTRODUCTION

Snake eels of the family Ophichthidae are the most diverse of true eels, including 260 living species distributed among 58 genera in all tropical oceans and seas (McCosker, 2002; Nelson, 2006). Snake eels live in a variety of habitats, from sandy intertidal to midwater depths of 800 m (McCosker, 2002). Ophichthids have pelagic leptocephalus larvae. The adults live in a variety of environments, from coral reefs to sand and mud substrates, oceanic midwaters, and also in rivers and estuaries (McCosker *et al.*, 1989). Some species are taken as bycatch of several types of fisheries, using trawl fisheries and hook-and-line, but they are rarely consumed (McCosker, 2002).

According to McCosker *et al.* (1989), Ophichthidae is currently divided into two subfamilies, Myrophinae (tribes Benthenchelyini and Myrophini) and Ophichthinae (including the tribes Bascanichthyini, Callechelyini, Ophichthini, and Sphagebranchini). The Bascanichthyini, sand eels, includes moderately small, very elongate, plain-coloured or banded species with hanging pointed snouts and anus at or behind the mid-body. They live buried in sand and mud from shallow to moderate depths. Sand eels are collected using ichthyocides in shallow waters, but are also captured by benthic and midwater trawling. The Bascanichthyini comprises eight genera, but only five are found in the western Atlantic, *Bascanichthys*, *Caralophia*, *Ethadophis*, *Gordiichthys*, and *Phaenomonas* (McCosker *et al.*, 1989).

The family Ophichthidae is poorly known in the Colombian Caribbean, with only a few reports published, including *Ichthyapus ophioneus* (Evermann & Marsh 1900), *Callechelys bilinearis* Kanazawa 1952 (Acero and Garzón, 1986), and *Ophichthus cylindroideus* (Ranzani 1839) (Barrera-García *et al.*, 2008). Species of *Bascanichthys*, the most primitive member of its tribe, inhabit sand, mud and silt bottoms; other features include an elongated body, cylindrical and compressed, head and trunk longer than the tail, dorsal fin originating on the head, median fins low, pectoral fins small, snout short and rounded, standing over the lower jaw, jaws short, eyes small, and anterior nostrils tubular (McCosker *et al.*, 1989). Reaching a maximum size of about 1000 mm total length, they are distributed in all tropical seas with approximately 12 valid species, but only four are recognized in the western Atlantic, *Bascanichthys bascanium* (Jordan 1884), *Bascanichthys inopinatus* McCosker, Böhlke & Böhlke 1989, *Bascanichthys paulensis* Storey 1939, and *Bascanichthys scuticaris* (Goode and Bean 1880). Herein we present the original description of a new species of *Bascanichthys* based on three specimens obtained from the stomachs of *Narcine bancroftii* (Griffith and Smith) fished in Gaira bay, Colombian Caribbean.

MATERIAL AND METHODS

Three sand eel specimens were found inside the stomachs of three mature females (462 to 542 mm total length) of Bancroft's numbfish *Narcine bancroftii*. These rays were collected as bycatch in local fisheries using beach seines in shallow waters (5 to 10 m) at Gaira bay in Salguero beach, located toward south of Santa Marta, Colombian Caribbean (11°10'11"N, 74°13'14"W). In the laboratory the numbfish were dissected from the pectoral arch to the cloaca, their stomachs were extracted and the contents deposited in a Petri box and then washed with fresh water; afterward, the material was weighed with a digital scale and stored in 70% isopropyl alcohol. The eels were almost perfectly conserved, keeping most of their skin and coloration, thus digestion process had not damaged the main features of the specimens. Both the holotype and paratypes were deposited in the fish collection of the Marine Natural History Museum of the Marine and Coastal Research Institute (Invemar) under the reference INV PEC8147 holotype, INV PEC8146 and INV PEC8145 paratypes.

All counts and measurements were taken directly from specimens using a calliper. Measurement values were recorded to the nearest tenth (0.1) of a millimetre, following McCosker *et al.* (1989). The following measurements were taken: Total length (TL), straight-line distance between the anterior tip of the upper lip and posterior tip of the tail; head length (HL), straight-line distance between the anterior tip of the upper lip and posterior edge of the opercular flap; trunk length, straight-line distance from the posterior edge of the opercular flap to mid-anus; tail, straight-line distance between mid-anus and rear tip of the tail; predorsal length, straight-line distance from anterior tip of upper lip up to anterior margin of the dorsal fin; depth at gill opening, body depth behind the gill opening; gill opening length, straight-line distance between gill opening corners; depth at anus, body depth at mid-anus; snout, straight-line distance from anterior tip of upper lip to closest point on the anterior fleshy edge of the orbit; preanal length, straight-line distance from anterior tip of the upper lip to mid-anus; eye, horizontal diameter of the eye; inter-orbital width, straight-line distance between eyes; pectoral-fin length, distance between base and rear tip of the pectoral fin; pectoral-fin base, length of pectoral-fin base.

Pore numbers were expressed as follows: supraorbital pores (SO) as ethmoid pore + pores in supraorbital canal; infraorbital pores (IO) as pores along upper jaw + pores in the vertical part of the canal behind the eye (in general the last pore included along the upper jaw is considered one of the postorbital pores); preoperculomandibular pores (POM) as pores along the lower jaw + preopercular pores; supratemporal pores (STC) total number of pores in the supratemporal canal

(McCosker *et al.*, 1989). One paratype was used to count total, predorsal, and preanal vertebrae. All counts and measurements were compared with material of two species of the genus *Bascanichthys*, *B. inopinatus* (ANSP 158886 paratype) and *B. paulensis* (ANSP 156906, ANSP 158821 paratypes), and five additional species recorded in the bibliography from the western Atlantic and the Eastern Pacific coasts.

Bascanichthys gaira, new species
Figure 1, 2



Figure 1. *Bascanichthys gaira* n.sp., holotype. INV PEC8147, 477 mm TL, Gaira Bay, Santa Marta, Colombia. Picture by A. Polanco, MHNM Invemar.

Material examined. Holotype, INV PEC8147 (477 mm TL), bahía de Gaira, Santa Marta, Colombia (11°10'11" N, 74°13'14" W), September 5, 2005. Paratypes, INV PEC8145 (468 mm TL) September 5, 2005, INV PEC8146 (411 mm TL) August 22, 2006, all from the same locality as the holotype: Bahía de Gaira, Santa Marta, Colombia (11°10'11" N, 74°13'14" W).

Diagnosis. An elongate, markedly bicolored bascanichthyin, dark brown dorsally and light brown almost cream ventrally, head and snout dark, fins pale without marks, sex unrecognized. Maximum total length 477 mm. Proportions as % of TL: head 4.6-5.3, trunk 47.9-51.7, tail 43.8-47.9; depth (at gill opening) 1.2-1.5; depth (at anus) 1-1.1; predorsal length 2.1-2.4; snout 12.4-12.7; eye 4.1-5.5;

interorbital width 6.9-9.7; pectoral-fin length 6.4-7.0 mm; Pores SO 1 + 3, IO 4 + 2, POM 4 + 2, STC 3. Pectoral fin minute, its base corresponding to 12.3-24.7% of gill-opening length. Uniserial mandibular teeth (Table 1; Figure 2).

Table 1. Proportional measurements (% TL) of *Bascanichthys gaira* n. sp.

| Measurements (mm) | Holotype | % | Paratypes | % | | |
|------------------------------------|----------|------|-----------|------|------|------|
| Total length | 477 | - | 468 | 411 | - | - |
| Head | 21.8 | 4.6 | 21.3 | 21.7 | 4.6 | 5.3 |
| Trunk | 242 | 50.7 | 242 | 197 | 51.7 | 47.9 |
| Preal length | 264 | 55.3 | 261 | 218 | 55.8 | 53 |
| Tail | 215 | 45.1 | 205 | 197 | 43.8 | 47.9 |
| Predorsal length | 10.9 | 2.3 | 9.8 | 9.8 | 2.1 | 2.4 |
| Depth at gill opening | 5.8 | 1.2 | 6.9 | 6.1 | 1.5 | 1.5 |
| Depth at anus | 5.1 | 1.1 | 5.2 | 4 | 1.1 | 1 |
| Proportion of head length | | % | | | % | |
| Snout | 2.7 | 12.5 | 2.7 | 2.7 | 12.7 | 12.4 |
| Eye | 0.9 | 4.1 | 1.1 | 1.2 | 5.2 | 5.5 |
| Interorbital width | 2.1 | 9.7 | 2 | 1.5 | 9.4 | 6.9 |
| Left gill-opening length | 1.5 | 6.9 | 1.5 | 1.5 | 7 | 6.9 |
| Right gill-opening length | 1.4 | 6.4 | 1.5 | 1.5 | 7 | 6.9 |
| Left pectoral-fin length | 1.3 | 5.9 | - | 1.1 | - | 5.3 |
| Right pectoral-fin length | 1.5 | 6.8 | - | 1.1 | - | 5.1 |
| Length left pectoral-fin base | 0.2 | 0.8 | - | 0.4 | - | 1.7 |
| Length right pectoral-fin base | 0.3 | 1.2 | - | 0.3 | - | 1.4 |
| Proportion of gill-opening lengths | | % | | | % | |
| Left pectoral fin | - | 12.3 | - | - | - | 24.7 |
| Right pectoral fin | - | 18.5 | - | - | - | 19.7 |

Description. Total vertebrae 189, predorsal vertebrae 1, preanal vertebrae 100. Elongate body, muscular and rounded, anus shortly behind midbody, longitudinal folds on head and gular region (Figure 2). Median fins developed but low, ending shortly before tail tip, pectoral fin minute, its base one-fourth the length of the gill openings, pectoral fin moderately long for *Bascanichthys* (3 to 6 times the length of its base), somewhat triangular and finishing in a filament. Head and jaws short, pointed snout overhanging lower jaw, eye small, located above half of the lower jaw, anterior nostril tubular, posterior nostril above midlength of upper jaw

and without flap, visible externally as a small hole in the upper lip. Head pores small and well-defined (Figure 2). Gill openings moderate in size, vertical and low-lateral on side, dentition typical for the genus, three anterior intermaxillary large stout teeth describing an inverted “V” in a groove on the underside of the snout, exposed when the mouth is closed, 13 to 17 teeth along vomer, well-separated from conical and uniserial (13-14) intermaxillary and maxillary teeth.

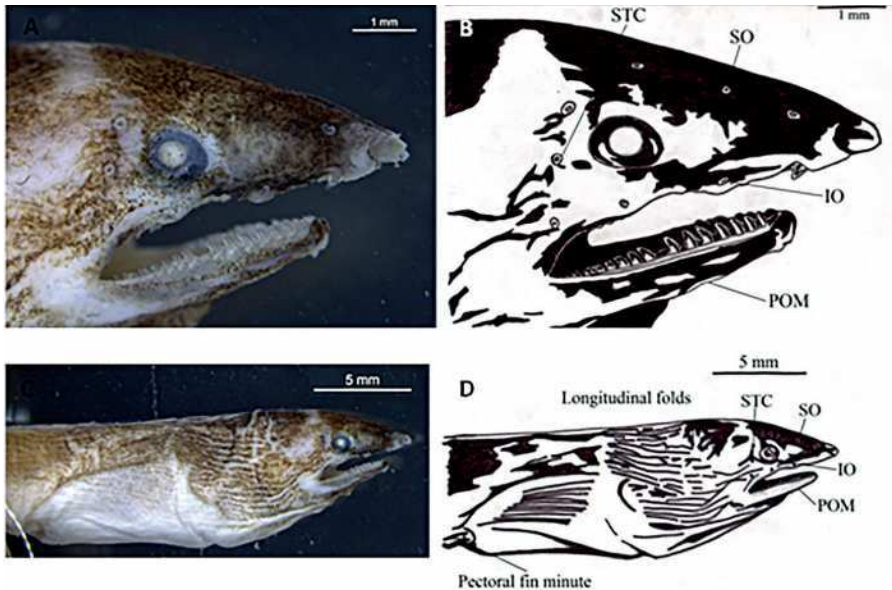


Figure 2. A and C. Pictures of *Bascanichthys gaira* n. sp. holotype. INV PEC8147, 477 mm TL, Gaira Bay, Santa Marta, Colombia. B and D. Drawings of head with well-developed pores: Supraorbital pores (SO), infraorbital pores (IO), preoperculomandibular pores (POM) and supratemporal pores (STC). Pictures by A. Polanco, MHNM Invenmar and illustrations by F. Moreno.

Distribution. All the specimens were collected in Gaira Bay (11°10'11" N, 74°13'14" W), Santa Marta, Colombia, inside the stomach of mature females of Bancroft's numbfish *Narcine bancroftii*, fished as bycatch of the local beach seine fisheries.

Etymology. This species was named *gaira* in reference to Bahía de Gaira, where this species was captured. The proposed vernacular name “Colombian sand eel” refers to the fact that this species is the first record of the genus *Bascanichthys* from Colombia and the southern Caribbean.

Remarks. Type material was compared with museum specimens of *B. inopinatus* (ANSP 158886 paratype) and *B. paulensis* (ANSP 156906, ANSP 158821 paratypes) as well as with the descriptions of Neotropical species presented by McCosker *et al.* (1989) and Robertson *et al.* (2015). There were four described

species of *Bascanichthys* from the western Atlantic: *B. bascanium* (Jordan 1884), *B. inopinatus* McCosker, Böhlke and Böhlke 1989, *B. paulensis* Storey 1939 and *B. scuticaris* (Goode and Bean 1880). *Bascanichthys scuticaris* differs from the new species by having a total of 159-167 vertebrae (vertebral count for *B. gaira* is 189). Other diagnostic characters of *B. scuticaris*, a species taken at coastal United States from North Carolina to the Gulf of Mexico, that differ from *B. gaira* are body marked by a series of small, pale spots above each lateral-line pore along body, tail, and branchial region; pore sequence: SO 1 + 3, IO 4 + 2, POM 4 + 2, ST 3 (McCosker *et al.*, 1989). *Bascanichthys gaira* differs from the other three western Atlantic species (*B. bascanium*, *B. inopinatus*, and *B. paulensis*) because pectoral fin in *B. gaira* is minute, its base corresponds to 12.3-24.7% of gill-opening length. In *B. bascanium*, a species reported from Georgia to Honduras, Puerto Rico, and a locality in Panamá, pectoral fin is broad-based and its width 44-47% length of gill opening (McCosker *et al.*, 1989); it should be corroborated if the material from Panamá indeed coincides with *B. bascanium* or it agrees with the new species. In *B. inopinatus*, a species apparently endemic to Puerto Rico, pectoral fin base represents 36-37% of the length of gill opening; additionally, *B. gaira* differs from *B. inopinatus* in vertebrae counts (*B. gaira* has 189 total vertebrae, 1 predorsal vertebra, and 100 preanal vertebrae; *B. inopinatus* has 199, 1, and 101, respectively) and in the number of supraorbital pores (*B. gaira* has 1+3 SO, *B. inopinatus* 1+4 SO) (McCosker *et al.*, 1989; Robertson *et al.*, 2015). *Bascanichthys gaira* seems to be closer to *B. paulensis*, since both have similar vertebrae counts; in *B. paulensis* the total vertebrae range between 190 and 196, with one or two predorsal vertebrae and 100-103 preanal vertebrae. Pore numbers are the same in both species. The pectoral fin and base length are different; in *B. paulensis* the pectoral-fin base length range is between 25 and 33% of the gill-opening length, while in *B. gaira* the pectoral fin base ranges from 12.3 to 24.7% of the gill-opening length. *Bascanichthys paulensis* has a very small and rounded pectoral fin, with a narrow base; although the pectoral fin of *B. gaira* is smaller, it is not rounded but somewhat triangular and finished in a filament.

In the Eastern Pacific *B. gaira* has three relatives: *B. panamensis* Meek and Hildebrand 1923, *B. cylindricus* Meek and Hildebrand 1923, and *B. bascanoides* Osburn and Nichols 1916 (Meek and Hildebrand, 1923). The main differences between them are the total number of vertebrae (total vertebrae 189, predorsal vertebrae 1, preanal vertebrae 100) and pectoral fin base/length ratio (12.3-24.7% of gill-opening length) (Tables 1 and 2).

Natural coloration of *B. gaira* is markedly bicolored, dark brown dorsally and light brown almost cream ventrally, head and snout dark, fins pale without marks. Colour in alcohol same that natural with some light zones in head and body.

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