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Hydrolagus matallanasi sp. nov. (Holocephali, Chimaeridae) a new species of rabbitfish from southern Brazil

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Abstract

Hydrolagus matallanasi sp. nov., the first species of the genus in the southwest Atlantic, is described from 21 specimens collected on the continental slope of southern Brazilian at 416–736 m depth. This new species can be distinguished from its congeners by the following combination of characters: an irregular brown coloration with reticulations and spots over the body; ventral surface whitish, including pectoral bases; proximal margin of the second dorsal fin whitish; tooth plates striped and bicolor, yellowish and gray; length of dorsal fin spine equal to or a slightly longer than head length; pectoral fin notably long, its tip extending beyond posterior margin of pelvic fin base; upper margin of second dorsal fin notably concave at middle region of second dorsal fin base; second dorsal fin with minimum height less than half of its maximum height (located at points anterior and posterior to middle region of fin); eye length slightly smaller than preorbital length. The new species is compared to *H. mirabilis*, the most similar species from North Atlantic, and *H. alberti*, which occurs in the western Atlantic.

Key words: rabbitfish, chimaera, *Hydrolagus matallanasi*, Chimaeridae, Brazil

Introduction

The Chimaeridae comprise two genera, *Chimaera* with seven species and *Hydrolagus* with 15 species (Didier, 2004). The anal and caudal fins are clearly separated in *Chimaera* but not so in *Hydrolagus* (Bigelow and Schroeder, 1953; Didier, 1995, 1998). In the Atlantic, *Hydrolagus* is represented by four species: *H. affinis* (Brito Capello, 1868), from the North Atlantic; *H. alberti* Bigelow and Schroeder, 1951, from the western North Atlantic; *H. mirabilis* (Collett, 1904), from the North and Central Atlantic (also off western Africa, Gulf of Mexico, and northern coast of South America to Surinam); and *H. pallidus* Hardy

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and Stehmann, 1990, from the northeast Atlantic, Iceland (Bigelow and Schroeder, 1951, 1953; Uyeno and Sasaki, 1983; Lloris, 1986; Hardy and Stehmann, 1990).

Two chimaeroids have been reported in Brazilian waters: *Callorhinchus callorhynchus* (Callorhynchidae) and *Harriotta raleighana* (Rhinochimaeridae) (Miranda-Ribeiro, 1928; Krefft, 1973). During deepwater trawling surveys off southern Brazil in September 2001, four specimens of an undescribed *Hydrolagus* were collected by the REVIZEE Program (Program for Assessment of the Sustainable Yield of Living Resources of the Exclusive Economic Zone). Subsequently, 17 additional specimens were collected during commercial fishing operations on the same area. The aim of this paper is to describe this new species.

Material and Methods

Methods of measuring follow those of Compagno *et al*. (1990), Didier and Stehmann (1996), and Didier (1998). Orientation and terminology of tooth plates follow Patterson (1992) and Didier *et al.* (1994). Terminology for lateral line canals of the head follows Didier (2004) and Didier and Rosenberger (2002). All measurements were taken on preserved specimens, measured point to point using dial calipers and ruler or measuring tape. Photographs were taken through stereoscopic microscope (Olympus SZPT with U-PMTVC camera) and software Image-Pro® Plus (version 3.0).

Institutional acronyms are as listed by Leviton *et al*. (1985), except MOVI - Museu Oceanográfico do Vale do Itajaí (Itajaí, SC, Brazil) and NUPEC — Núcleo de Pesquisa e Estudo em Chondrichthyes (Santos, SP, Brazil).

Measurements and their acronyms: total length (TL); precaudal length (PCL); body length (BDL); snout-vent length (SVL); trunk length (TRL); pre-first dorsal length (PD1); pre-second dorsal length (PD2); second dorsal fin base (D2B); maximum height of anterior 1/3 of the second dorsal fin (D2AH); maximum height of posterior 1/3 of the second dorsal fin (D2PH); caudal dorsal margin (CDM); maximum height of dorsal caudal fin (CDH); caudal ventral margin (CVM); maximum height of ventral caudal fin (CVH); head length (HDL); preorbital length (POB); first dorsal fin base (D1B); dorsal spine length along anterior margin (DSA); maximum height of first dorsal fin (D1H); pectoral fin anterior margin (P1A); pelvic fin anterior margin (P2A); interdorsal space (IDS); anterior edge of first dorsal fin base to anterior edge of pectoral fin base (D1P1); anterior edge of base of first dorsal fin to anterior edge of pelvic base (D1P2); anterior edge of second dorsal fin base to anterior edge of pectoral fin base (D2P1); anterior edge of second dorsal fin base to anterior edge of pelvic fin base (D2P2); posterior base of pectoral fin to anterior base of pelvic fin (P2P); eye length (EYL); eye height (EYH); total length of claspers from pelvic fin base to tip (CLT); length of medial branch of clasper from fork to tip (CLM); and length of lateral branch of clasper from fork to tip (CLL).

Anatomical structures and their acronyms: angular canal (AN); infraorbital canal (IO); mandibular canal (M); nasal canal (N); oral canal (O); occipital canal (OC); otic canal (OT); preopercular canal (POP); suborbital canal (SO); subrostral canal (SR); and supratemporal canal (ST); mandibular tooth plate (MTP); palatine tooth plate (PTP); and vomerine tooth plate (VTP).

***Hydrolagus matallanasi* sp. nov.**
(striped rabbitfish / quimera-malhada)
Figures 1–4, Table 1

Holotype. MOVI 24303, mature male (296 mm PCL), 29º52.08'S, 047º48.39'W, 517 m, 20.7ºC surface temp., 6.9ºC bottom temp., off Santa Catarina, Brazil, #238, REVIZEE Program, 10 Sep. 2001, bottom trawl, RV "Atlântico Sul".

Paratypes. Twenty specimens: MOVI 24304 (277 mm TL) and MOVI 24305 (234 mm PCL), males, same haul as holotype; MOVI 24291 (331 mm PCL), MOVI 24292 (347 mm PCL), MOVI 24293 (296 mm PCL), and MOVI 24294 (268 mm PCL), females, 24º01.90'S, 042º38.80'W, 736 m, off Rio de Janeiro, Brazil, 11 Mar. 2002, #47, bottom trawl, FV "Nuevo Apenino"; MOVI 24295 (female 353 mm PCL), 23º47'10"S, 041º49'46"W, 518 m, off Rio de Janeiro, Brazil, #04, 16 Sep. 2001, bottom gillnet, FV "South Coast"; MOVI 24296 (male 302 mm PCL), and MOVI 24297 (female 280 mm PCL), 23º42.00'S, 042º07.05'W, 419 m, off Rio de Janeiro, Brazil, #63, 03 Dec. 2001, bottom trawl, FV "Nuevo Apenino"; MOVI 24298 (278 mm PCL), MOVI 24299 (270 mm PCL), MOVI 24300 (275 mm PCL), and MOVI 24301 (239 mm PCL), males, 23º44'19"S, 041º53'31"W, 416 m, off Rio de Janeiro, Brazil, #101, 26 Dec. 2001, bottom trawl, FV "Cipi"; MOVI 24302 (female 271 mm PCL), 30º17.90'S, 047º56.99'W, 449 m, 22.0ºC surface temp., 11.7ºC bottom temp., off Santa Catarina, Brazil, #240, REVIZEE Program, 10 Sep. 2001, bottom trawl, RV "Atlântico Sul"; NUPEC 1782 (328 mm PCL), NUPEC 1783 (349 mm PCL), NUPEC 1784 (378 mm PCL), NUPEC 1785 (352 mm PCL), NUPEC 1786 (357 mm PCL), and NUPEC 1787 (351 mm PCL), females, 650–700 m, off southern Rio de Janeiro, Brazil, Mar. 2002, bottom trawl, commercial fishing vessel not identified.

Comparative material. *H. alberti* - USNM 153558, holotype (male 275 mm PCL) and USNM 153559, paratype (male 280 mm PCL), 558 m, 29º11'N, 086º52'W, off Pensacola, Florida; ISH 257/1981 (2 specimens), NSMT-P 40045, (male 435 mm PCL), 570–620 m, off Suriname. *H. mirabilis* - ISH 1034/1982 (3), ISH 64/1965 (1), NSMT-P 40046 (female 253 mm PCL), NSMT-P 40634 (male 359 mm PCL), 875–920 m, off Suriname and French Guiana.

TABLE 1. Measurements of *Hydrolagus matalhanasi* sp. nov.

	Holotype		Paratypes			
	male		males		females	
	MOVI 24303		n = 7		n = 13	
	mm	% of BDL	mean ± SD	range	mean ± SD	range
PCL (mm)	296.0		267.9 ± 23.8	234.0 – 302.0	327.8 ± 36.6	268.0 – 378.0
BDL (mm)	237.0		216.4 ± 27.7	171.0 – 246.0	266.1 ± 33.8	202.0 – 308.0
Measurements in percentage of BDL						
SVL	143.0	60.3	57.6 ± 3.6	51.1 – 63.2	60.9 ± 2.5	57.1 – 65.8
TRL	89.3	37.7	34.2 ± 1.9	31.4 – 36.4	38.6 ± 1.7	36.1 – 42.3
PD1	64.0	27.0	27.2 ± 3.0	22.0 – 31.6	27.2 ± 1.8	24.9 – 30.5
PD2	111.0	46.8	48.4 ± 3.6	44.5 – 53.8	49.0 ± 2.4	44.3 – 53.0
D2B	187.0	78.9	75.9 ± 3.9	72.3 – 84.2	75.4 ± 3.8	69.4 – 83.2
D2AH	12.6	5.3	4.8 ± 0.9	3.7 – 6.1	5.1 ± 0.5	4.4 – 6.0
D2PH	8.6	3.6	3.4 ± 0.5	2.8 – 4.3	2.7 ± 0.6	1.3 – 3.7
CDM	56.2	23.7	23.3 ± 2.6	19.8 – 27.7	23.5 ± 1.6	20.9 – 26.7
CDH	5.6	2.4	2.4 ± 0.9	1.3 – 3.8	2.8 ± 0.6	1.7 – 3.9
CVM	69.0	29.1	30.9 ± 5.6	25.1 – 41.7	33.3 ± 2.0	30.1 – 37.0
CVH	6.8	2.9	2.4 ± 0.6	2.0 – 3.7	2.8 ± 0.6	2.0 – 3.9
HDL	59.0	24.9	22.8 ± 3.2	17.6 – 27.4	22.9 ± 2.7	19.1 – 28.0
POB	29.2	12.3	11.4 ± 1.8	8.4 –14.0	11.4 ± 1.4	10.1 – 14.4
D1B	38.0	16.0	15.9 ± 1.3	13.7 – 17.4	16.3 ± 2.1	13.6 – 20.5
DSA	59.3	25.0	24.6 ± 2.6	20.7 – 26.9	23.5 ± 1.1	21.9 – 25.5
D1H	55.6	23.5	19.7 ± 2.2	16.3 – 22.2	18.6 ± 1.3	15.8 – 20.3
P1A	111.0	46.8	45.8 ± 2.5	42.7 – 49.6	43.0 ± 2.4	39.4 – 47.0
P2A	55.2	23.3	21.2 ± 2.8	17.7 – 25.8	21.5 ± 1.4	20.0 – 24.8
IDS	7.5	3.2	4.8 ± 2.0	2.7 – 8.8	6.4 ± 2.6	1.4 – 10.3
D1P1	9.0	3.8	4.1 ± 1.9	1.7 – 7.0	4.8 ± 1.2	2.9 – 7.9
D1P2	78.0	32.9	32.2 ± 1.7	30.6 – 35.8	35.1 ± 2.1	31.7 – 37.8
D2P1	54.5	23.0	25.4 ± 2.3	22.4 – 28.7	26.6 ± 2.0	23.1 – 29.5
D2P2	31.5	13.3	11.0 ± 1.3	8.8 – 12.7	13.4 ± 1.9	8.7 – 15.6
P2P	66.0	27.8	29.7 ± 3.0	24.7 – 34.8	33.0 ± 3.0	29.2 – 37.9
EYL	20.0	8.4	8.6 ± 1.0	7.0 – 9.6	8.1 ± 1.1	6.0 – 9.9
EYH	16.0	6.8	5.5 ± 0.8	4.8 – 7.1	5.6 ± 0.8	4.4 – 7.5
CLT	39.0	16.5	16.4 ± 2.3	14.1– 21.1	–	–
CLM	21.0	8.9	9.2 ± 1.5	7.7 – 12.3	–	–
CLL	25.3	10.7	11.4 ± 1.5	9.6 – 13.7	–	–

Diagnosis. This new species can be distinguished from its congeners by the following combination of characters: an irregular brown coloration with reticulations and spots over the body; ventral surface whitish, including pectoral bases; proximal margin of the second dorsal fin whitish; tooth plates striped and bicolor, yellowish and gray; length of dorsal fin spine equal to or a slightly greater than head length; pectoral fin notably long, its tip extending beyond posterior margin of pelvic fin base; upper margin of second dorsal fin notably concave at middle region of second dorsal fin base; minimum height of second dorsal fin less than half of maximum height (located at points anterior and posterior to middle region of fin); eye length slightly smaller than preorbital length.

Description. Body proportions of holotype and paratypes are given in Table 1. Drawing of the holotype in Figure 1. A small-bodied species, adult males measure from 296 to 302 mm PCL (n=8). Body tapering from head and trunk to a whip-like tail with long filament. Eye large, dorsolaterally situated, 2/3 of preorbital length. Lateral line canal curved ventrally at point slightly anterior to first dorsal fin spine. Pectoral fin long, its tip beyond insertion of pelvic fin when depressed, and more than 1.5 times head length. In vertical projection, first dorsal fin origin slightly posterior to anterior insertion of pectoral fins; dorsal-fin spine long, its length equal to or slightly greater than head length; upper margin of second dorsal fin notably concave at middle region of second dorsal fin base; second dorsal fin with minimum height less than half of its maximum height (measured at points anterior and posterior to middle region of fin). Caudal filament elongate, longer than distance from tip of snout to insertion of pelvic fin. Anal fin absent. The lateral line canals of the head have the same pattern as the *H. mirabilis* group: the preopercular (POP) and oral (O) lateral line canals branch from the infraorbital canal (IO) (Fig. 2), whereas in the *H. colliei* group the POP and O canals are not fused. Claspers bifid, divided for only distal 1/3 of length (Fig. 3). Brownish reticulations and spots covering the body; ventral surface brownish white, including pectoral fin bases (Fig. 1); tooth plates striped and bicolor, yellowish and gray (Fig. 4).

Distribution. Twenty-one specimens were collected at seven stations off the states of Santa Catarina (2 sta., 4 specimens) and Rio de Janeiro (5 sta., 17 specimens), southern Brazil, between 23º42'S and 30º18'S, 416–736 m depth (Fig. 5).

Etymology. Named in honor of Dr. Jesús Matallanas Garcia, in recognition of his extensive work and tireless dedication to ichthyology.

Biological and ecological notes. Males range in size from 234 to 302 mm PCL (n=8) and mature at or around 296 mm PCL. Females range from 268 to 378 mm PCL (n=13). Gorgonians, hard corals, tube sponges, crinoids, and ophiuroids were taken near collecting sites of *H. matallanasi* providing evidence that this species inhabits deep-reefs on the continental slope, usually deeper than 400 m. It also shares this habitat with the sharks *Heptranchias perlo*, *Scyliorhinus haeckelii*, *Galeus mincaronei*, *Schroederichthys saurisqualus*, *Squalus* sp., and the skate *Gurgesiella dorsalifera*.

Comparisons. *Hydrolagus matallanasi* and *H. mirabilis* share an indented second dorsal fin, but are easily distinguished by: colour pattern (reticulations and spots covering the body dorsolaterally *vs* body uniform pale brown); ventral pectoral-fin bases (brownish white *vs* pale brown); eye length (about 2/3 of preorbital length *vs* nearly equal to preorbital length); tooth plates coloration (striped and bicolor, yellowish and gray *vs* yellowish); and dorsal-spine length (equal to or a slightly longer than head length *vs* 4/5 of head length). Another Atlantic species, *H. alberti*, is not similar to the new species, as its upper second dorsal fin margin is straight while in *H. matallanasi* it is notably concave near the middle of the second dorsal fin base. Coloration also differs among these two species, as *H. alberti* is pale brown with no reticulations or spots.

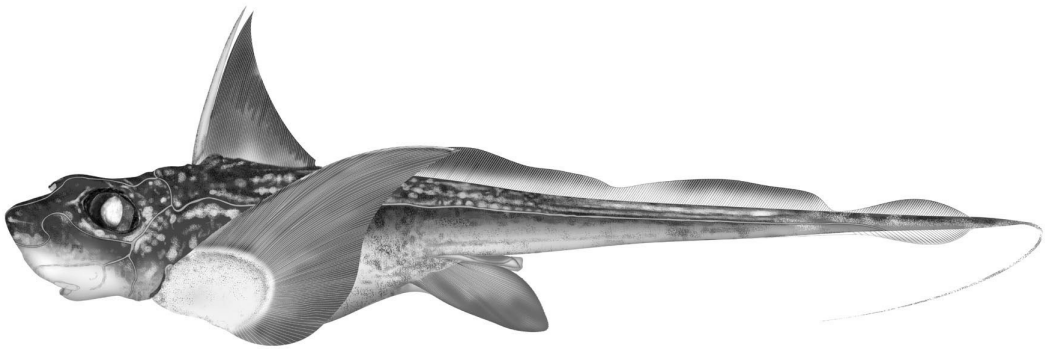

FIGURE 1. *Hydrolagus matallanasi* sp. nov., MOVI 24303, holotype, mature male 296 mm PCL. Drawing by Rafael de Alcantara Brandi.

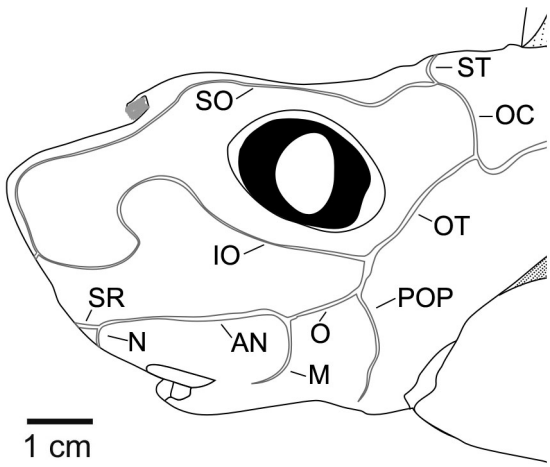

FIGURE 2. Lateral line canals of the head of *Hydrolagus matallanasi* sp. nov., MOVI 24303, holotype, mature male 296 mm PCL: Scale = 1 cm.

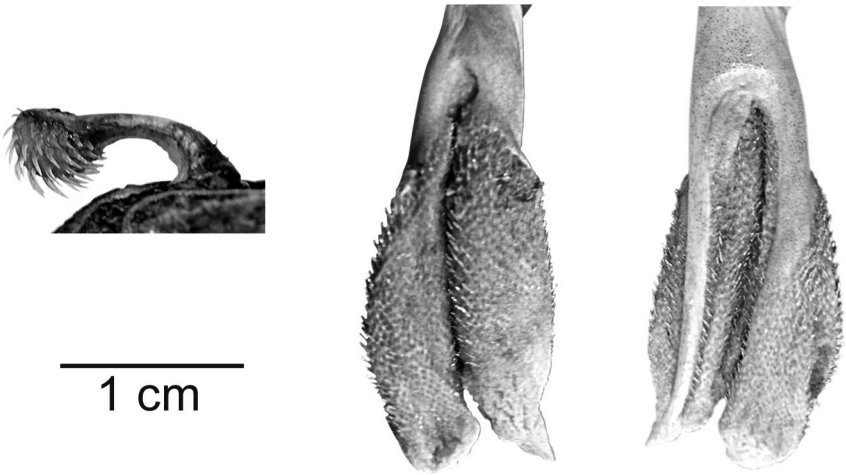

FIGURE 3. *Hydrolagus matallanasi* sp. nov., MOVI 24303, holotype, mature male 296 mm PCL; left to right: frontal tenaculum and left pelvic clasper shown in dorsal and ventral view, respectively. Scale = 1 cm.

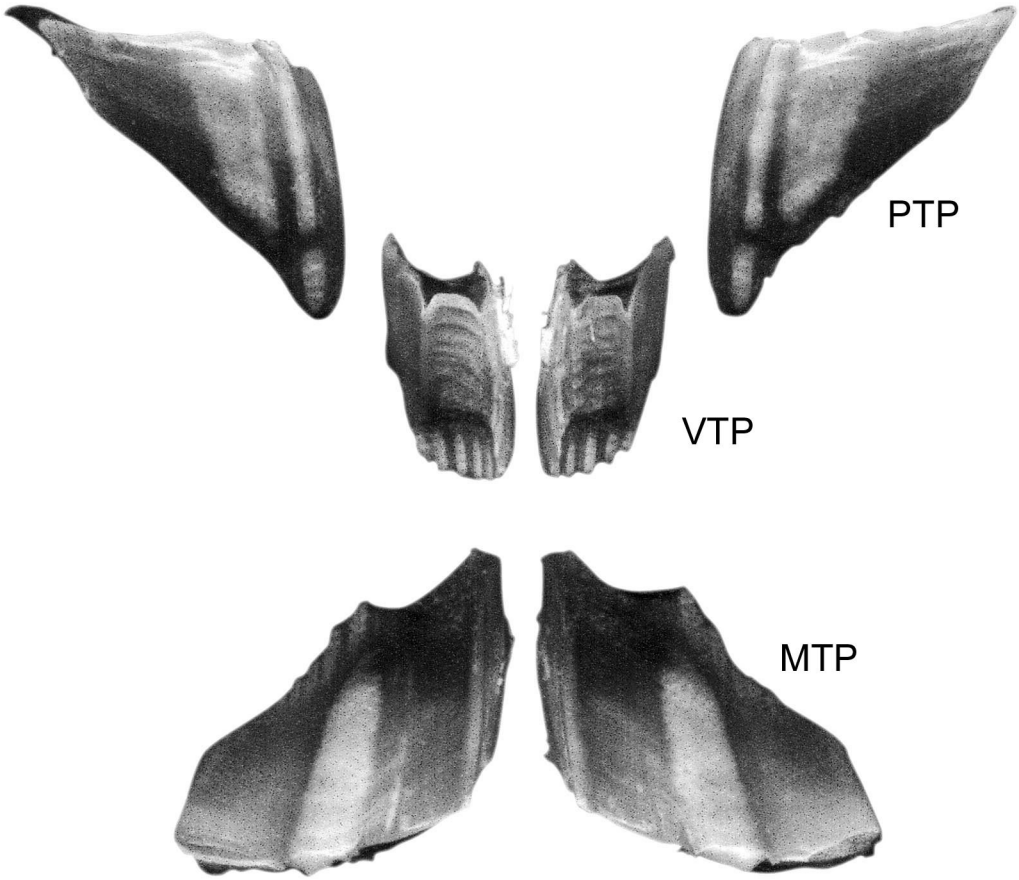

FIGURE 4. Exposed oral surfaces of tooth plates of *Hydrolagus matallanasi* sp. nov., NUPEC 1785, paratype, female 352 mm PCL.

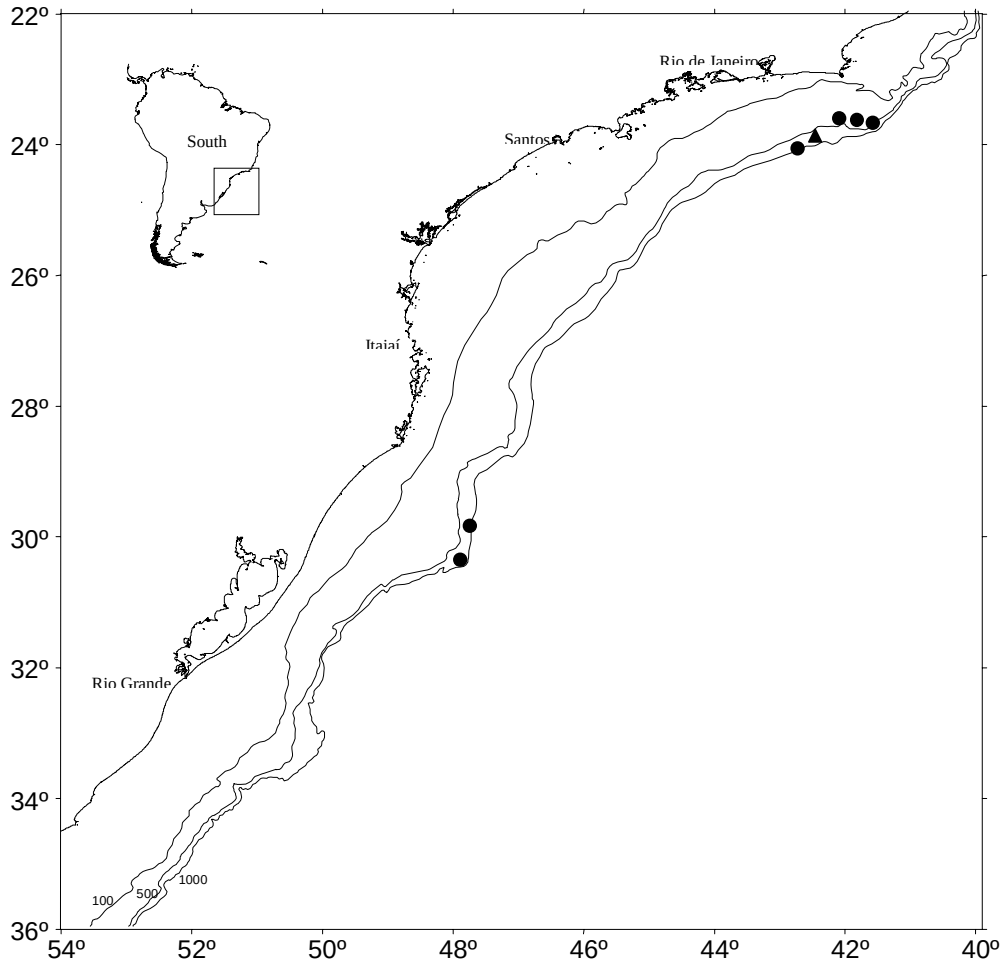

FIGURE 5. Distribution of *Hydrolagus matallanasi* sp. nov. Type locality indicated by a triangle.

Key to the western Atlantic *Hydrolagus* species
[Modified from Bigelow and Schroeder (1953) and Didier (2004)]

1a. Upper margin of second dorsal fin straight ..... *H. alberti*
1b. Upper margin of second dorsal fin notably concave at middle region of second dorsal fin base 2
2a. Body pale brown, without reticulations and spots; ventral base of pectoral fin darkish brown; eye length nearly equal to preorbital length; dorsal spine length 4/5 of head length; pelvic claspers in males divided for nearly 1/2 their length..... *H. mirabilis*
2b. Brown coloration with reticulations and spots covering dorsoventrally the body; ventral base of pectoral fin whitish; eye length about 2/3 of preorbital length; dorsal spine

length equal to or slightly longer than head length; pelvic claspers in males divided for nearly 1/3 their length ..... *H. matallanasi* sp. nov.

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