Neotropical Ichthyology

Original article

https://doi.org/10.1590/1982-0224-2022-0004

Deep-sea dragonfishes (Teleostei: Stomiiformes) collected from off northeastern Brazil, with a review of the species reported from the Brazilian Exclusive Economic Zone

Bárbara T. Villarins[1], Fabio Di Dario[2], Leandro N. Eduardo[3,4], Flávia Lucena-Frédou[3], Arnaud Bertrand[3,4], Artem M. Prokofiev[5,6] and Michael M. Mincarone[2]

Correspondence:
Michael M. Mincarone
mincarone@macae.ufrj.br

The Stomiiformes includes about 455 species of mostly mesopelagic fishes in the families Diplophidae, Gonostomatidae, Phosichthyidae, Sternoptychidae, and Stomiidae. Here we report 55 species of the order collected during the ABRACOS (Acoustics along the BRAzilian COaSt) expeditions off northeastern Brazil, including islands and seamounts of Fernando de Noronha Ridge. *Triplophos hemingi* (Diplophidae), *Pachystomias microdon* and *Melanostomias biseriatus* (Stomiidae) are recorded for the first time in the western South Atlantic. *Eustomias bibulbosus*, *Grammatostomias ovatus* and *Photonectes achirus* (Stomiidae) are recorded for the first time in the South Atlantic. *Eustomias minimus* (Stomiidae), previously known from four poorly preserved specimens, is reported for the first time in the Atlantic. Occurrences of 18 species are confirmed or recorded for the first time in the Brazilian Exclusive Economic Zone: *Triplophos hemingi* (Diplophidae), *Gonostoma denudatum* (Gonostomatidae), *Aristostomias grimaldii*, *Astronesthes gudrunae*, *Bathophilus nigerrimus*, *Borostomias elucens*, *Eustomias bibulbosus*, *E. braueri*, *E. minimus*, *E. schmidti*, *Grammatostomias ovatus*, *G. dentatus*, *Leptostomias gladiator*, *Melanostomias biseriatus*, *M. bartonbeani*, *Pachystomias microdon*, *Photonectes achirus*, and *Photostomias goodyeari* (Stomiidae). Diagnostic and distributional data for all species recorded are provided, with new anatomical information presented for *Melanostomias bartonbeani* and *Grammatostomias ovatus*. A checklist of the 108 species of Stomiiformes confirmed in Brazilian waters is also presented.

Keywords: Fernando de Noronha Archipelago, Mesopelagic fishes, Rocas Atoll, Seamounts, Southwestern Tropical Atlantic.

Submitted January 17, 2022
Accepted May 16, 2022
by Luiz Osmar
Epub July 08, 2022

1 Programa de Pós-Graduação em Ciências Ambientais e Conservação, Instituto de Biodiversidade e Sustentabilidade, Universidade Federal do Rio de Janeiro, Av. São José do Barreto, 764, 27965-045 Macaé, RJ, Brazil. btvillarins@gmail.com.

2 Instituto de Biodiversidade e Sustentabilidade, Universidade Federal do Rio de Janeiro, Av. São José do Barreto, 764, 27965-045 Macaé, RJ, Brazil. (FDD) didario@gmail.com, (MMM) mincarone@macae.ufrj.br (corresponding author).

3 Departamento de Pesca e Aquicultura, Universidade Federal Rural de Pernambuco, Rua Dom Manuel de Medeiros, s/n, 52171-900 Recife, PE, Brazil. (LNE) leandronole@hotmail.com, (FLF) flavialucena@hotmail.com.

4 MARBEC, Univ. Montpellier, CNRS, Ifremer, IRD, Sète, France. Arnaud.Bertrand@ird.fr.

5 A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninski prospekt 33, Moscow 119071, Russia. prokartster@gmail.com.

6 P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Nakhimovski rospect 36, Moscow 117997, Russia.

Online version ISSN 1982-0224
Print version ISSN 1679-6225

Neotrop. Ichthyol.
vol. 20, no. 2, Maringá 2022

Stomiiformes inclui cerca de 455 espécies válidas de peixes principalmente mesopelágicos, distribuídos nas famílias Diplophidae, Gonostomatidae, Phosichthyidae, Sternoptychidae e Stomiidae. Aqui, relatamos a ocorrência de 55 espécies de Stomiiformes coletadas durante as expedições ABRACOS (*Acoustics along the BRAzilian COaSt*) no nordeste do Brasil, incluindo as ilhas e montes submarinos da Cadeia de Fernando de Noronha. *Triplophos hemingi* (Diplophidae), *Pachystomias microdon* e *Melanostomias biseriatus* (Stomiidae) são registradas pela primeira vez no Atlântico Sul ocidental. *Eustomias bibulbosus*, *Grammatostomias ovatus* e *Photonectes achirus* (Stomiidae) são registradas pela primeira vez no Atlântico Sul. *Eustomias minimus* (Stomiidae), anteriormente conhecida a partir de quatro espécimes mal preservados, é reportada pela primeira vez no Atlântico. A ocorrência de 18 espécies é confirmada ou registrada pela primeira vez na Zona Econômica Exclusiva brasileira: *Triplophos hemingi* (Diplophidae), *Gonostoma denudatum* (Gonostomatidae), *Aristostomias grimaldii*, *Astronesthes gudrunae*, *Bathophilus nigerrimus*, *Borostomias elucens*, *Eustomias bibulbosus*, *E. braueri*, *E. minimus*, *E. schmidti*, *Grammatostomias ovatus*, *G. dentatus*, *Leptostomias gladiator*, *Melanostomias biseriatus*, *M. bartonbeani*, *Pachystomias microdon*, *Photonectes achirus*, e *Photostomias goodyeari* (Stomiidae). Dados diagnósticos e de distribuição de todas as espécies registradas são fornecidos, com novas informações anatômicas para *Melanostomias bartonbeani* e *Grammatostomias ovatus*. Uma lista preliminar das 108 espécies de Stomiiformes confirmadas em águas brasileiras também é apresentada.

Palavras-chave: Arquipélago Fernando de Noronha, Atol das Rocas, Atlântico Sudoeste Tropical, Montes submarinos, Peixes mesopelágicos.

INTRODUCTION

The Stomiiformes is one of the most diverse and abundant groups of fishes in the meso- and bathypelagic zones (Gjøsaeter, Kawaguchi, 1980; Marks *et al*., 2020). Although they vary in body shape, fishes of the order are mostly characterized by having serial luminescent organs of unique derived morphology, an elongate body (except in most members of the Sternoptychidae), the pectoral fins situated low on body, the mouth extending beyond eye in most groups, with the maxilla partly included into mouth gape, teeth present on the maxilla and premaxilla, and chin barbel present in some groups (Morrow, 1964a; Harold, Weitzman, 1996; Prokofiev, 2005; Nelson *et al*., 2016). Currently, the Stomiiformes comprises about 455 valid species commonly known as bristlemouths, lightfishes, hatchetfishes, and barbeled dragonfishes, in the families Diplophidae (10 species), Gonostomatidae (24), Phosichthyidae (24), Sternoptychidae (78), and Stomiidae (319), respectively (Fink, 1985; Kenaley, Stewart, 2015a; Nelson *et al*., 2016; Fricke *et al*., 2022).

Species of the order are distributed throughout the world's oceans (Morrow, Gibbs, 1964; Harold, Weitzman, 1996; Kenaley, Stewart, 2015a), but data on the species composition of the group and other aspects of its diversity are still scarce in the western

South Atlantic. In the Brazilian Exclusive Economic Zone, which includes a substantial portion of the western South Atlantic, about 100 species of the Stomiiformes were previously reported (Gibbs, 1969; Mukhacheva, 1972; Gibbs *et al*., 1983; Gomon, Gibbs, 1985; Serét, Andreata, 1992; Haimovici *et al*., 1994; Clarke, 2000; Parin, Borodulina, 1997, 2000; Parin *et al*., 1999; Figueiredo *et al*., 2002; Mincarone *et al*., 2004; Bernardes *et al*., 2005; Bonecker, Castro, 2006; Braga *et al*., 2007; Haimovici *et al*., 2008; Lima *et al*., 2011; Costa, Mincarone, 2010; Goçalo *et al*., 2011; Bonecker *et al*., 2012; Perez *et al*., 2013; Lins Oliveira *et al*., 2015; Judkins, Haedrich, 2018; Eduardo *et al*., 2018a; Melo *et al*., 2020), but there are still doubts about the taxonomy, occurrence, and distribution of several of those species in the region.

In recent oceanographic cruises conducted during the ABRACOS (Acoustic along the BRAzilian COast) expeditions off northeastern Brazil and adjacent oceanic islands and seamounts, more than 9,000 specimens of mesopelagic fishes were collected, resulting in a significant increase of knowledge on the diversity and distribution of several deep-sea groups (*e.g*., Eduardo *et al*., 2018a,b, 2019, 2020a,b,c, 2021; Mincarone *et al*., 2019, 2020, 2021; Afonso *et al*., 2021). Here we report on new records and further distributional and anatomical information on the stomiiforms collected during the ABRACOS expeditions. In addition, we provide a checklist of the species of the group confirmed in the Brazilian Exclusive Econonic Zone (EEZ).

MATERIAL AND METHODS

Specimens examined are part of a large collection of mesopelagic invertebrates and fishes made during the ABRACOS expeditions, carried out between 29 September and 21 October 2015 (ABRACOS 1 – AB1; Bertrand, 2015), and between 9 April and 10 May 2017 (ABRACOS 2 – AB2; Bertrand, 2017). Both expeditions were conducted using the French RV *Antea* off northeastern Brazil (Rio Grande do Norte, Paraíba, Pernambuco, and Alagoas states) and along the Fernando de Noronha Ridge, which includes the Rocas Atoll, the Fernando de Noronha Archipelago, and associated seamounts. Sampling was conducted using micronekton (body mesh 40 mm, cod-end mesh 10 mm) and mesopelagic (body mesh 30 mm, cod-end mesh 4 mm) nets. Trawl depth was continuously recorded using a Scanmar depth sensor fitted to the upper part of the trawl mouth. Open-mouth nets were employed, but pre-established target depths were defined for each trawl according to the presence of an acoustic scattered layer or patches detected with a Simrad EK60 split-beam scientific echo sounder. At the target depths, trawling activity lasted for about 30 minutes at 2–3 kt. Therefore, collection of specimens most likely occurred at target depths, which are indicated as capture depths in the species accounts.

The survey comprised 82 fishing stations between the surface and 1,113 m depth (Fig. 1; Tab. 1), resulting in the collection of 3,113 specimens of the Stomiiformes out of a total of about 9,000 specimens of fishes. Among the stomiiforms collected, 2,220 were identified to species level and 893 were identified only to genus due to their small size and/or poor condition of preservation (**S1**). After capture, specimens were fixed in a 10% formalin solution and then preserved in 70% ethanol. Families and subfamilies were considered according to Kenaley, Stewart (2015a,e). Specimens were identified

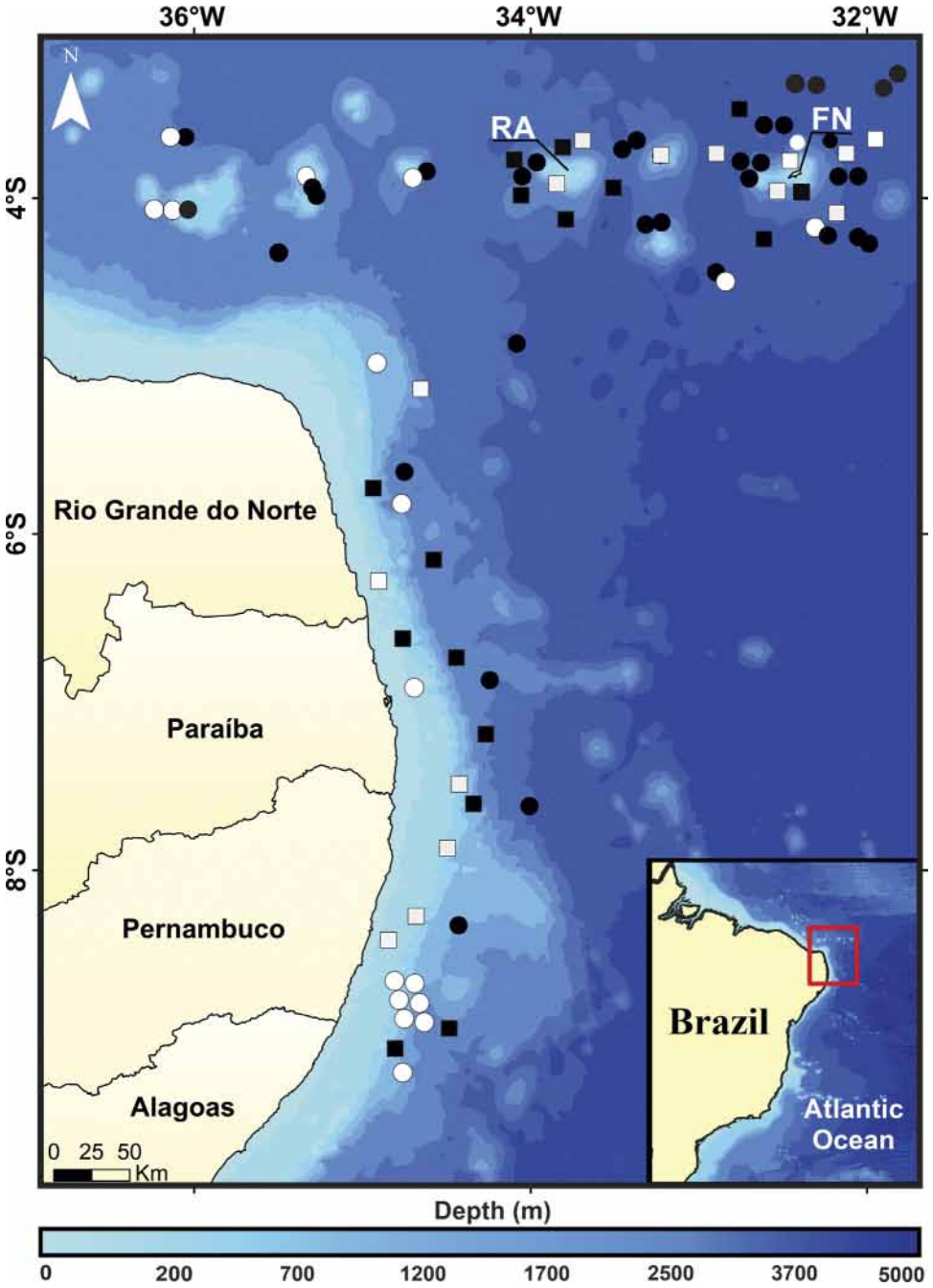

FIGURE 1 | Sampling stations (n = 80) of the ABRACOS 1 (squares; 29 September to 21 October 2015) and ABRACOS 2 (circles; 9 April to 10 May 2017) expeditions. Black symbols indicate stations with occurrence of Stomiiformes. Oceanic islands: RA, Rocas Atoll; FN, Fernando de Noronha Archipelago.

according to Regan, Trewavas (1929, 1930), Grey (1964), Schultz (1964), Gibbs (1964, 1971), Morrow (1964b,c,d), Morrow, Gibbs (1964, 1969), Baird (1971), Gibbs, Craddock (1973), Gibbs *et al.* (1983, 1984), Gomon, Gibbs (1985), Parin, Borodulina (1995, 1996, 2000, 2002, 2003), Clarke (1998, 1999, 2000, 2001), McEachran, Fechhelm (1998), Harold (2003), Kenaley, Hartel (2005), Kenaley (2007, 2009), Liao *et al.* (2006), Lima *et al.* (2011), Kenaley, Stewart (2015a,b,c,d,e,f,g,h), Harold *et al.* (2015), Stewart, Kenaley (2015a,b) and Sutton *et al.* (2020). All specimens examined are deposited in the Fish Collection of the Instituto de Biodiversidade e Sustentabilidade, Universidade

Federal do Rio de Janeiro (NPM, Macaé, Brazil), except some specimens of the Sternoptychidae (Eduardo *et al*., 2020a) and Chauliodontinae (Eduardo *et al*., 2020b), which were selected for biological analyses. Fin rays and vertebrae counts follow Hubbs, Lagler (1958). Photophore terminology, barbel morphology, measurements, teeth and vertebrae counts for *Eustomias* Vaillant, 1884 follow Morrow, Gibbs (1964) and Gibbs *et al.* (1983). Vertebrae counts were accessed through radiographs taken on a Faxitron LX-60 Digital x-ray cabinet. Radiographs were also used to confirm fin ray counts. Unless stated otherwise, gill raker count refers to the total number of rakers in the first gill arch. Institutional abbreviations follow Sabaj (2020).

TABLE 1 | Sampling stations conducted by French RV *Antea* off northeastern Brazil during the ABRACOS 1 (AB1) and ABRACOS 2 (AB2) expeditions. Only stations with occurrence of Stomiiformes are listed.

Station	Date	Hour		Net	Coordinates		Target Depth (m)
		Initial	Final		Initial	Final	
AB1#04	2 Oct 2015	14:00	14:30	Micro	03°54'26"S 32°20'21"W	03°53'17"S 32°19'25"W	90
AB1#09	4 Oct 2015	21:17	21:47	Meso	03°28'14"S 32°45'37"W	03°27'35"S 32°46'42"W	105
AB1#12	5 Oct 2015	21:24	21:54	Meso	03°56'19"S 33°30'41"W	03°56'36"S 33°32'00"W	130
AB1#14	6 Oct 2015	21:40	22:26	Meso	03°59'58"S 34°03'22"W	03°57'42"S 34°04'52"W	510
AB1#15	7 Oct 2015	11:34	12:14	Meso	03°44'02"S 33°59'58"W	03°43'07"S 34°01'17"W	537
AB1#20	7 Oct 2015	21:13	21:37	Meso	03°45'19"S 33°53'11"W	03°44'32"S 33°54'05"W	60
AB1#22	8 Oct 2015	21:32	22:12	Meso	04°07'43"S 33°47'27"W	04°07'00"S 33°48'59"W	525
AB1#25	11 Oct 2015	21:30	21:54	Meso	05°48'08"S 34°57'07"W	05°46'38"S 34°57'30"W	75
AB1#26	12 Oct 2015	12:48	13:08	Meso	06°09'13"S 34°34'35"W	06°09'49"S 34°33'45"W	560
AB1#31	13 Oct 2015	21:24	21:54	Meso	06°44'04"S 34°26'23"W	06°44'47"S 34°25'59"W	50
AB1#34	14 Oct 2015	21:30	22:00	Meso	07°11'26"S 34°15'56"W	07°12'06"S 34°15'19"W	90–100
AB1#36	15 Oct 2015	21:47	22:17	Meso	07°36'08"S 34°20'15"W	07°36'44"S 34°19'23"W	60
AB1#51	19 Oct 2015	22:09	23:35	Meso	08°56'29"S 34°29'03"W	08°59'07"S 34°28'37"W	45–200
AB1#52	20 Oct 2015	11:44	11:24	Meso	09°03'55"S 34°48'05"W	09°01'54"S 34°48'11"W	570
AB2#16	14 Apr 2017	21:53	22:39	Micro	07°36'15"S 33°59'30"W	07°36'49"S 33°57'19"W	680
AB2#21	16 Apr 2017	11:25	12:12	Micro	06°50'21"S 34°18'24"W	06°48'24"S 34°20'30"W	>800
AB2#28	18 Apr 2017	22:33	23:10	Micro	05°37'02"S 34°47'07"W	05°38'02"S 34°49'55"W	70/130
AB2#35	20 Apr 2017	22:35	23:15	Micro	04°19'37"S 35°29'52"W	04°18'32"S 35°32'20"W	630
AB2#39	24 Apr 2017	21:49	22:37	Micro	04°52'27"S 34°35'23"W	04°50'53"S 34°51'05"W	650–800
AB2#40A	26 Apr 2017	10:43	11:06	Micro	03°31'21"S 32°31'40"W	03°31'31"S 32°30'41"W	440
AB2#41A	26 Apr 2017	21:44	22:06	Micro	03°19'59"S 32°24'42"W	03°19'32"S 32°25'05"W	430
AB2#41B	26 Apr 2017	23:16	23:31	Micro	03°19'16"S 32°25'42"W	03°19'14"S 32°25'11"W	25
AB2#42A	27 Apr 2017	12:23	12:26	Micro	03°15'28"S 31°48'29"W	03°15'28"S 31°50'41"W	780
AB2#42B	27 Apr 2017	14:52	15:26	Micro	03°15'44"S 31°48'59"W	03°15'26"S 31°48'23"W	50
AB2#44A	28 Apr 2017	12:44	13:17	Micro	03°52'53"S 32°17'33"W	03°52'13"S 32°16'28"W	<850
AB2#44B	28 Apr 2017	14:47	15:02	Micro	03°52'18"S 32°17'58"W	03°52'46"S 32°18'20"W	130
AB2#45B	28 Apr 2017	22:53	23:15	Meso	04°14'19"S 32°12'52"W	04°14'23"S 32°07'00"W	50
AB2#46A	29 Apr 2017	11:20	11:45	Meso	04°08'31"S 32°18'15"W	04°08'57"S 32°17'29"W	360

TABLE 1 | (Continued)

Station	Date	Hour		Net	Coordinates		Target Depth (m)
		Initial	Final		Initial	Final	
AB2#48A	30 Apr 2017	10:30	10:58	Micro	04°25'05"S 32°57'52"W	04°25'25"S 32°56'56"W	505
AB2#49A	30 Apr 2017	21:17	21:52	Micro	04°10'38"S 33°16'07"W	04°10'58"S 33°15'04"W	770–1020
AB2#49B	30 Apr 2017	23:27	23:56	Micro	04°10'34"S 33°15'34"W	04°10'10"S 33°16'36"W	90
AB2#50A	1 May 2017	10:48	11:29	Micro	03°49'01"S 32°35'56"W	03°47'33"S 32°36'51"W	615
AB2#52A	2 May 2017	11:47	12:18	Micro	03°43'16"S 33°25'10"W	03°42'14"S 33°24'36"W	822–984
AB2#52B	2 May 2017	14:00	14:30	Micro	03°41'56"S 33°23'29"W	03°42'34"S 33°22'36"W	385
AB2#53A	2 May 2017	22:08	22:40	Micro	03°48'59"S 33°59'17"W	03°50'06"S 33°58'47"W	610
AB2#53B	2 May 2017	23:57	00:27	Micro	03°49'47"S 33°57'42"W	03°48'28"S 33°57'44"W	65
AB2#54B	3 May 2017	03:11	13:47	Micro	03°45'17"S 34°41'04"W	03°44'39"S 34°40'05"W	830–1030
AB2#56B	4 May 2017	12:19	02:52	Micro	03°57'44"S 35°24'22"W	03°56'23"S 35°24'41"W	260
AB2#56C	4 May 2017	14:03	14:34	Micro	03°58'47"S 35°23'04"W	03°58'33"S 35°22'25"W	260
AB2#58A	5 May 2017	11:58	02:29	Micro	03°56'54"S 36°06'14"W	03°57'57"S 36°09'28"W	520
AB2#59A	5 May 2017	21:57	22:37	Micro	03°38'02"S 36°31'46"W	03°38'36"S 36°17'50"W	700–1113
AB2#59B	5 May 2017	00:00	00:26	Micro	03°38'36"S 36°22'38"W	03°38'08"S 36°23'46"W	110
AB2#60B	6 May 2017	12:49	13:19	Micro	03°31'43"S 36°21'20"W	03°31'47"S 36°22'26"W	700–670

RESULTS

DIPLOPHIDAE

The Diplophidae as considered here includes ten valid species in the genera *Diplophos* Günther, 1873, *Manducus* Goode & Bean, 1896, and *Triplophos* Brauer, 1902 (Nelson, 2006; Kenaley, Stewart, 2015b). Fishes of the family are characterized by having an elongate body, two rows of photophores along the body (ventral and lateral series), dorsal adipose fin absent, chin barbel absent, dorsal-fin origin in advance of anal-fin origin, 10–15 dorsal-fin rays, 36–68 anal-fin rays, more than 61 vertebrae, teeth in premaxilla uniseral and biserial in lower jaw, presence of photophores on isthmus, one orbital photophore and IC 70–115 (Grey, 1964; Johnson, 1970; Ozawa *et al*., 1990; Kenaley, Stewart, 2015b; Koeda, Ho, 2019).

Three species of the Diplophidae were previously reported in the Brazilian EEZ in the genera *Diplophos* and *Manducus* (Mukhacheva, 1978; Smith *et al*., 1991; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Braga *et al*., 2007; Costa, Mincarone, 2010; Pinheiro *et al*., 2015; Judkins, Haedrich, 2018; Eduardo *et al*., 2020c), all of which were identified among specimens examined in this study. In addition, the occurrence of a fourth species of the family, *Triplophos hemingi* (McArdle, 1901), is reported for the first time in Brazilian waters.

Diplophos Günther, 1873

Diagnosis. *Diplophos* can be distinguished in the Diplophidae by the presence of 10–15 dorsal-fin rays; 43–68 anal-fin rays; more than 74 vertebrae; IC 83–115; OA

78–97 (Grey, 1964; Ozawa *et al*., 1990; Kenaley, Stewart, 2015b; Koeda, Ho, 2019). Seven valid species (Fricke *et al*., 2022).

Diplophos australis Ozawa, Oda & Ida, 1990

(Fig. 2A)

Diagnosis. *Diplophos australis* is distinguished from congeners by the presence of 84–91 vertebrae; 12–13 gill rakers; 61–67 anal-fin rays; IV 41–44; OA 80–87; IC 99–105 (Ozawa *et al*., 1990; Koeda, Ho, 2019).

Geographical distribution. South Atlantic and South Pacific oceans, between 20°S and 40°S (Ozawa *et al*., 1990). In the South Atlantic, *D. australis* was reported from off

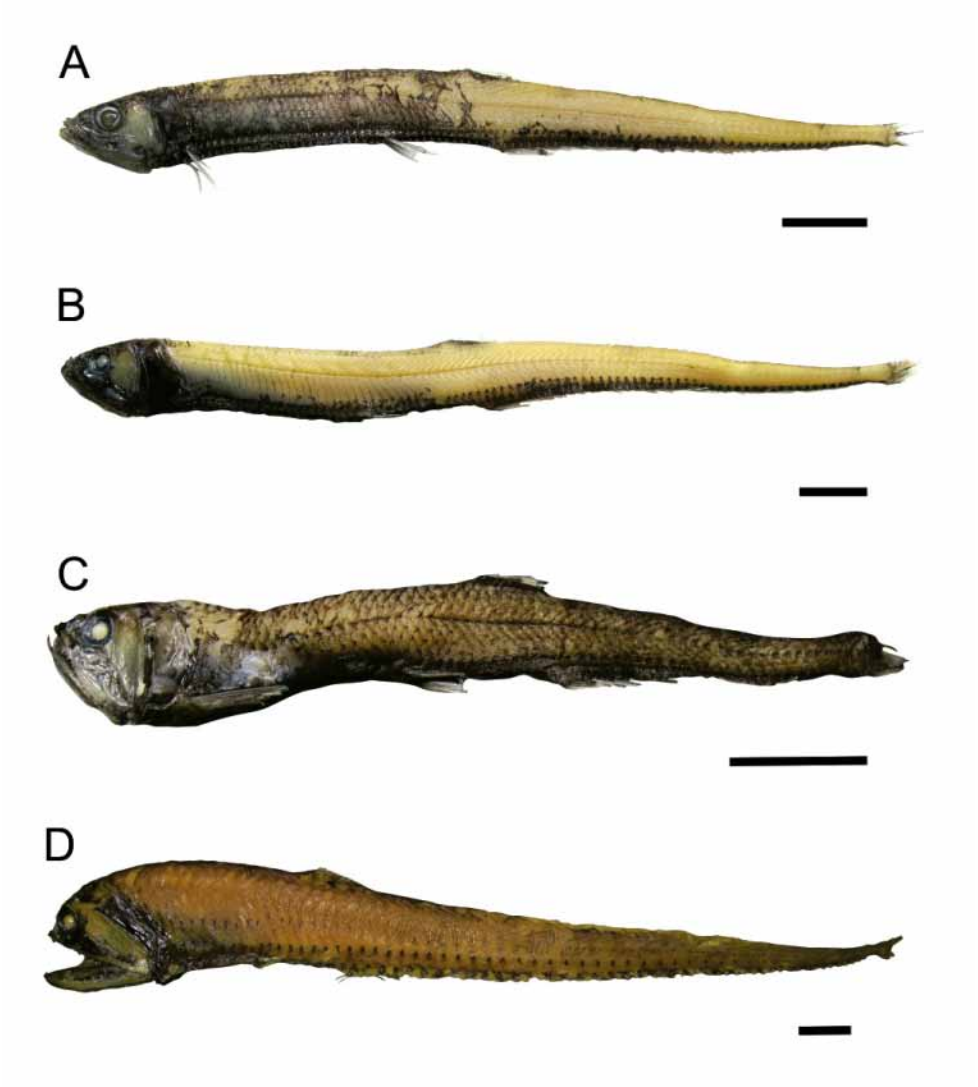

FIGURE 2 | A. *Diplophos australis*, NPM 4564, 99 mm SL; **B.** *Diplophos taenia*, NPM 4566, 129 mm SL; **C.** *Manducus maderensis*, NPM 4530, 63 mm SL; **D.** *Triplophos hemingi*, NPM 4561, 196 mm SL. Scale bars = 10 mm.

Brazil, South Africa, Saint Helena, Ascension, and Tristan da Cunha islands (Ozawa *et al*., 1990; Judkins, Haedrich, 2018). In Brazilian waters, the species was previously reported from off São Paulo to Rio Grande do Sul States (Figueiredo *et al*., 2002; Menezes *et al*., 2003; Judkins, Haedrich, 2018). The specimens reported here, collected from off Fernando de Noronha Archipelago at depths between 780 and 850 m, represent the northernmost record of the species in the Atlantic Ocean (about 3° S; Fig. 3A).

Specimens examined. 3 (71–99 mm SL): NPM 4564, 2 (75–99 mm), AB2#42A; NPM 4920, 1 (71 mm), AB2#44A.

Diplophos taenia Günther, 1873

(Fig. 2B)

Diagnosis. *Diplophos taenia* is distinguished from congeners by the presence of 90–100 vertebrae; 11–13 gill rakers; 56–72 anal-fin rays; IV 42–48; OA 85–97; IC 104–115 (Ozawa *et al*., 1990; Kenaley, Stewart, 2015b; Koeda, Ho, 2019).

Geographical distribution. Circumglobal, between 40°N and 55°S (Mukhacheva, 1978; Pequeño, 1989; Ozawa *et al*., 1990; Quéro *et al*., 1990a; Kenaley, Stewart, 2015b; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, *D. taenia* is reported from off Canada to Uruguay, including the Gulf of Mexico and the Caribbean Sea (McAllister, 1990; Ozawa *et al*., 1990; McEachran, Fechhelm, 1998; Harold, 2003; Judkins, Haedrich, 2018). Previous records of the species in Brazilian waters were made off the northeastern coast (including oceanic islands), the Vitória-Trindade Chain (Montague and Davis seamounts), and off Rio de Janeiro, Santa Catarina and Rio Grande do Sul States (Figueiredo *et al*., 2002; Menezes *et al*., 2003; Braga *et al*., 2007; Pinheiro *et al*., 2015; Eduardo *et al*., 2020c). Additional records are also known off northeastern Brazil, outside the EEZ (Parin *et al*., 1974; Olivar *et al*., 2017). Larvae were reported along the Vitória-Trindade Chain and off Rio de Janeiro State (Bonecker, Castro, 2006, 2014; Stocco, Joyeux, 2015). The specimens reported here were collected off the Rocas Atoll, Fernando de Noronha Archipelago, and Paraíba and Rio Grande do Norte States (including the seamounts), between depths of 25 and 1,113 m (Fig. 3A).

Specimens examined. 25 (42–129 mm SL): NPM 3291, 1 (76 mm), AB1#4; NPM 3292, 1 (51 mm), AB1#15; NPM 3293, 1 (46 mm), AB1#31; NPM 4562, 1 (100 mm), AB2#39; NPM 4563, 7 (49–106 mm), AB2#40A; NPM 4566, 1 (129 mm), AB2#59A; NPM 4567, 6 (42–73 mm), AB2#41B; NPM 4569, 1 (92 mm), AB2#49B; NPM 4614, 3 (49–77 mm), AB2#41A; NPM 6066, 3 (53–61 mm), AB2#45B.

Manducus Goode & Bean, 1896

Diagnosis. *Manducus* can be distinguished in the Diplophidae by the presence of 12–13 dorsal-fin rays; 36–59 anal-fin rays; IC 70–86; photophore series along lateral line (LLP) 65–78; total vertebrae 61–76 (Grey, 1964; Johnson, 1970). Two valid species (Fricke *et al*., 2022).

Manducus maderensis (Johnson, 1890)

(Fig. 2C)

Diagnosis. *Manducus maderensis* differs from *Manducus greyae* (Johnson, 1970) by the number of anal-fin rays (36–41 *vs*. 58–59); number of OA photophores (45–48 *vs*. 50–54); number of IC photophores (70–75 *vs*. 84–86); number of photophore series along lateral line (65–68 *vs*. 76–78); total vertebrae (61–63 *vs*. 76) (Grey, 1964; Johnson, 1970).

Geographical distribution. Atlantic Ocean, from 40°N to 30°S (Smith *et al*., 1991; Figueiredo *et al*., 2002; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off United States to southeastern Brazil, including the Gulf of Mexico and the Caribbean Sea (Smith *et al*., 1991; McEachran, Fechhelm, 1998, Harold, 2003). The species was previously recorded off Rio Grande do Norte and Paraíba States, and from Bahia to Rio de Janeiro States, Fernando de Noronha Archipelago, Rocas Atoll, and the Vitória-Trindade Chain (Davis Seamount) in Brazilian waters (Mukhacheva, 1978; Smith *et al*., 1991; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Braga *et al*., 2007; Costa, Mincarone, 2010; Pinheiro *et al*., 2015; Judkins, Haedrich, 2018). Additional records outside the Brazilian EEZ are known along the western South Atlantic (Smith *et al*., 1991). *Manducus maderensis* is reported here based on specimens collected off the Rocas Atoll and Fernando de Noronha Archipelago, between depths of 90 and 615 m (Fig. 3A).

Specimens examined. 3 (42–65 mm SL): NPM 3259, 1 (42 mm), AB1#22; NPM 4122, 1 (65 mm), AB2#50A; NPM 4530, 1 (63 mm), AB2#49B.

Triplophos Brauer, 1902

Diagnosis. *Triplophos* can be distinguished in the Diplophidae by the trunk much shorter than tail; dorsal-fin origin well in advance of anal-fin origin; 10–11 dorsal-fin rays; 57–63 anal-fin rays; 9–10 pectoral-fin rays; 23–25 gill rakers; two rows of conspicuous photophores along the body; IC 68–70; OA 50–55; first 9 OA sightly lower than the remaining photophores of the series; additional head photophores above premaxilla and maxilla; presence of photophores on isthmus; maxilla with a short toothed portion, with 5–6 uniserial teeth; premaxilla with two rows of small teeth (Grey, 1964; Schaefer *et al*., 1986a). A single valid species (Fricke *et al*., 2022).

Triplophos hemingi (McArdle, 1901)

(Fig. 2D)

Diagnosis. Same as for the genus.

Geographical distribution. Atlantic, Indian, and western Pacific oceans, between 23°N and 20°S (Grey, 1964; Lloris, 1982; Schaefer *et al*., 1986a; Quéro *et al*., 1990a; Randall, Lim, 2000; Harold, 2003; Sutton *et al*., 2020). In the western Atlantic, reported from the Caribbean Sea and Suriname (Grey, 1964; Harold, 2003; Saavedra-Díaz *et*

al., 2004). The specimen of *T. hemingi* identified here was collected near the seamounts off Rio Grande do Norte State, between depths of 700 and 1,113 m (Fig. 3A), and represents the first record in the western South Atlantic.

Specimen examined. 1: NPM 4561, 1 (196 mm), AB2#59A.

GONOSTOMATIDAE

The Gonostomatidae includes 24 valid species in the genera *Cyclothone* Goode & Bean, 1883, *Gonostoma* Rafinesque, 1810, *Margrethia* Jespersen & Tåning, 1919, *Sigmops* Gill, 1883, and *Zaphotias* Goode & Bean, 1898, with a wide distribution in the Atlantic,

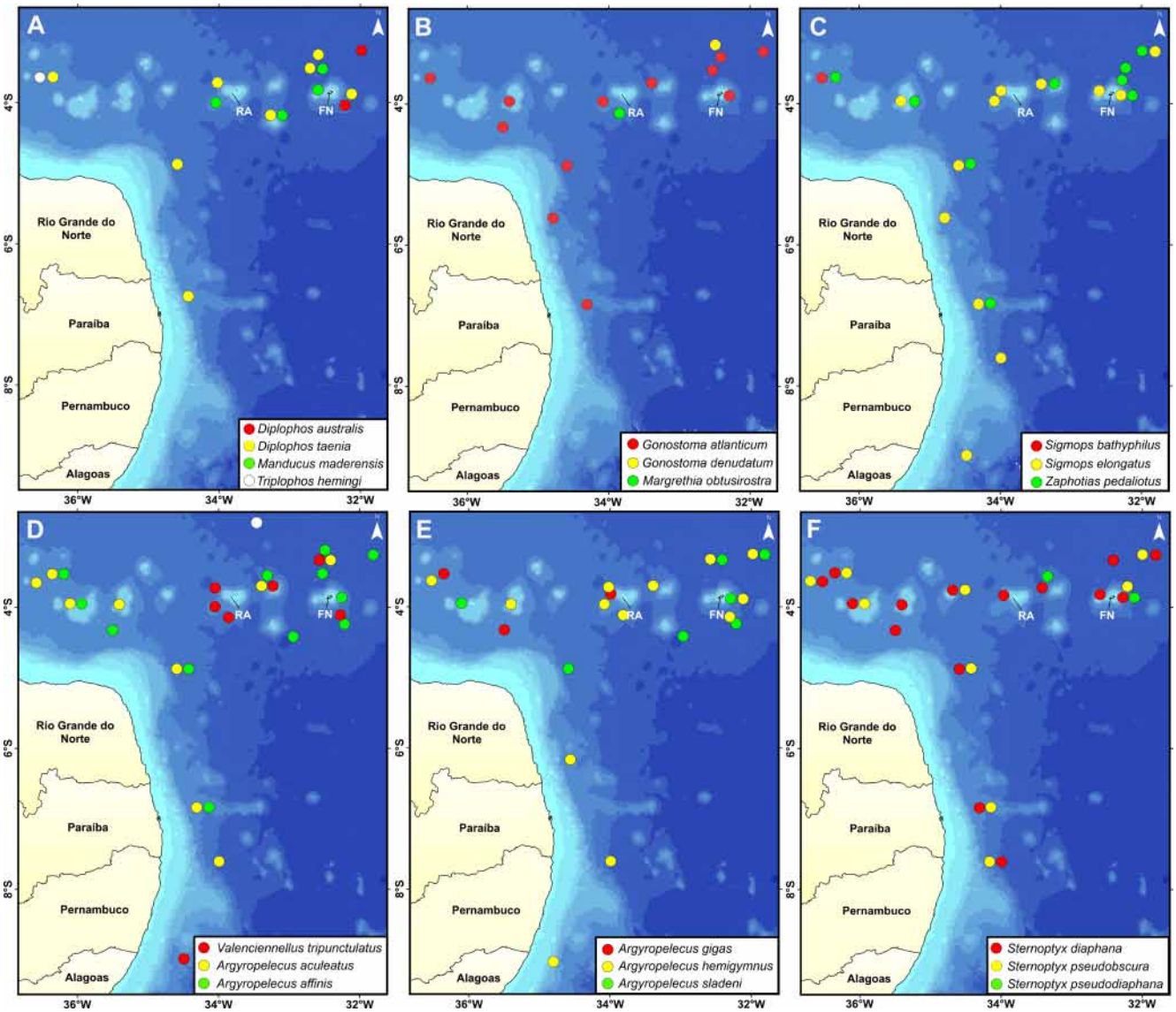

FIGURE 3 | Records of species of Diplophidae (**A**), Gonostomatidae (**B**, **C**) and Sternoptychidae (**D**, **E**, **F**) collected during the ABRACOS expeditions off northeastern Brazil. Oceanic islands: RA, Rocas Atoll; FN, Fernando de Noronha Archipelago.

Indian, Pacific, and Southern oceans (Gon, 1990a; Duhamel *et al*., 2014; Nelson *et al*., 2016; Koeda, Ho, 2019; Fricke *et al*., 2022). Fishes of the family are characterized by having an elongate and laterally compressed body, at least one row of serial photophores, chin barbel and postorbital photophore absent, adipose fins present or absent, 16–67 anal-fin rays, and 12–16 branchiostegal rays (Harold, 1998, 2003; Kenaley, Stewart, 2015c; Nelson *et al*., 2016). Gonostomatids also have the dorsal-fin origin near the middle of body or slightly posterior to it, one row of premaxillary teeth, and two rows of dentary teeth near the symphysis (Harold, 1998, 2003).

Fourteen species in all the five currently recognized genera of the Gonostomatidae were previously reported in Brazilian waters (Mukhacheva, 1972, 1974, 1978; Séret, Andreata, 1992; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Costa, Mincarone, 2010; Bonecker *et al*., 2014; Pinheiro *et al*., 2015; Stocco, Joyeux, 2015; Mincarone *et al*., 2017; Olivar *et al*., 2017; Eduardo *et al*., 2018a, 2020c; Judkins, Haedrich, 2018; Melo *et al*., 2020; Pinheiro *et al*., 2020; Tab. 2). *Cyclothone signata* Garman, 1899 was included in a list of Brazilian marine deep-sea fishes by Melo *et al*. (2020), likely based on NHMUK 1969.6.26.254-257 (four specimens collected near the Fernando de Noronha Archipelago). However, records of the species in the Atlantic require verification, since they actually may refer to *C. alba* Brauer, 1906 (Carneiro *et al*., 2019). Here we also report for the first time on the occurrence of *Gonostoma denudatum* Rafinesque, 1810 in the Brazilian EEZ.

Cyclothone Goode & Bean, 1883

Diagnosis. *Cyclothone* can be distinguished in the Gonostomatidae by the absence of adipose fin; dorsal- and anal-fin origins about opposite; 12–15 dorsal-fin rays; 16–21 anal-fin rays; 29–35 vertebrae; maxillary teeth close-set, subequal, increasing in size posteriorly; vomerine teeth present or absent, palatine teeth only in an anterior patch; photophores present or absent, SO and isthmus series always absent; when present, photophores along the body in ventral and lateral series, OP 2, OA 6–10; caudal glands present or absent; anus closer to pelvic-fin than to anal-fin origin, or midway between origin of those fins (Grey, 1964; Mukhacheva, 1964, 1974; Badcock, 1982; Nazarkin, 2015). A total of 13 valid species (Fricke *et al*., 2022).

Remarks. Nine species of *Cyclothone* were previously reported in the Brazilian EEZ (Tab. 2). Unfortunately, all collected specimens were severely damaged and could not be identified at the species level (**S1**).

Gonostoma Rafinesque, 1810

Diagnosis. *Gonostoma* can be distinguished in the Gonostomatidae by the anal opening close to the anal-fin origin; anal-fin origin in advance of, or opposite to, dorsal-fin origin; absence of elongate rays in dorsal and anal fins; head and trunk longer than tail; 15–18 gill-rakers; no photophores on isthmus; no minute photophores on body or head; two rows of conspicuous photophores along the body (lateral and ventral series); first 5–6 IV forming an arch; upper jaw teeth in a single row, with a series of long, slender, subequal teeth interspaced with shorter teeth (Grey, 1964; Mukhacheva, 1972; Schaefer *et al*., 1986a). Two valid species (Schaefer *et al*., 1986a; Miya, Nishida, 2000; Fricke *et al*., 2022).

Gonostoma atlanticum Norman, 1930

(Fig. 4A)

Diagnosis. *Gonostoma atlanticum* differs from *Gonostoma denudatum* by the absence of adipose fin (*vs*. adipose fin present); 5–6+11=16–17 gill rakers (*vs*. 5+10=15); teeth present on vomer (*vs*. teeth absent on vomer); first 1 or 2 AC photophores elevated and the others at the same level (*vs*. first 2 AC elevated and the following 2 AC below the others) (Grey, 1964; Mukhacheva, 1972; Schaefer *et al*., 1986a).

Geographical distribution. Circumglobal, between 48°N and 36°S (Grey, 1964; Mukhacheva, 1972; Clarke, 1974; Nakabo, 2002; Hutchins, 2001; Judkins, Haedrich 2018; Burton, Lea, 2019; Sutton *et al*., 2020; Love *et al*., 2021). In the Atlantic Ocean, reported from off Canada to Brazil, including the Gulf of Mexico and the Caribbean Sea (Grey, 1964; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018). In Brazil, the species was previously recorded off Pará, Maranhão, and Rio Grande do Norte States, and off the Saint Peter and Saint Paul Archipelago (Mukhacheva, 1972; Judkins, Haedrich, 2018). Additional records are also known off northeastern and southeastern Brazil, outside the country's EEZ (Parin *et al*., 1974; Menezes *et al*., 2003; Stocco, Joyeux, 2015; Judkins, Haedrich, 2018). *Gonostoma atlanticum* is reported here based on specimens collected off Rio Grande do Norte (including seamounts), Pernambuco, and Paraíba States, the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 130 and 1,113 m (Fig. 3B).

FIGURE 4 | A. *Gonostoma atlanticum*, NPM 4615, 61 mm SL; **B.** *Gonostoma denudatum*, NPM 6519, 122 mm SL; **C.** *Margrethia obtusirostra*, NPM 3384, 27 mm SL; **D.** *Sigmops bathyphilus*, NPM 4764, 155 mm SL; **E.** *Sigmops elongatus*, NPM 3182, 173 mm SL; **F.** *Zaphotias pedaliotus*, NPM 4407, 62 mm SL. Scale bars = 10 mm.

Specimens examined. 67 (19–68 mm SL): NPM 3498, 2 (damaged), AB1#14; NPM 4532, 3 (51–57 mm), AB2#44A; NPM 4612, 5 (30–59 mm), AB2#42A; NPM 4615, 13 (45–68 mm), AB2#41A; NPM 4617, 9 (46–67 mm), AB2#40A; NPM 4619, 15 (39–57 mm), AB2#52B; NPM 4779, 5 (49–59 mm), AB2#35; NPM 4780, 1 (50 mm), AB2#52A; NPM 4781, 7 (41–56 mm), AB2#39; NPM 4897, 3 (53–60 mm), AB2#59A; NPM 4927, 2 (46–58 mm), AB2#21; NPM 5064, 1 (19 mm), AB2#28; NPM 5940, 1 (49 mm), AB2#16.

Gonostoma denudatum Rafinesque, 1810

(Fig. 4B)

Diagnosis. See *Gonostoma atlanticum*.

Geographical distribution. Atlantic Ocean from 40°N to 40°S (apparently more common in the eastern Atlantic), including the Mediterranean Sea (De Groot, Nijssen, 1971; Mukhacheva, 1972; Parin *et al*., 1974; Schaefer *et al*., 1986a; Quéro *et al*., 1990a; Golani, 1996; Santos *et al*., 1997; Bordes *et al*., 1999; Harold, 2003; Lipej, Dulčić, 2010; Béarez *et al*., 2017; Bayhan, Ergüden, 2019; Elbaraasi *et al*., 2019; Bariche, Fricke, 2020; Akbora *et al*., 2020; Sutton *et al*., 2020). *Gonostoma denudatum* is reported for the first time in Brazilian waters based on one specimen collected near the Fernando de Noronha Archipelago, at 440 m depth (Fig. 3B).

Specimen examined. 1: NPM 6519, 1 (122 mm), AB2#40A.

Margrethia Jespersen & Tåning, 1919

Diagnosis. *Margrethia* can be distinguished in the Gonostomatidae by the presence of adipose fin; dorsal-fin origin in advance of anal-fin origin; anterior rays of the dorsal- and anal-fin elongated; 14–16 pectoral-fin rays; 15–16 dorsal-fin rays; 21–26 anal-fin rays; no photophores on isthmus; a single row of large and irregular ventral photophores; SO absent; BR 10–13; OP 3; IV 13–16; AC 13–17 (Grey, 1964; Mukhacheva, 1976; Schaefer *et al*., 1986a). Two valid species (Fricke *et al*., 2022).

Margrethia obtusirostra Jespersen & Tåning, 1919

(Fig. 4C)

Diagnosis. *Margrethia obtusirostra* differs from *M. valentinae* Parin, 1982 by having the last photophores of the anterior AC group above the anal-fin base (*vs*. last photophores of the anterior AC group behind the anal-fin base); last 2 IV displaced ventrally (*vs*. last 2 IV in a straight line with anterior IV) (Grey, 1964; Schaefer *et al*., 1986a).

Geographical distribution. Circumglobal, from 43°N to 45°S, except the eastern Pacific Ocean (Grey, 1964; Bordes *et al*., 1999; Quéro *et al*., 1990a; Hutchins, 2001; Moore *et al*., 2003; Kenaley, Stewart, 2015c; Fricke *et al*., 2018; Sutton *et al*., 2020). In the western Atlantic, known from off Canada to southern Brazil, including the Gulf

of Mexico and the Caribbean Sea (Grey, 1964; Parin *et al*., 1974; Vinnichenko, 1997; McEachran, Fechhelm, 1998; Figueiredo *et al*., 2002; Harold, 2003; Judkins, Haedrich, 2018). In Brazilian waters, the species was previously reported from off Bahia to Rio de Janeiro States and off Rio Grande do Sul State (Figueiredo *et al*., 2002; Menezes *et al*., 2003; Braga *et al*., 2007), with additional records off the Trindade and Martin Vaz Archipelago, outside the Brazilian EEZ (Parin *et al*., 1974; Judkins, Haedrich, 2018). Larvae were also recorded off Rio de Janeiro State (Bonecker *et al*., 2012, 2014). The specimen of *M. obtusirostra* examined here was collected off the Rocas Atoll, at 525 m depth (Fig. 3B).

Specimen examined. 1: NPM 3384, 1 (27 mm), AB1#22.

Sigmops Gill, 1883

Diagnosis. The genus was reappraised by Miya, Nishida (2000), who included in *Sigmops* five species previously allocated in *Gonostoma*: *Sigmops bathyphilus* (Vaillant, 1884), *S. ebelingi* (Grey, 1960), *S. elongatus* (Günther, 1878), *S. gracilis* (Günther, 1878), and *S. longipinnis* (Mukhacheva, 1972). *Sigmops* can be distinguished in the Gonostomatidae by the absence of elongate rays in dorsal and anal fins; head and trunk nearly as long as tail; no photophores on isthmus; two rows (lateral and ventral) of photophores; SO present; OA 11–21; IC 32–43; first 4–6 IV forming an arch or an ascending line; palatine teeth uniserial; upper jaw teeth in a single row, with a series of long, slender, subequal teeth interspaced with shorter teeth (Grey, 1964; Mukhacheva, 1972; Schaefer *et al*., 1986a).

Sigmops bathyphilus (Vaillant, 1884)

(Fig. 4D)

Diagnosis. *Sigmops bathyphilus* can be distinguished from congeners by the presence of adipose fin; anal-fin origin in line with dorsal-fin origin; 10–14 pectoral-fin rays; 11–15 dorsal-fin rays; 7–9 pelvic-fin rays; 21–26 anal-fin rays; 28–32 gill rakers; no photophores on isthmus; two rows (lateral and ventral) of minute and obscure photophores; IC 32–38; OA 14–16, in an irregular row (Grey, 1964; Mukhacheva, 1972; Kenaley, Stewart, 2015c; Coad, 2018a).

Geographical distribution. Circumglobal between 70°N and 45°S, except the western Indian Ocean (Grey, 1964; Schaefer *et al*., 1986a; Pequeño, 1989; Hutchins, 2001; Møller *et al*., 2010; Kenaley, Stewart, 2015c; Béarez *et al*., 2017; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off Greenland, Canada, United States, the Bermudas and the Caribbean Sea, and off Rio de Janeiro State, Brazil (Mukhacheva, 1972; Grey, 1964; Harold, 2003; Moore *et al*., 2003; Costa, Mincarone, 2010; Møller *et al*., 2010; Judkins, Haedrich, 2018). Here we report on one specimen of *S. bathyphilus* collected off Rio Grande do Norte State, near the seamounts of the region, between depths of 700 and 1,113 m (Fig. 3C).

Specimen examined. 1: NPM 4764, 1 (155 mm), AB2#59A.

Sigmops elongatus (Günther, 1878)

(Fig. 4E)

Diagnosis. *Sigmops elongatus* can be distinguished from congeners by the presence of adipose fin; anal-fin origin in line with dorsal-fin origin; paired fins short; 10–13 pectoral-fin rays; 12–15 dorsal-fin rays; 28–32 anal-fin rays; 6 pelvic-fin rays; 19–21 gill rakers; two rows (lateral and ventral) of conspicuous photophores; OP 3; OA 13–15; AC 20–24; IC 41–43; first 1–2 OA elevated; first 5–6 IV forming an arch; presence of a large luminous gland behind ORB; presence of 2 infracaudal and 1–2 supracaudal luminous glands; adult size larger than 200 mm SL (Grey, 1964; Mukhacheva, 1972; Kenaley, Stewart, 2015c).

Geographical distribution. Circumglobal between 65°N and 45°S, including the Mediterranean Sea (Mukhacheva, 1972; Grey, 1964; Schaefer *et al*., 1986a; Pequeño, 1989; Quéro *et al*., 1990a; Nakabo, 2002; Román *et al*., 2000; Hutchins, 2001; Møller *et al*., 2010; Kenaley, Stewart, 2015c; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, reported from off Canada to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Grey, 1964; Parin *et al*., 1974; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Judkins, Haedrich, 2018; Ramírez *et al*., 2019). In Brazilian waters, the species was previously reported from off Rio Grande do Norte to Rio Grande do Sul States, including the Rocas Atoll, and the Fernando de Noronha and Trindade and Martin Vaz archipelagos (Mukhacheva, 1972; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Mincarone *et al*., 2017; Eduardo *et al*., 2018a; Judkins, Haedrich, 2018). Larvae were also recorded off Rio de Janeiro State (Bonecker *et al*., 2012, 2014). Specimens of *S. elongatus* examined here were collected off Rio Grande do Norte (including seamounts), Paraíba, and Pernambuco States, the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 70 and 984 m (Fig. 3C).

Specimens examined. 41 (45–207 mm SL): NPM 3182, 3 (49–173 mm), AB1#51; NPM 3284, 1 (45 mm), AB1#14; NPM 4539, 4 (93–198 mm), AB2#39; NPM 4540, 4 (90–205 mm), AB2#52A; NPM 4542, 5 (134–190 mm), AB2#50A; NPM 4543, 3 (186–192 mm), AB2#44A; NPM 4544, 9 (51–184 mm), AB2#21; NPM 4546, 5 (164–207 mm), AB2#16; NPM 4547, 2 (128–190 mm), AB2#53A; NPM 4548, 2 (186–196 mm), AB2#42A; NPM 4783, 2 (47–78 mm), AB2#56C; NPM 5056, 1 (49 mm), AB2#28.

Zaphotias Goode & Bean, 1898

Diagnosis. *Zaphotias* can be distinguished in the Gonostomatidae by the absence of adipose fin; anal-fin origin in advance of dorsal-fin origin; anteriormost anal-fin rays greatly elongated; 14–16 pectoral-fin rays; 17–20 dorsal-fin rays; no photophores on isthmus; a single row of conspicuous ventral photophores; SO present; BR 11–13; upper jaw teeth in a single row, with 10–12 long teeth and 2–4 small teeth in each interspace (Grey, 1964; Mukhacheva, 1976). A single valid species (Fricke *et al*., 2022).

Zaphotias pedaliotus (Goode & Bean, 1896)

(Fig. 4F)

Diagnosis. As for the genus.

Geographical distribution. Atlantic and Indian oceans, from 43°N to 40°S (Grey, 1964; Mukhacheva, 1976; Schaefer *et al*., 1986a; Quéro *et al*., 1990a; Porteiro *et al*., 1999; Hutchins, 2001; Olivar *et al*., 2017; Judkins, Haedrich, 2018; Bernal *et al*., 2020; Sutton *et al*., 2020). In the western Atlantic, the species was recorded from off Canada to northeastern Brazil, including the Gulf of Mexico and the Caribbean Sea (Grey, 1964; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Judkins, Haedrich, 2018). In Brazilian waters, the species was previously recorded off Maranhão State, the Rocas Atoll, and the Saint Peter and Saint Paul and Fernando de Noronha archipelagos (Mukhacheva, 1976; Eduardo *et al*., 2018a; Judkins, Haedrich, 2018). *Zaphotias pedaliotus* is herein recorded from off Rio Grande do Norte State (near the seamounts), Paraíba State, Rocas Atoll, and Fernando de Noronha Archipelago, based on specimens collected between depths of 130 and 984 m (Fig. 3C).

Remarks. Until recently, this species was usually recognized as *Bonapartia pedaliota* Goode & Bean, 1896, including in Brazilian waters (*e.g*., Eduardo *et al*., 2018a; Judkins, Haedrich, 2018; Melo *et al*., 2020). However, *Bonapartia* Goode & Bean, 1896 is a junior homonym of *Bonapartia* Büttikofer, 1896 (Aves: Pycnonotidae). The species should therefore be recognized in *Zaphotias* Goode & Bean, 1898 (Sangster, 2021).

Specimens examined. 141 (37–81 mm SL): NPM 4229, 47 (37–72 mm), AB2#52B; NPM 4392, 28 (42–71 mm), AB2#41A; NPM 4407, 3 (53–62 mm), AB2#56B; NPM 4408, 23 (40–81 mm), AB2#42A; NPM 4409, 6 (58–61 mm), AB2#52A; NPM 4423, 29 (49–71 mm), AB2#40A; NPM 4529, 1 (56 mm), AB2#21; NPM 4611, 1 (damaged), AB2#59A; NPM 5059, 2 (57–60 mm), AB2#44A; NPM 6106, 1 (damaged), AB2#44B.

STERNOPTYCHIDAE

The Sternoptychidae comprises meso- and bathypelagic fishes distributed in the Atlantic, Indian, Pacific, and Southern oceans (Schultz, 1964; Gon, 1990b; Lima *et al*., 2011; Duhamel *et al*., 2014; Harold *et al*., 2015). The family includes 78 valid species in 10 genera and two subfamilies: Maurolicinae, with the genera *Araiophos* Grey, 1961, *Argyripnus* Gilbert & Cramer, 1897, *Danaphos* Bruun, 1931, *Maurolicus* Cocco, 1838, *Sonoda* Grey, 1959, *Thorophos* Bruun 1931, and *Valenciennellus* Jordan & Evermann, 1896; and Sternoptychinae, with the genera *Argyropelecus* Cocco, 1829, *Polyipnus* Günther, 1887, and *Sternoptyx* Hermann, 1781 (Lima *et al*., 2011; Nelson *et al*., 2016; Fricke *et al*., 2022). Species of the Sternoptychidae are typically small and characterized in the Stomiiformes by the pseudobranch present, ventral photophores series united in groups of two or more photophores, and chin barbel absent (Harold, 2003; Harold *et al*., 2015).

Fifteen species of the Sternoptychidae were reported in Brazilian waters, in the genera *Argyripnus*, *Argyropelecus*, *Maurolicus*, *Polyipnus*, *Sternoptyx*, and *Valenciennellus* (Baird, 1971; Borodulina, 1978; Séret, Andreata, 1992; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Costa, Mincarone, 2010; Lima *et al*., 2011; Bonecker *et al*., 2014; Lins Oliveira *et al*., 2015; Mincarone *et al*., 2017; Eduardo *et al*., 2018a; Judkins, Haedrich, 2018; Melo *et al*., 2020; Pinheiro *et al*., 2020; Tab. 2). An undescribed species of *Polyipnus* was also reported off the central coast of Brazil (Lima *et al*., 2011). *Maurolicus javanicus* Parin & Kobyliansky, 1993 and *M. muelleri* (Gmelin, 1789) were also reported from off the north and northeastern coasts of Brazil (Judkins, Haedrich, 2018; Melo *et al*., 2020), but according to Rees *et al*. (2020) the distribution of these species is likely restricted to the eastern Indian Ocean and the Arctic Circle, respectively. Therefore, the occurrence of those species in Brazilian waters needs confirmation. All sternoptychids collected during the ABRACOS expeditions, listed below, were previously reported in Brazilian waters.

Maurolicinae

Members of the Maurolicinae can be recognized in the Sternoptychidae by an elongate body, not extremely compressed laterally, dorsal blade absent, and 19–27 anal-fin rays (Harold, 2003; Nelson *et al*., 2016).

Valenciennellus Jordan & Evermann, 1896

Diagnosis. *Valenciennellus* can be distinguished in the Maurolicinae by the eyes moderately tubular and directed upwards; 7–8 dorsal-fin rays; 24–25 anal-fin rays; AC in 3 to 6 groups; BR 6 (Bruun, 1931; Grey, 1964; McEachran, Fechhelm, 1998). Two valid species (Fricke *et al*., 2022).

Valenciennellus tripunctulatus (Esmark, 1871)

(Fig. 5A)

Diagnosis. *Valenciennellus tripunctulatus* differs from *V. carlsbergi* Bruun 1931 by the AC in 4 to 6 (typically 5) groups (*vs.* AC in 3 groups), and 5 OA photophores (*vs.* 2) (Bruun, 1931; Grey, 1964).

Geographical distribution. Circumglobal between 55ºN and 44ºS (Grey, 1964; Parin *et al*., 1974; Quéro *et al*., 1990b; Lipej, Dulčić, 2010; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species was reported from off Canada to Brazil, including the Gulf of Mexico and the Caribbean Sea (Grey, 1964; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018). In Brazilian waters, *V. tripunctulatus* was previously reported off Pará, Maranhão, Santa Catarina, and Rio Grande do Sul States, also in the vicinities of the Fernando de Noronha, Saint Peter and Saint Paul, and Trindade and Martin Vaz archipelagos (Figueiredo *et al*., 2002; Olivar *et al*., 2017; Judkins, Haedrich, 2018). Additional records in the western Atlantic outside the Brazilian EEZ are also known (Menezes *et al*., 2003;

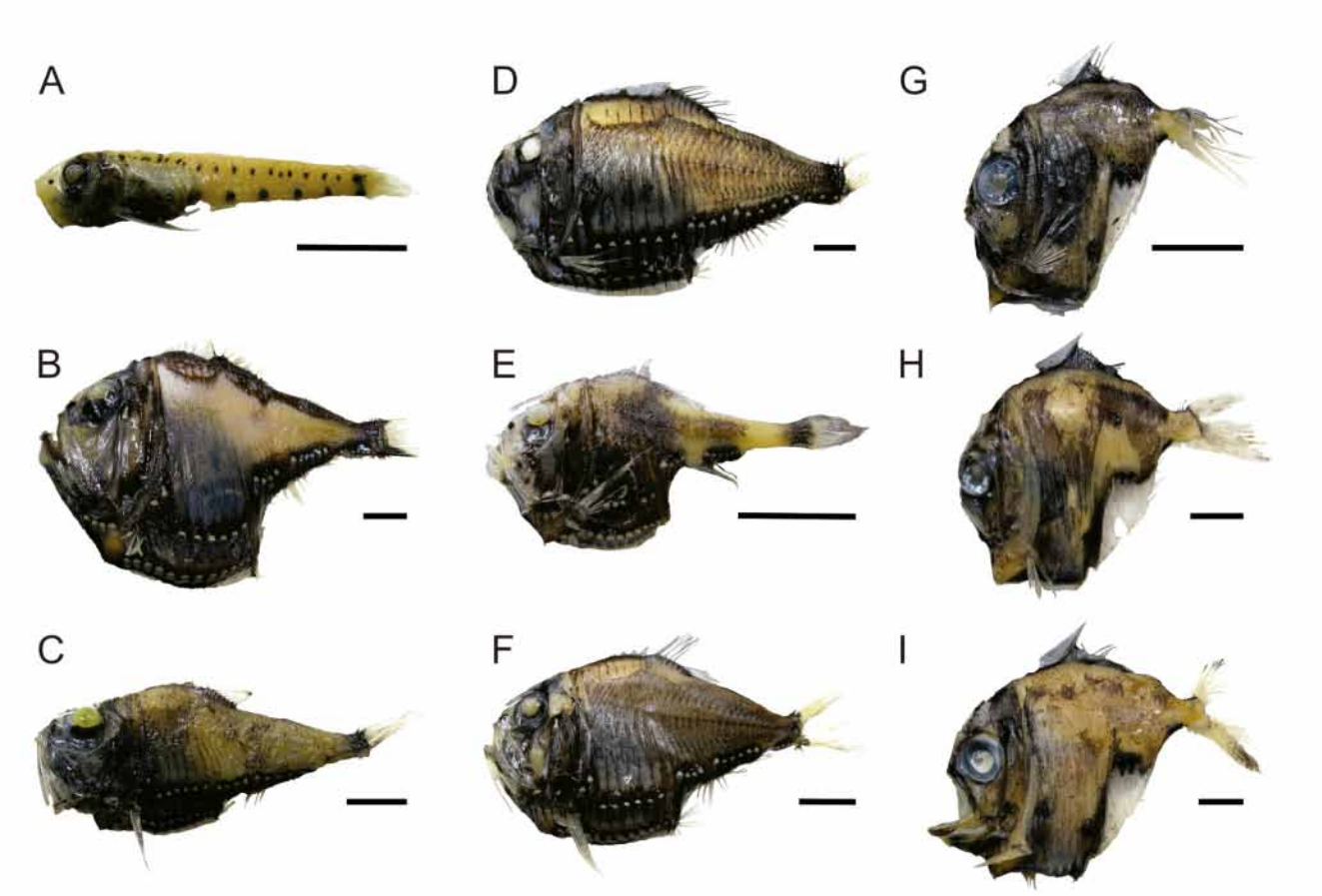

FIGURE 5 | A. *Valenciennellus tripunctulatus*, NPM 3301, 29 mm SL; **B.** *Argyropelecus aculeatus*, NPM 4133, 82 mm SL; **C.** *Argyropelecus affinis*, NPM 4089, 53 mm SL; **D.** *Argyropelecus gigas*, NPM 4090, 88 mm SL; **E.** *Argyropelecus hemigymnus*, NPM 3203, 26 mm SL; **F.** *Argyropelecus sladeni*, NPM 4102, 60 mm SL; **G.** *Sternoptyx diaphana*, NPM 4160, 28 mm SL; **H.** *Sternoptyx pseudobscura*, NPM 4103, 51 mm SL; **I.** *Sternoptyx pseudodiaphana*, NPM 4160, 59 mm SL. Scale bars = 10 mm.

Olivar *et al*., 2017; Judkins, Haedrich, 2018). Larvae were recorded off Rio de Janeiro State (Bonecker *et al*., 2014). Specimens of *V. tripunctulatus* examined here were collected off Pernambuco State, Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 45 and 537 m (Fig. 3D).

Specimens examined. 19 (23–32 mm SL): NPM 3285, 7 (23–28 mm), AB1#51; NPM 3301, 3 (29–30 mm), AB1#15; NPM 3302, 3 (28 mm), AB1#14; NPM 3303, 2 (23–29 mm), AB1#22; NPM 4243, 1 (32 mm), AB2#52B; NPM 4438, 1 (31 mm), AB2#41A; NPM 4439, 2 (damaged), AB2#46A.

Sternoptychinae

Members of the Sternoptychinae can be recognized in the Sternoptychidae by the body extremely compressed laterally, presence of dorsal blade and 11–19 anal-fin rays (Harold, 2003; Nelson *et al*., 2016).

Argyropelecus Cocco, 1829

Diagnosis. *Argyropelecus* can be distinguished in the Sternoptychinae by the eyes tubular, directed upwards; dorsal blade with several spines anterior to dorsal-fin rays; abdominal keel developed; post-abdominal spines present; AB 12; SAB 6; SP 2; PAN 4 (Baird, 1971, 1986). A total of 10 valid species (Fricke *et al*., 2022).

Argyropelecus aculeatus Valenciennes, 1850

(Fig. 5B)

Diagnosis. *Argyropelecus aculeatus* differs from congeners by the presence of denticles in the SC photophores; PAN, AN and SC in separated groups; two post-abdominal spines with different sizes, the posterior one markedly larger than the anterior; posteriormost abdominal keel scale slanting forward; dorsal blade height and width approximately equal; 9–10 dorsal-fin rays; lower jaw with a pair of canine teeth (Baird, 1971; Borodulina, 1978; Lima *et al*., 2011; Harold *et al*., 2015).

Geographical distribution. Circumglobal in tropical and temperate waters, between 43°N and 40°S (Baird, 1971; Parin *et al*., 1974; Borodulina, 1978; Pequeño, 1989; Quéro *et al*., 1990b; McAllister, 1990; Harold, 2003; Harold *et al*., 2015; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species was reported from off the United States to Uruguay, including the Gulf of Mexico and the Caribbean Sea (McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018; Ramírez *et al*., 2019). In the Brazilian EEZ, *A. aculeatus* was previously reported from off the northeast to southeast coast, including the Rocas Atoll and the Fernando de Noronha and Saint Peter and Saint Paul archipelagos (Borodulina, 1978; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Costa, Mincarone, 2010; Lima *et al*., 2011; Judkins, Haedrich, 2018; Eduardo *et al*., 2018a, 2020a). Larvae were also recorded off Rio de Janeiro State (Bonecker *et al*., 2014). Specimens of *A. aculeatus* examined here were collected off Rio Grande do Norte (including seamounts), Paraíba, and Pernambuco States, in addition to the Rocas Atoll and Fernando de Noronha Archipelago, between depths of 430 and 1,113 m (Fig. 3D).

Specimens examined. 43 (30–82 mm SL): NPM 4112, 6 (32–46 mm), AB2#16; NPM 4113, 1 (46 mm), AB2#39; NPM 4114, 1 (45 mm), AB2#60B; NPM 4120, 1 (42 mm), AB2#59A; NPM 4125, 1 (48 mm), AB2#52B; NPM 4131, 22 (34–82 mm), AB2#58A; NPM 4133, 1 (82 mm), AB2#41A; NPM 4142, 1 (36 mm), AB2#21; NPM 4187, 9 (30–67 mm), AB2#56C.

Argyropelecus affinis Garman, 1899

(Fig. 5C)

Diagnosis. *Argyropelecus affinis* differs from congeners by the PAN, AN and SC not distinctly separated in groups, organized in a nearly straight line; dorsal blade reduced, its height less than one-third of its length; ventral keel scales not extending below

abdominal photophores; laterally directed postorbital spine absent (Baird, 1971, 1986; Borodulina, 1978).

Geographical distribution. Circumglobal in tropical and temperate waters, between 43°N and 35°S (Norman, 1939; Baird, 1971; Pequeño, 1989; Quéro *et al*., 1990b; Harold, 2003; Vélez, 2009; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species was reported from off Canada to Brazil, including the Gulf of Mexico and the Caribbean Sea (Uyeno, Aizawa, 1983; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018). In Brazilian waters, *A. affinis* was previously reported off the northeastern coast and adjacent oceanic islands (Borodulina, 1978; Eduardo *et al*., 2018a, 2020a), with additional records in the western Atlantic outside the Brazilian EEZ (Parin *et al*., 1974; Menezes *et al*., 2003; Olivar *et al*., 2017; Judkins, Haedrich, 2018). The specimens examined here were collected from off the Paraíba and Rio Grande do Norte States, including seamounts, and off the Rocas Atoll and Fernando de Noronha Archipelago, between depths of 50 and 850 m (Fig. 3D).

Specimens examined. 378 (28–78 mm SL): NPM 4089, 31 (28–68 mm), AB2#52B; NPM 4094, 7 (45–61 mm), AB2#58A; NPM 4110, 24 (45–59 mm), AB2#48A; NPM 4111, 4 (damaged), AB2#42A; NPM 4134, 2 (53–65 mm), AB2#60B; NPM 4135, 27 (33–68 mm), AB2#45B; NPM 4180, 46 (33–78 mm), AB2#41A; NPM 4210, 14 (44–65 mm), AB2#39; NPM 4211, 210 (35–73 mm), AB2#35; NPM 4426, 11 (48–57 mm), AB2#44A; NPM 4428, 1 (48 mm), AB2#40A; NPM 4436, 1 (39 mm), AB2#21.

Argyropelecus gigas Norman, 1930

(Fig. 5D)

Diagnosis. *Argyropelecus gigas* differs from congeners by the PAN, AN, and SC not distinctly separated in groups; dorsal blade developed, its height more than one-third its length; a prominent, laterally directed, postorbital (sphenotic) spine near the postero-dorsal margin of the eye (Baird, 1971; Borodulina, 1978; Harold *et al*., 2015).

Geographical distribution. Circumglobal in tropical and temperate waters, between 65°N and 40°S (Baird, 1971; Borodulina, 1978; Pequeño, 1989; Quéro *et al*., 1990b; Randall, Lim, 2000; Harold, 2003; Møller *et al*., 2010; Harold *et al*., 2015; Sutton *et al*., 2020). In the western Atlantic, reported from off Greenland to Uruguay, including the Gulf of Mexico and the Caribbean Sea (McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Møller *et al*., 2010; Nión *et al*., 2016; Afonso *et al*., 2018; Judkins, Haedrich, 2018). In Brazilian waters the species was previously reported off Saint Peter and Saint Paul Archipelago, and Rio Grande do Norte and Rio Grande do Sul States (Borodulina, 1978; Bernardes *et al*., 2005; Haimovici *et al*., 2008). Additional records in the western Atlantic outside the Brazilian EEZ are also known (Parin *et al*., 1974; Borodulina, 1978; Judkins, Haedrich, 2018). Specimens of *A. gigas* examined here were collected off Rio Grande do Norte State, near the seamounts, and the Rocas Atoll, between depths of 610 and 700 m (Fig. 3E).

Specimens examined. 9 (78–91 mm SL): NPM 4090, 2 (78–88 mm), AB2#35; NPM 4096, 5 (84–90 mm), AB2#53A; NPM 4132, 2 (83–91 mm), AB2#60B.

Argyropelecus hemigymnus Cocco, 1829

(Fig. 5E)

Diagnosis. *Argyropelecus hemigymnus* differs from congeners by the PAN, AN and SC in separated groups; AN series length shorter than the gap between AC and SC; a single post-abdominal spine with serrated margins; an elongated, slender posterior body trunk; 8 dorsal-fin rays (Baird, 1971; Borodulina, 1978; Lima *et al*., 2011; Harold *et al*., 2015).

Geographical distribution. Circumglobal in tropical and temperate waters, between 66°N and 60°S, including the Mediterranean Sea (Baird, 1971; Borodulina, 1978; Pequeño, 1989; Quéro *et al*., 1990b; Harold, 2003; Møller *et al*., 2010; Harold *et al*., 2015; Elbaraasi *et al*., 2019; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species was reported from off Greenland to Argentina, including the Gulf of Mexico and the Caribbean Sea (Parin *et al*., 1974; Borodulina, 1978; Baird, 1971; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Møller *et al*., 2010; Judkins, Haedrich, 2018). *Argyropelecus hemigymnus* was also reported along almost the entire Brazilian coast, and off Saint Peter and Saint Paul Archipelago (Borodulina, 1978; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Haimovici *et al*., 2008; Costa, Mincarone, 2010; Lima *et al*., 2011; Olivar *et al*., 2017; Judkins, Haedrich, 2018; Eduardo *et al*., 2020a). Larvae were recorded off Rio de Janeiro State (Bonecker *et al*., 2014). Specimens of *A. hemigymnus* examined here were collected off Pernambuco, Alagoas, and Rio Grande do Norte States (including the seamounts), and off the Rocas Atoll and Fernando de Noronha Archipelago, between depths of 260 and 1,113 m (Fig. 3E).

Specimens examined. 53 (8–31 mm SL): NPM 3201, 7 (8–20 mm), AB1#15; NPM 3202, 3 (27–30 mm), AB1#14; NPM 3203, 5 (21–26 mm), AB1#22; NPM 3204, 11 (16–22 mm), AB1#26; NPM 3999, 2 (11–13 mm), AB1#52; NPM 4136, 4 (14–28 mm), AB2#59A; NPM 4137, 3 (23–26 mm), AB2#16; NPM 4138, 2 (26–31 mm), AB2#42A; NPM 4139, 1 (25 mm), AB2#52A; NPM 4140, 5 (22–28 mm), AB2#41A; NPM 4188, 2 (17–21 mm), AB2#56C; NPM 4429, 1 (22 mm), AB2#44A; NPM 4432, 5 (19–22 mm), AB2#46A; NPM 4456, 1 (21 mm), AB2#46B; NPM 5734, 1 (15 mm), AB2#52B.

Argyropelecus sladeni Regan, 1908

(Fig. 5F)

Diagnosis. *Argyropelecus sladeni* differs from congeners by the PAN, AN and SC in separated groups; denticles in SC photophores absent; two post-abdominal spines with similar sizes; a long, outwardly hooked upper preopercular spine; lower jaw teeth uniform in size; dorsal blade low, its height about three or more times its length; 9–10 dorsal-fin rays (Baird, 1971; Borodulina, 1978; Lima *et al*., 2011; Harold *et al*., 2015).

Geographical distribution. Circumglobal in tropical and temperate waters, between 60°N and 41°S (Baird, 1971; Borodulina, 1978; Pequeño, 1989; Quéro *et al*., 1990b; Aizawa, 2002; Harold, 2003; Harold *et al*., 2015; Orlov, Tokranov, 2019; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, reported from off Canada to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Baird, 1971; Borodulina, 1978; Uyeno, Aizawa, 1983; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018). In Brazilian waters, the species was previously reported off Pará, Rio Grande do Norte, and Bahia States, in addition to the Fernando de Noronha and Saint Peter and Saint Paul archipelagos (Baird, 1971; Borodulina, 1978; Menezes *et al*., 2003; Lima *et al*., 2011; Olivar *et al*., 2017; Eduardo *et al*., 2018a; Judkins, Haedrich, 2018). Larvae were recorded off Rio de Janeiro State (Bonecker *et al*., 2014). The specimens of *A. sladeni* examined here were collected off Rio Grande do Norte State, including seamounts, and the Fernando de Noronha Archipelago, between depths of 50 and 850 m (Fig. 3E).

Specimens examined. 14 (32–65 mm SL): NPM 4091, 1 (41 mm), AB2#48A; NPM 4102, 1 (60 mm), AB2#42A; NPM 4106, 2 (51–64 mm), AB2#39; NPM 4116, 1 (54 mm), AB2#58A; NPM 4141, 2 (39–40 mm), AB2#41A; NPM 4182, 6 (32–61 mm), AB2#45B; NPM 4427, 1 (65 mm), AB2#44A.

Sternoptyx Hermann, 1781

Diagnosis. *Sternoptyx* can be distinguished in the Sternoptychidae by the body extremely compressed; eyes not tubular; dorsal blade with one spine; anterior margin of dorsal blade serrated; abdominal keel developed; post-abdominal spines present; AB 10; BR 3; I 5; PO externally indistinct and ventral to orbit (Baird, 1971; Borodulina, 1978; Lima *et al*., 2011). Four valid species (Fricke *et al*., 2022).

Sternoptyx diaphana Hermann, 1781

(Fig. 5G)

Diagnosis. *Sternoptyx diaphana* differs from congeners by the SAN slightly elevated, its height less than half the distance between the ventral body margin and its midline; posterior margin of AN and ventral margin of the anal-fin base forming a narrow V shaped line; body depth larger than standard length; 9–11 dorsal-fin rays, usually less than 11; 28 vertebrae, occasionally 27 or 29 (Baird, 1971; Borodulina, 1978; Aizawa, 2002; Lima *et al*., 2011).

Geographical distribution. Circumglobal in tropical and temperate waters, between 55°N and 55°S (Baird, 1971; Borodulina, 1978; Pequeño, 1989; Quéro *et al*., 1990b; Lima *et al*., 2011; Harold, 2003; Harold *et al*., 2015; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species is reported from off Canada to Argentina, including the Gulf of Mexico and the Caribbean Sea (Baird, 1971; Parin *et al*., 1974; Uyeno, Aizawa, 1983; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Nión *et al*., 2016; Judkins, Haedrich, 2018; Ramírez *et al*., 2019). The species was

previously recorded off Maranhão, Rio Grande do Norte, Bahia, Espírito Santo, Rio de Janeiro, and Rio Grande do Sul States in Brazilian waters, in addition to the Fernando de Noronha and Saint Peter and Saint Paul archipelagos (Baird, 1971; Borodulina, 1978; Séret, Andreata, 1992; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Braga *et al*., 2007; Costa, Mincarone, 2010; Lima *et al*., 2011; Lins Oliveira *et al*., 2015; Olivar *et al*., 2017; Judkins, Haedrich, 2018; Eduardo *et al*., 2018a, 2020a; Pinheiro *et al*., 2020). Larvae were recorded off Rio de Janeiro State (Bonecker *et al*., 2012, 2014). *Sternoptyx diaphana* is reported here based on specimens collected off Paraíba, Pernambuco, and Rio Grande do Norte States, including the seamounts, in addition to the Rocas Atoll and Fernando de Noronha Archipelago, between depths of 130 and 1,113 m (Fig. 3F).

Specimens examined. 1,046 (11–43 mm SL): NPM 4152, 95 (14–43 mm), AB2#54B; NPM 4154, 2 (27–28 mm), AB2#56B; NPM 4155, 3 (26–31 mm), AB2#35; NPM 4156, 12 (19–35 mm), AB2#21; NPM 4157, 80 (14–35 mm), AB2#44A; NPM 4158, 10 (23–29 mm), AB2#58A; NPM 4160, 91 (13–38 mm), AB2#59A; NPM 4161, 17 (16–42 mm), AB2#16; NPM 4167, 23 (18–33 mm), AB2#41A; NPM 4185, 1 (21 mm), AB2#50A; NPM 4186, 466 (15–33 mm), AB2#39; NPM 4189, 1 (22 mm), AB2#56C; NPM 4215, 65 (11–36 mm), AB2#42A; NPM 4231, 173 (14–34 mm), AB2#53A; NPM 4327, 2 (12–17 mm), AB2#52A; NPM 4453, 1 (26 mm), AB2#44B; NPM 4506, 3 (17–32 mm), AB2#60B; NPM 5011, 1 (15 mm), AB2#53B.

Sternoptyx pseudobscura Baird, 1971

(Fig. 5H)

Diagnosis. *Sternoptyx pseudobscura* differs from congeners by the SAN distinctly elevated, positioned higher or near mid-trunk line; posterior anal-fin pterygiophores nearly as long as the anterior ones; 9–11 dorsal-fin rays; usually 29 vertebrae, occasionally 27, 28, 30 or 31 (Baird, 1971, 1986; Borodulina, 1978; Badcock, Baird, 1980; Lima *et al*., 2011).

Geographical distribution. Circumglobal in tropical and temperate waters, between 40°N and 40°S (Baird, 1971; Borodulina, 1977, 1978; Quéro *et al*., 1990b; Harold, 2003; Lima *et al*., 2011; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species is reported from off Canada to Brazil, including the Gulf of Mexico and the Caribbean Sea (Baird, 1971; Uyeno, Aizawa, 1983; McAllister, 1990; Harold, 2003; Milkova *et al*., 2016; Judkins, Haedrich, 2018; Ramírez *et al*., 2019). In Brazilian waters, *S. pseudobscura* was previously reported off the northeastern coast and adjacent oceanic islands, and from Bahia to Rio de Janeiro States, with additional records outside the Brazilian EEZ off the northeast and south regions (Baird, 1971; Borodulina, 1978; Menezes *et al*., 2003; Braga *et al*., 2007; Costa, Mincarone, 2010; Lima *et al*., 2011; Eduardo *et al*., 2018a, 2020a; Judkins, Haedrich, 2018). The species is reported here based on specimens collected between depths of 520 and 1,113 m off Paraíba, Pernambuco, and Rio Grande do Norte States, including the seamounts, in addition to the Fernando de Noronha Archipelago (Fig. 3F).

Specimens examined. 58 (13–58 mm SL): NPM 4101, 4 (46–54 mm), AB2#21; NPM 4103, 1 (51 mm), AB2#39; NPM 4104, 4 (36–51 mm), AB2#16; NPM 4108, 15 (22–59 mm), AB2#59A;

NPM 4117, 2 (30–45 mm), AB2#58A; NPM 4153, 5 (39–45 mm), AB2#54B; NPM 4159, 12 (17–56 mm), AB2#42A; NPM 4214, 1 (55 mm), AB2#60B; NPM 4468, 14 (13–42 mm), AB2#44A.

Sternoptyx pseudodiaphana Borodulina, 1977

(Fig. 5I)

Diagnosis. *Sternoptyx pseudodiaphana* differs from congeners by the SAN slightly elevated; body depth approximately equal to SL; SAN photophore height 33–50% body depth; posterior ACB photophore adjacent to or adjoining the anal-fin base; 9–13 dorsal-fin rays, usually 11 or 12; 30–32 vertebrae, rarely 29 (Borodulina, 1978; Badcock, Baird, 1980; Lima *et al*., 2011; Harold *et al*., 2015).

Geographical distribution. Circumglobal in the Southern Hemisphere to 50° S, with a few records in the North Atlantic, between 15°N and 20°N (Badcock, Baird, 1980; Pequeño, 1989; Lima *et al*., 2011; Harold *et al*, 2015; Judkins, Haedrich, 2018; Sutton *et al*., 2020). In the western Atlantic, the species was reported off Brazil, in Rio Grande do Norte and Rio de Janeiro States, and near the Saint Peter and Saint Paul Archipelago (Costa, Mincarone, 2010; Lima *et al*., 2011; Lins Oliveira *et al*., 2015; Judkins, Haedrich, 2018). *Sternoptyx pseudodiaphana* is reported here based on specimens collected between depths of 822 and 984 m off the Rocas Atoll and Fernando de Noronha Archipelago (Fig. 3F).

Specimens examined. 3 (42–59 mm SL): NPM 4166, 1 (59 mm), AB2#52A; NPM 4467, 2 (42–46 mm), AB2#44A.

PHOSICHTHYIDAE

The Phosichthyidae is a family of meso- and bathypelagic fishes with a wide distribution in the Atlantic, Indian, and Pacific oceans (Kenaley, Stewart, 2015d). A total of 24 species are recognized in the genera *Ichthyococcus* Bonaparte, 1840, *Phosichthys* Hutton, 1872, *Pollichthys* Grey, 1959, *Polymetme* McCulloch, 1926, *Vinciguerria* Jordan & Evermann, 1896, *Woodsia* Grey, 1959, and *Yarrella* Goode & Bean, 1896 (Fricke *et al*., 2022). Phosichthyids are characterized by an elongate and laterally compressed body, with two rows of serial photophores, photophores present on isthmus, and chin barbel absent (Harold, 2003; Kenaley, Stewart, 2015d). Except for *Polymetme* and *Yarrella*, the species of Phosichthyidae have two orbital photophores (suborbital and postorbital) (Harold, 2003).

Nine species of the Phosichthyidae were previously reported in Brazilian waters, in the genera *Ichthyococcus, Phosichthys*, *Pollichthys*, *Polymetme*, and *Vinciguerria* (Gorbunova, 1972; Krefft, 1983; Haimovici *et al*., 1994; Vasconcelos-Filho *et al*., 1996; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Mincarone *et al*., 2004; Bernardes *et al*., 2005; Bonecker, Castro, 2006; Braga *et al*., 2007; Haimovici *et al*., 2008; Costa, Mincarone, 2010; Bonecker *et al*., 2012, 2014, 2019; Perez *et al*., 2013; Lins Oliveira *et al*., 2015; Pinheiro *et al*., 2015, 2020; Mincarone *et al*., 2017; Judkins, Haedrich, 2018; Melo *et al*., 2020; Tab. 2). Melo *et*

al. (2020: 201) included *Polymetme corythaeola* (Alcock, 1898) in a list of Brazilian deep-sea fishes. However, as far as we were able to check, there is no confirmed records of that species in the Brazilian EEZ. The record of Haimovici *et al*. (1994) of *P. corythaeola* in southern Brazil actually refers to *P. thaeocoryla* Parin & Borodulina, 1990 (Menezes *et al*., 2003). All species of the Phosichthyidae identified in the ABRACOS expeditions and listed below were previously reported for Brazilian waters.

Ichthyococcus Bonaparte, 1840

Diagnosis. *Ichthyococcus* is distinguished in the Phosichthyidae by the relatively small mouth, reaching to about mid-eye; premaxilla excluded from mouth gape; jaw teeth uniserial and closely spaced; two ORB (1 anterior to eye and 1 mid-ventral or posterior to it); anal-fin base well behind dorsal-fin base; adipose fin present; 10–15 dorsal-fin rays; 13–17 anal-fin rays; eyes tubular and somewhat upward directed; two rows of serial photophores (ventral and lateral series); BR 11–13; IV 25–28; VAV 9–14; AC 12–14; OA 23–31 (Grey, 1964; Mukhacheva, 1980; Fujii, 1983a). Seven valid species (Fricke *et al*., 2022).

Ichthyococcus polli Blache, 1964

(Fig. 6A)

Diagnosis. *Ichthyococcus polli* differs from congeners by the presence of the abdominal adipose fin; interorbital space 7.5–10.0% HL; body depth 26.9–31.9% SL; 20–27 gill-rakers; SO present; IV photophores in a straight line, only 8th IV elevated; AC in a straight line; OA 28–29; VAV 11–13; IC 50–53 (Mukhacheva, 1980; Fujii, 1983a; Schaefer *et al*., 1986b).

Geographical distribution. Atlantic Ocean, between 44°N and 20°S (Krefft, 1983; Quéro *et al*., 1990c; Sutton *et al*., 2020). In the western Atlantic, previously recorded off United States, Suriname, French Guiana, and Brazil (off Saint Peter and Saint Paul Archipelago) (Blache, 1963; Mukhacheva, 1980; Fujii, 1983a; Krefft, 1983; Schaefer *et al*., 1986b). *Ichthyococcus polli* is reported here based on specimens collected off Paraíba State, Rio Grande do Norte State (near the seamounts), the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 110 and 1,113 m (Fig. 7A).

Specimens examined. 14 (41–72 mm SL): NPM 3258, 1 (41 mm), AB1#14; NPM 4148, 1 (69 mm), AB2#59A; NPM 4149, 1 (51 mm), AB2#21; NPM 4150, 7 (44–59 mm), AB2#52B; NPM 4151, 1 (72 mm), AB2#58A; NPM 4339, 1 (50 mm), AB2#42A; NPM 4410, 1 (53 mm), AB2#40A; NPM 4926, 1 (53 mm), AB2#52A.

Phosichthys Hutton, 1872

Diagnosis. *Phosichthys* is a monotypic genus distinguished in the Phosichthyidae by the presence of two ORB (one anterior to eye and one mid-ventral or posterior to it); eyes not tubular; lower jaw teeth uniserial; teeth on vomer and palatine; dorsal-fin origin posterior to pelvic-fin origin; dorsal adipose fin present; dorsal-fin base and

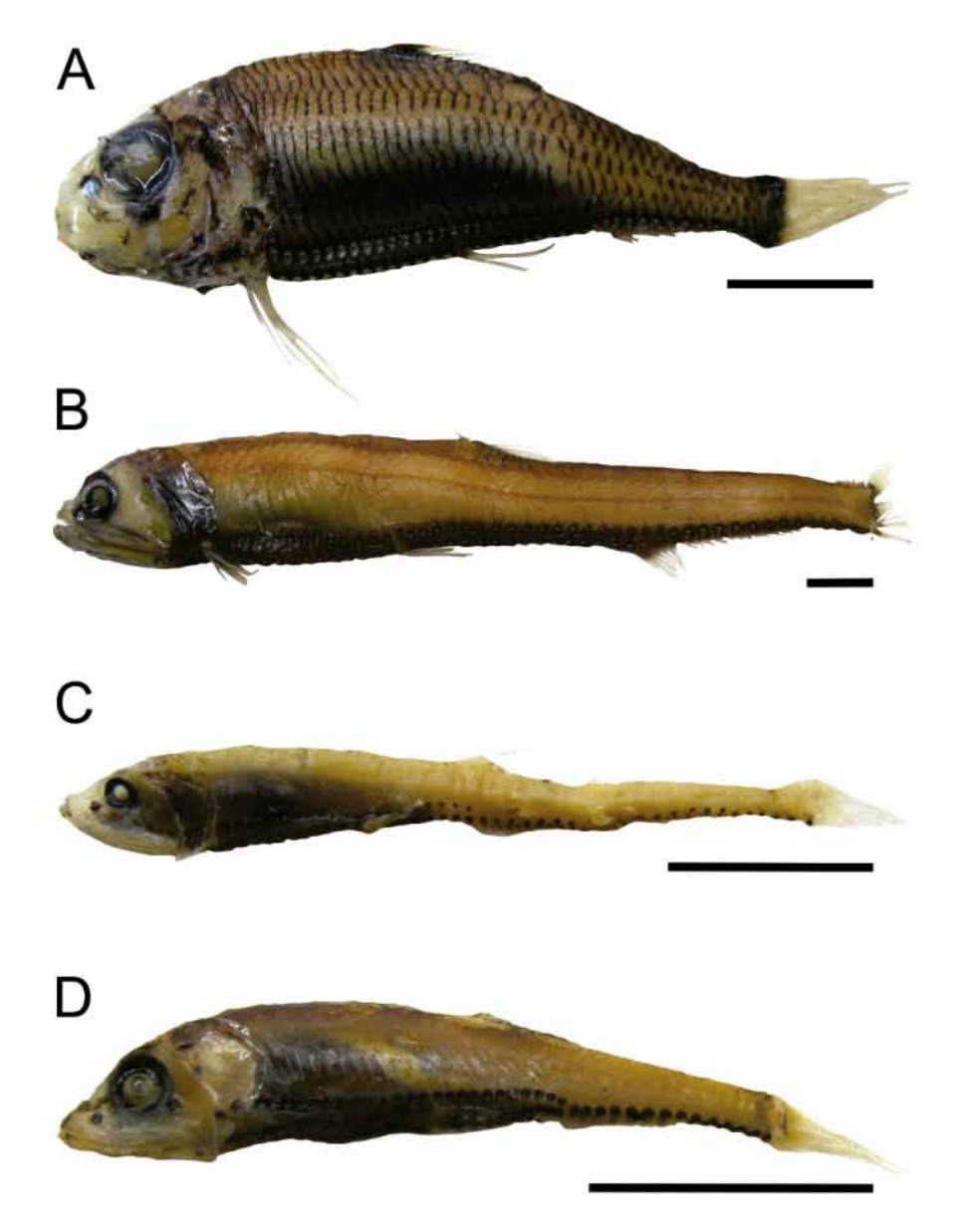

FIGURE 6 | A. *Ichthyococcus polli*, NPM 4119, 51 mm SL; **B.** *Phosichthys argenteus*, NPM 4560, 64 mm SL; **C.** *Pollichthys mauli*, NPM 3290, 38 mm SL; **D.** *Vinciguerria nimbaria*, NPM 3305, 27 mm SL. Scale bars = 10 mm.

dorsal adipose-fin base much shorter than anal-fin base; 12–13 dorsal-fin rays; 23–26 anal-fin rays; 15–18 gill rakers; IC 57–58; AC 16–18 (Schaefer *et al*., 1986b; Kenaley, Stewart, 2015d; Sutton *et al*., 2020).

Phosichthys argenteus Hutton, 1872

(Fig. 6B)

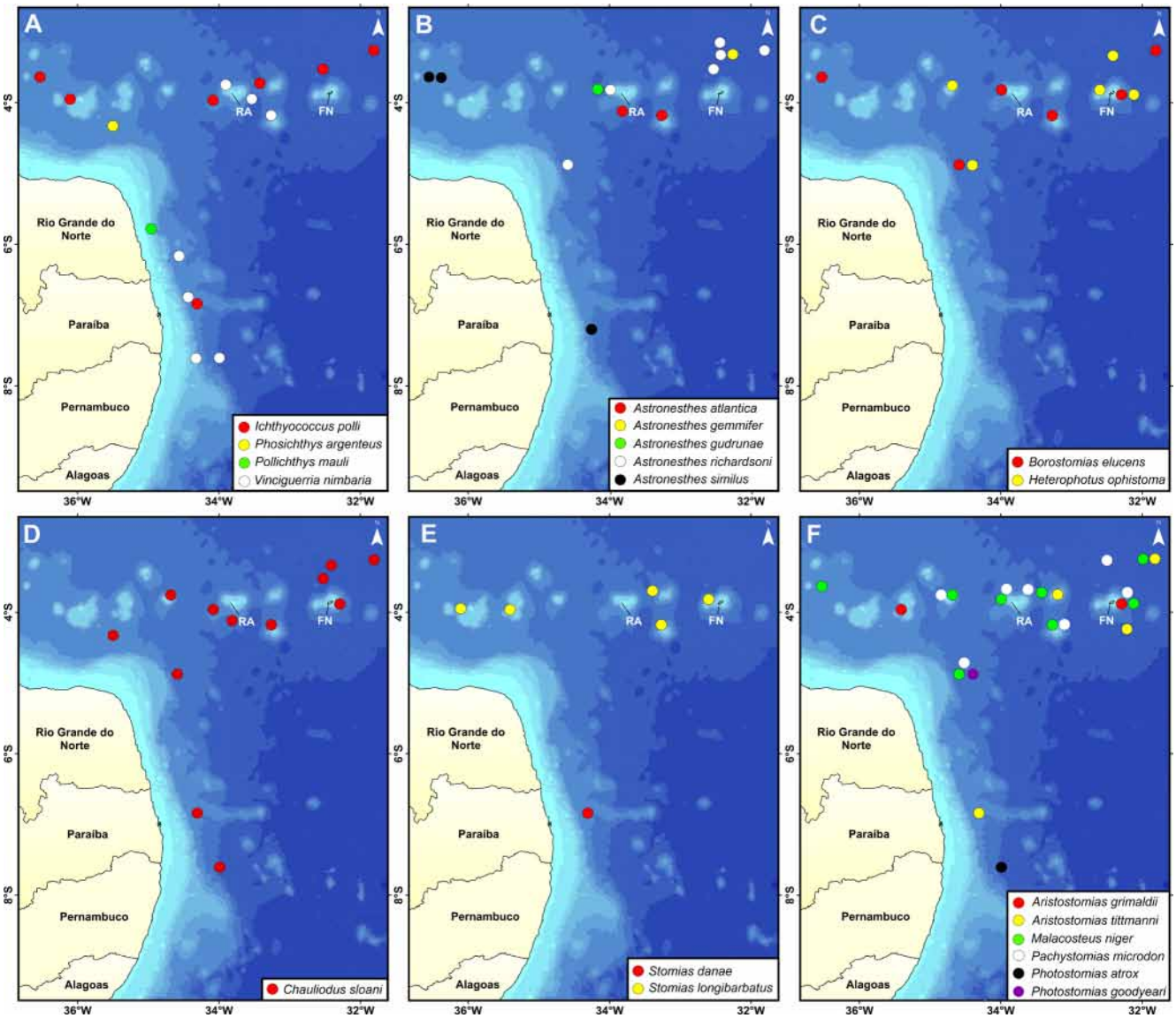

FIGURE 7 | Records of species of Phosichthyidae (**A**), Astronesthinae (**B**, **C**), Chauliodontinae (**D**), Stomiinae (**E**), and Malacosteinae (**F**) collected during the ABRACOS expeditions off northeastern Brazil. Oceanic islands: RA, Rocas Atoll; FN, Fernando de Noronha Archipelago.

Diagnosis. Same as for the genus.

Geographical distribution. Cincumglobal in the Southern Hemisphere, except the eastern Pacific Ocean (Quéro *et al*., 1990c; Hutchins, 2001; Kenaley, Stewart, 2015d; Balushkin, 2017; Sutton *et al*., 2020). In the western Atlantic, the species was recorded off Brazil (from Bahia to Rio Grande do Sul States), Uruguay, and off the Malvinas Islands (Parin *et al*., 1974; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Nión *et al*., 2016). *Phosichthys argenteus* is reported here based on one specimen collected at 63 m depth off Rio Grande do Norte State, near the seamounts (Fig. 7A).

Specimen examined. 1: NPM 4560, 1 (64 mm), AB2#35.

Pollichthys Grey, 1959

Diagnosis. *Pollichthys* is a monotypic genus that can be distinguished in the Phosichthyidae by the presence of two ORB (one anterior to eye and one mid-ventral or posterior to it); eyes not tubular; premaxillary teeth uniserial; 15–17 gill rakers; pseudobranchiae absent; pelvic-fin origin in advance of dorsal-fin origin; anal-fin base length more than twice the dorsal-fin base length; 10–12 dorsal-fin rays; 22–30 anal-fin rays; photophores present on isthmus; ORB 2; OP 3; SO present; IC 47–50; OA 19–21 (Grey, 1964; Schaefer *et al*., 1986b; Sutton *et al*., 2020).

Pollichthys mauli (Poll, 1953)

(Fig. 6C)

Diagnosis. Same as for the genus.

Geographical distribution. Atlantic, western and central Pacific, and western Indian oceans, between 47°N and 36°S (Grey, 1964; Schaefer *et al*., 1986b; Quéro *et al*., 1990c; Aizawa, 2002; Mundy, 2005; Fricke *et al*., 2009; Judkins, Haedrich, 2018; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off Canada to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Grey, 1964; Bekker *et al*., 1975; McAllister, 1990; McEachran, Fechhelm, 1998; Schmitter-Soto *et al*., 2000; Harold, 2003; Nión *et al*., 2016; Judkins, Haedrich, 2018). In Brazil, *Pollichthys mauli* was previously recorded from off Rio Grande do Norte to Rio Grande do Sul States (Vasconcelos-Filho *et al*., 1996; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Costa, Mincarone, 2010), and near the Vitória-Trindade Chain (Montague and Davis seamounts; Pinheiro *et al*., 2015). Larvae were recorded between Bahia and São Paulo States, including the Vitória-Trindade Chain (Bonecker, Castro, 2006; Goçalo *et al*., 2011; Bonecker *et al*., 2012, 2014). *Pollichthys mauli* is reported here based on one specimen collected between depths of 75 and 525 m off Rio Grande do Norte State (Fig. 7A).

Specimen examined. 1: NPM 3290, 1 (38 mm), AB1#25.

Vinciguerria Jordan & Evermann, 1896

Diagnosis. *Vinciguerria* can be distinguished in the Phosichthyidae by the presence of two ORB (one anterior to eye and one mid-ventral or posterior to eye); eyes round or slightly tubular; teeth uniserial in upper jaw and biserial on anterior portion of lower jaw; pseudobranchiae absent; pelvic-fin origin in advance of dorsal-fin origin; anal-fin base length similar to or slightly shorther than dorsal-fin base; dorsal adipose fin present, above posterior portion of anal; 12–16 dorsal-fin rays; 12–17 anal-fin rays; photophores present on isthmus; OP 3; IC 39–48; OA 18–25; 14–36 gill rakers (Grey, 1964; Gorbunova, 1972; Johnson, Feltes, 1984; Schaefer *et al*., 1986b). Five valid species

(Fricke *et al*., 2022).

Vinciguerria nimbaria (Jordan & Williams, 1895)

(Fig. 6D)

Diagnosis. *Vinciguerria nimbaria* differs from congeners by the eyes not tubular, lateral; interorbital width broad; 6–10 small teeth on premaxilla; SO present; IV 21–24; IC 45–46; 17–26 gill rakers; 13–15 dorsal-fin rays; 13–16 anal-fin rays; 9–11 pectoral-fin rays; 7 pelvic-fin rays; dorsal-adipose fin origin near vertical through end of anal-fin base; 39–44 vertebrae (Grey, 1964; Gorbunova, 1972; Schaefer *et al*., 1986b; Kenaley, Stewart, 2015d).

Geographical distribution. Circumglobal, between 48°N and 45°S (Grey, 1964; Pequeño, 1989; Quéro *et al*., 1990c; Kenaley, Stewart, 2015d; Judkins, Haedrich, 2018; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species is reported from off Canada to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Grey, 1964; Parin *et al*., 1974; McAllister, 1990; McEachran, Fechhelm, 1998; Harold, 2003; Judkins, Haedrich, 2018). In Brazilian waters, *V. nimbaria* was recorded off Maranhão, Rio Grande do Norte, Paraíba and from off Bahia to Rio Grande do Sul States, in addition to the Trindade and Martin Vaz and Saint Peter and Saint Paul archipelagos, and the Vitória-Trindade Chain, near the Montague Seamount (Gorbunova, 1972; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Braga *et al*., 2007, Judkins, Haedrich, 2018; Pinheiro *et al*., 2015, 2020). Larvae were recorded from Bahia to São Paulo States, including the Vitória-Trindade Chain (Bonecker, Castro, 2006; Goçalo *et al*., 2011; Bonecker *et al*., 2012, 2014, 2019; Stocco, Joyeux, 2015). *Vinciguerria nimbaria* is reported here based on specimens collected between depths of 50 and 780 m off Rio Grande do Norte, Paraíba, and Pernambuco States, and from the vicinities of the Rocas Atoll (Fig. 7A).

Specimens examined. 22 (17–49 mm SL): NPM 3305, 1 (27 mm), AB1#14; NPM 3385, 8 (21–32 mm), AB1#12; NPM 3386, 1 (21 mm), AB1#20; NPM 3387, 3 (18–25 mm), AB1#31; NPM 3388, 3 (17–21 mm), AB1#26; NPM 4568, 2 (31–38 mm), AB2#49B; NPM 4618, 1 (21 mm), AB1#36; NPM 4623, 1 (22 mm), AB2#42A; NPM 4765, 2 (49 mm), AB2#16.

STOMIIDAE

The Stomiidae is a family of meso- and bathypelagic fishes with a wide distribution in the Atlantic, Indian, Pacific, and Southern oceans (Fink, 1985; Gon, 1990c; Duhamel *et al*., 2014; Kenaley, Stewart, 2015e). It is the most diverse family of the Stomiiformes, with a total of 28 genera and about 319 valid species (Fink, 1985; Nelson *et al*., 2016; Fricke *et al*., 2022). The family is generally regarded as monophyletic (*e.g*., Fink, 1985; Nelson *et al*., 2016; Kenaley, Stewart, 2015e), but subfamilies within the assemblage are likely not monophyletic and are sometimes treated as distinct families (*e.g*., Harold, 2003; Parin, Borodulina, 2003; Prokofiev, 2014, 2015, 2020). Here we follow Kenaley,

Stewart (2015e), who provisionally recognized six subfamilies of stomiid fishes: Astronesthinae, Chauliodontinae, Idiacanthinae, Malacosteinae, Melanostomiinae, and Stomiinae. In general, members of the Stomiidae have an elongated body, mouth large to extremely large, teeth often fang-like, sometimes small, no true gill rakers in adults, two rows of photophores along the body, and a chin barbel often ornate and associated with the hyoid apparatus present in most species (Kenaley, Stewart, 2015e; Nelson *et al*., 2016).

At least 50 species of the Stomiidae were previously reported in Brazillian waters, in the genera *Aristostomias* Zugmayer, 1913, *Astronesthes* Richardson, 1845, *Bathophilus* Giglioli, 1882, *Chauliodus* Bloch & Schneider, 1801, *Echiostoma* Lowe, 1843, *Eustomias* Vaillant 1884, *Flagellostomias* Parr, 1927, *Grammatostomias* Goode & Bean, 1896, *Heterophotus* Regan & Trewavas, 1929, *Idiacanthus* Peters, 1877, *Leptostomias* Gilbert, 1905, *Malacosteus* Ayres, 1848, *Melanostomias* Brauer, 1902, *Photonectes* Günther, 1887, *Photostomias* Collett, 1889, *Stomias* Cuvier, 1816, and *Thysanactis* Regan & Trewavas, 1930 (Gibbs, 1969; Parin, Novikova, 1974; Shcherbachev, Novikova, 1976; Gibbs *et al*., 1983; Gomon, Gibbs, 1985; Séret, Andreata, 1992; Haimovici *et al*., 1994; Parin, Borodulina, 1996, 1997, 2000; Parin *et al*., 1999; Clarke, 2000; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Mincarone *et al*., 2004; Bernardes *et al*., 2005; Kenaley, Hartel, 2005; Bonecker, Castro, 2006; Braga *et al*., 2007; Haimovici *et al*., 2008; Costa, Mincarone, 2010; Lins Oliveira *et al*., 2015; Pinheiro *et al*., 2015; Mincarone *et al*., 2017; Eduardo *et al*., 2018a, 2020c; Judkins, Haedrich, 2018; Klautau *et al*., 2020; Melo *et al*., 2020; Tab. 2). Here we report on 10 new records of stomiid fishes in the Brazilian EEZ: *Aristostomias grimaldii* Zugmayer, 1913, *Astronesthes gudrunae* Parin & Borodulina, 2002, *Bathophilus nigerrimus* Giglioli, 1882, *Borostomias elucens* (Brauer, 1906), *Eustomias bibulbosus* Parr, 1927, *E. minimus* Clarke, 1999, *Grammatostomias ovatus* Prokofiev, 2014, *Melanostomias biseriatus* Regan & Trewavas, 1930, *Pachystomias microdon* (Günther, 1878), and *Photonectes achirus* Regan & Trewavas, 1930. Occurrences of *Eustomias braueri* Zugmayer, 1911, *E. schmidti* Regan & Trewavas, 1930, *Grammatostomias dentatus* Goode & Bean, 1896, *Leptostomias gladiator* (Zugmayer, 1911), *Melanostomias bartonbeani* Parr, 1927 and *P. goodyeari* Kenaley & Hartel, 2005, are also confirmed for Brazilian waters. Records of *Idiacanthus fasciola* Peters, 1877, *Aristostomias polydactylus* Regan & Tewavas, 1930, *Bathophilus altipinnis* Beebe, 1933, and *Eustomias metamelas* Gomon & Gibbs, 1985 in the Brazilian EEZ (UF 190899, MNRJ 30734, MCZ 132776, and MNRJ 30807, respectively) require verification, but those species likely occur in the region given their wide distribution in the Atlantic (Gomon, Gibbs, 1985; McEachran, Fechhelm, 1998; Stewart, Kenaley, 2015a; Kenaley, Stewart, 2015g).

Astronesthinae

Members of the Astronesthinae can be recognized in the Stomiidae by an elongated body; mouth large; barbel present on chin; absence of scales; dorsal-fin origin well in advance of anal-fin origin; dorsal adipose fin present, except in the genus *Rhadinesthes* Regan & Trewavas, 1929; ventral adipose fin often present in front of anal fin; 9–21 dorsal-fin rays; 12–28 anal-fin rays (Stewart, Kenaley, 2015b; Nelson *et al*., 2016).

Astronesthes Richardson, 1845

Diagnosis. *Astronesthes* can be distinguished in the Astronesthinae by the dorsal-fin origin above or behind the pelvic-fin origin; anal-fin origin after the posterior end of the dorsal-fin base; 11–22 anal-fin rays; both dorsal and ventral adipose fins present; premaxillary teeth fang-like; maxillary teeth closely set and comb-like; ceratohyal teeth absent (Gibbs, 1964; Nakayama *et al*., 2021). A total of 48 valid species (Fricke *et al*., 2022).

Astronesthes atlantica Parin & Borodulina, 1996

(Fig. 8A)

Diagnosis. *Astronesthes atlantica* differs from congeners by the low counts of widely spaced photophores in the IC (26–28) and OA (13–14; usually 13) series; AC 7–8; IP and PV in a straight line; last photophore of VAL behind anal-fin origin and last VAV; 14–17 dorsal-fin rays; 13–15 anal-fin rays; 7–8 pectoral-fin rays (Parin, Borodulina, 1996; Sutton *et al*., 2020).

Geographical distribution. Tropical and subtropical portions of the Atlantic Ocean, between 35°N and 40°S (Parin, Borodulina, 1996; Harold, 2003; Sutton *et al*., 2020). In the western Atlantic, the species is reported from the Gulf of Mexico, Caribbean Sea, and off French Guiana and Brazil (Parin, Borodulina, 1996). In Brazilian waters, the species was reported off Saint Peter and Saint Paul and Trindade and Martin Vaz archipelagos, with additional records outside the Brazilian EEZ in the western Atlantic (Parin, Borodulina, 1996; Judkins, Haedrich, 2018; Sutton *et al*., 2020). *Astronesthes atlantica* is reported here based on specimens collected off the Rocas Atoll, between depths of 90 and 525 m (Fig. 7B).

Specimens examined. 2 (31–32 mm SL): NPM 4019, 1 (32 mm), AB1#22; NPM 4824, 1 (31 mm), AB2#49B.

Astronesthes gemmifer Goode & Bean, 1896

(Fig. 8B)

Diagnosis. *Astronesthes gemmifer* differs from congeners by the presence of four fangs and two additional teeth on the premaxilla; serial photophores closely spaced; last 5–6 VAL and VAV above anal-fin base; IV forming an arch below the pectoral-fin base; IC 62–70; OA 42–48; posterior part of elongated terminal bulb of chin barbel black ventrally (Parin, Borodulina, 2000, 2003; Sutton *et al*., 2020).

Geographical distribution. Atlantic, Indian, and central Pacific oceans, between 62°N and 40°S (Gibbs, 1990a; Parin, Borodulina, 2003; Sutton *et al*., 2020). In the western Atlantic, the species was reported from off Canada to Brazil, including the Gulf of Mexico and the Caribbean Sea (McAllister, 1990; McEachran, Fechhelm, 1998; Parin, Borodulina, 2000; Harold, 2003; Menezes *et al*., 2003). In Brazil, *A. gemmifer* was

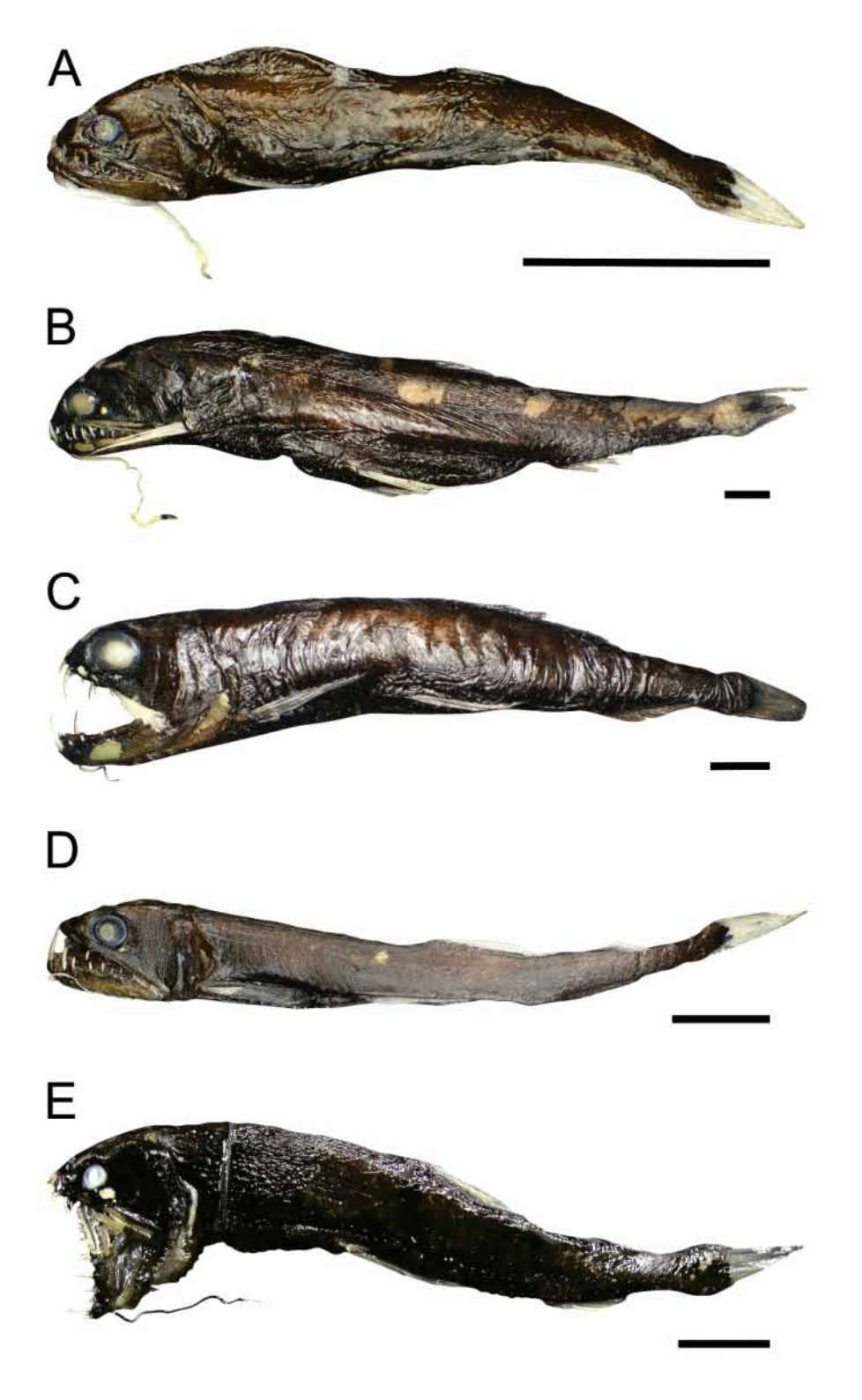

FIGURE 8 | **A.** *Astronesthes atlantica*, NPM 4019, 32 mm SL; **B.** *Astronesthes gemmifer*, NPM 4799, 146 mm SL; **C.** *Astronesthes gudrunae*, NPM 4802, 111 mm SL; **D.** *Astronesthes richardsoni*, NPM 3194, 71 mm SL; **E.** *Astronesthes similus*, NPM 4811, 75 mm SL. Scale bars = 10 mm.

reported off Saint Peter and Saint Paul Archipelago, with additional records outside the Brazilian EEZ off Rio Grande do Sul State (Parin, Borodulina, 2000; Judkins, Haedrich, 2018; Sutton *et al*., 2020). *Astronesthes gemmifer* is reported here based on one specimen collected off Fernando de Noronha Archipelago, at 430 m depth (Fig. 7B).

Specimen examined. 1: NPM 4799, 1 (146 mm), AB2#41A.

Astronesthes gudrunae Parin & Borodulina, 2002

(Fig. 8C)

Diagnosis. *Astronesthes gudrunae* differs from congeners by the AC with 1–2 elevated photophores; IV forming an arch below the pectoral-fin base; the presence of an aggregation of luminous tissue above the pectoral-fin, larger than eye and longitudinally oriented; three luminous spots on upper jaw, the first largest and anterior to orbit; IC 51–53; OA 32–33; PV 2 and 3 at the same level; chin barbel without a terminal bulb (Parin, Borodulina, 2002; Sutton *et al*., 2020).

Geographical distribution. Previous records of *Astronesthes gudrunae* are mostly restricted to the North Atlantic, south to 40° N, including the Caribbean Sea, with a single record in the eastern North Atlantic, at 22°1'N, 32°8'W (Parin, Borodulina, 2002, 2003; Judkins, Haedrich, 2018; Sutton *et al*., 2020). *Astronesthes gudrunae* is reported for the first time in the Brazilian EEZ based on one specimen collected off Rocas Atoll, at 610 m depth (Fig. 7B), which also represents the southernmost record of the species known so far (about 3° S).

Specimen examined. 1: NPM 4802, 1 (111 mm), AB2#53A.

Astronesthes richardsoni (Poey, 1852)

(Fig. 8D)

Diagnosis. *Astronesthes richardsoni* differs from congeners by the pelvic-fin origin well in advance of the dorsal-fin origin; anal-fin base approximately equal to dorsal-fin base; IV series in a linear row; IC 55–60; PV 15–17; OV 14–16; OA 33–37; 2–3 palatine teeth; postorbital luminous organ small; a ring of luminous spots on the cheek; chin barbel without terminal bulb (Parin, Borodulina, 2000, 2003; Sutton *et al*., 2020).

Geographical distribution. Atlantic Ocean, between 60°N and 30°S (Gibbs, 1990a; Parin, Borodulina, 2000; Afonso *et al*., 2018; Sutton *et al*., 2020). In the western Atlantic, the species was reported from off Canada to Brazil, including the Gulf of Mexico and the Caribbean Sea (Gibbs, 1990a; McEachran, Fechhelm, 1998; Parin, Borodulina, 2000; Harold, 2003; Coad, 2018b). In Brazil, *A. richardsoni* was reported from off Maranhão and Rio Grande do Norte States, and off Fernando de Noronha and Saint Peter and Saint Paul archipelagos. Additional records in the western South Atlantic are known outside the Brazilian EEZ (Parin *et al*., 1974; Gibbs, 1990a; Parin, Borodulina, 2000,

2003; Judkins, Haedrich, 2018; Sutton *et al*., 2020). *Astronesthes richardsoni* is reported here based on specimens collected off Rio Grande do Norte State, the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 25 and 800 m (Fig. 7B).

Specimens examined. 10 (22–132 mm SL): NPM 3194, 2 (49–71 mm), AB1#9; NPM 4800, 1 (132 mm), AB2#39; NPM 4801, 1 (122 mm), AB2#53A; NPM 4805, 1 (31 mm), AB2#41B; NPM 4812, 2 (91–111 mm), AB2#42A; NPM 4813, 1 (22 mm), AB2#39; NPM 4814, 1 (31 mm), AB2#40A.

Astronesthes similus Parr, 1927

(Fig. 8E)

Diagnosis. *Astronesthes similus* differs from congeners by the anal-fin base longer than the dorsal-fin base; 11–12 dorsal-fin rays; 6 pectoral-fin rays; BR 20–21; OA 39–41; IC 59–63; AC in a straight line; only two filaments on the terminal bulb of the chin barbel (Gibbs *et al*., 1984; Parin, Borodulina, 2003).

Geographical distribution. Western Atlantic, between 43°N and 27°S, including the Gulf of Mexico and the Caribbean Sea (Parr, 1927; Gibbs *et al*., 1984; McEachran, Fechhelm, 1998; Harold, 2003; Menezes *et al*., 2003; Moore *et al*., 2003; Ramírez *et al*., 2019). In Brazil, the species is reported off the northeastern region (Eduardo *et al*., 2020c), from off Bahia to Rio de Janeiro States (Braga *et al*., 2007), and in the Vitória-Trindade Chain (Davis Seamount; Pinheiro *et al*., 2015). Records outside the Brazilian EEZ in the vicinities of the Saint Peter and Saint Paul and Trindade and Martin Vaz archipelagos are also known (Gibbs *et al*., 1984; Judkins, Haedrich, 2018). *Astronesthes similus* is reported here based on specimens collected between depths of 90 and 1,113 m off Paraíba and Rio Grande do Norte States (Fig. 7B).

Specimens examined. 10 (36–75 mm SL): NPM 3423, 1 (40 mm), AB1#34; NPM 4811, 2 (53–75 mm), AB2#59A; NPM 4822, 7 (36–48 mm), AB2#59B.

Borostomias Brauer, 1906

Diagnosis. *Borostomias* can be distinguished in the Astronesthinae by the presence of 8 or more short and widely spaced maxillary teeth; gill teeth in groups of 2–4; ceratohyal teeth absent; dorsal-fin origin close to pelvic-fin origin; photophore series in continuous rows (Gibbs, 1964). Six valid species (Fricke *et al*., 2022).

Borostomias elucens (Brauer, 1906)

(Fig. 9A)

Diagnosis. *Borostomias elucens* can be distinguished from congeners by the fang-like premaxillary teeth; 13–16 anal-fin rays; ventral adipose fin absent; chin barbel with spherical terminal bulb, without filaments; AC 12–14, forming and arch behind anal-fin

base; VAV 14–15; VAL 18 or less (Gibbs, 1964; Sutton *et al*., 2020).

Geographical distribution. Cincumglobal in tropical and subtropical waters (Gibbs, 1964; Bekker *et al*., 1975; Yamamoto, 1982; Gibbs, 1990a; Aizawa, 2002; Shinohara *et al*., 2005; Liao *et al*., 2006; Tatsuta *et al*., 2014; Wang *et al*., 2019; Sutton *et al*., 2020). In the western Atlantic, the species is reported from the Gulf of Mexico, Caribbean Sea, off French Guiana, and off northeastern Brazil outside the EEZ (Parin *et al*., 1974; Regan, Trewavas, 1929; Fujii, 1983b; Harold, 2003; Olivar *et al*., 2017; Judkins, Haedrich, 2018). *Borostomias elucens* is therefore reported for the first time in the Brazilian EEZ based on specimens collected off Rio Grande do Norte State (including the seamounts), the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 650 and 1,113 m (Fig. 7C).

Specimens examined. 45 (46–299 mm SL): NPM 4299, 6 (96–196 mm), AB2#44A; NPM 4300, 8 (54–288 mm), AB2#42A; NPM 4302, 4 (91–299 mm), AB2#59A; NPM 4303, 3 (72–164 mm), AB2#49A; NPM 4391, 14 (46–284 mm), AB2#39; NPM 4399, 13 (47–278 mm), AB2#53A.

Heterophotus Regan & Trewavas, 1929

Diagnosis. *Heterophotus* is a monotypic genus that can be distinguished in the Astronesthinae by the postorbital organ as long as the eye; ventral photophores in irregular groups of 1–5; IP 1–11; PV 32–35; VAV 13–14; OV 33–36; VAL 16–20; AC 13–15; 31–35 closely spaced and erect (not slanting) maxillary teeth; gill arch teeth in

FIGURE 9 | A. *Borostomias elucens*, NPM 4299, 196 mm SL; **B.** *Heterophotus ophistoma*, NPM 4400, 223 mm SL. Scale bars = 10 mm.

groups of 2; ceratohyal teeth absent; 14–20 palatine teeth; 12–17 anal-fin rays; 11–13 dorsal-fin rays; ventral adipose fin absent; chin barbel with flattened white tip without terminal filaments; tip of snout not upturned (Gibbs, 1964; Sutton *et al*., 2020).

Heterophotus ophistoma Regan & Trewavas, 1929

(Fig. 9B)

Diagnosis. Same as for the genus.

Geographical distribution. Tropical and subtropical waters of the Atlantic (Gibbs, 1964, 1990a; Harold, 2003; Czudaj *et al*., 2020; Sutton *et al*., 2020), Indian (Hutchins, 2001, Shcherbachev *et al*., 1986), and central and western Pacific oceans (Clarke, 1974; Aizawa, 2002; Mundy, 2005; Liao *et al*., 2006; Shinohara *et al*., 2009; Fricke *et al*., 2011). In the western Atlantic, the species is known from off United States to northeastern Brazil, including the Gulf of Mexico and the Caribbean Sea (Regan, Trewavas, 1929; Bekker *et al*., 1975; Fujii, 1983b; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018). In Brazil the species was previously reported from off Maranhão State, and the Fernando de Noronha and Saint Peter and Saint Paul archipelagos (Judkins, Haedrich, 2018; Klautau *et al*., 2020; Marceniuk *et al*., 2021). *Heterophotus ophistoma* is reported here based on specimens collected between depths of 430 and 1,030 m off Rio Grande do Norte State (including the seamounts), and the Fernando de Noronha Archipelago (Fig. 7C).

Specimens examined. 8 (96–253 mm SL): NPM 4304, 1 (211 mm), AB2#39; NPM 4326, 1 (207 mm), AB2#41A; NPM 4398, 2 (219–253 mm), AB2#50A; NPM 4400, 2 (218–223 mm), AB2#54B; NPM 4401, 1 (216 mm), AB2#44A.

Chauliodontinae

Members of the Chauliodontinae can be recognized in the Stomiidae by the dorsal-fin origin well in advance of the pelvic-fin origin, shortly behind head; very long fang-like teeth on both jaws extending well beyond opposite jaw when mouth is closed; dorsal and ventral adipose fin present, dorsal adipose fin large, angular, distinctly placed posteriorly on body; body long, slender, compressed, marked with scale-like hexagonal patterns, each hexagonal cell containing 1 or 2 photophores; 5–7 dorsal-fin rays, the first one elongated, second one with a red photophore on tip; anal fin short, 10–13 rays, below dorsal adipose fin; chin barbel short to absent (Morrow, 1964b; Nelson *et al*., 2016; Stewart, 2015). A single genus (Fricke *et al*., 2022).

Chauliodus Bloch & Schneider, 1801

Diagnosis. Same as for the subfamily. Nine valid species (Fricke *et al*., 2022).

Chauliodus sloani Bloch & Schneider, 1801

(Fig. 10)

Diagnosis. *Chauliodus sloani* differs from congeners by the presence of an approximately round postorbital organ; dorsal-fin origin over 4–10 OV; fourth premaxillary tooth longer than the third; predorsal length 17–28% SL; PV 17–23; VAV 22–28; AC 9–13; IC 62–69; OV 17–22; VAL 22–28; OA 41–48 (Morrow, 1964b; Parin, Novikova, 1974; Gibbs, 1986a; Stewart, 2015; Sutton *et al*., 2020).

Geographical distribution. Circumglobal, between 65°N and 45°S, including the Mediterranean Sea (Parin, Novikova, 1974; Gibbs, 1986a; Bilecenoglu *et al*., 2002; Vélez, 2009; Møller *et al*., 2010; Lipej, Dulčić, 2010; Duhamel *et al*., 2014; Stewart, 2015; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species is reported from off Canada to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Morrow, 1964b; Parin, Novikova, 1974; McAllister, 1990; McEachran, Fechhelm, 1998; Nión *et al*., 2016; Mecklenburg *et al*., 2018; Coad, 2018b; Ramírez *et al*., 2019). In Brazil, *C. sloani* was previously recorded off Amapá, Pará, Maranhão, Rio Grande do Norte, Bahia, Espírito Santo, Rio de Janeiro, and Rio Grande do Sul States, in addition to the Saint Peter and Saint Paul Archipelago (Parin, Novikova, 1974; Figueiredo *et al*., 2002; Menezes *et al*., 2003; Bernardes *et al*., 2005; Braga *et al*., 2007; Haimovici *et al*., 2008; Lins Oliveira *et al*., 2015; Judkins, Haedrich, 2018; Eduardo *et al*., 2020b). Larvae were recorded off Rio de Janeiro State (Bonecker, Castro, 2006; Bonecker *et al*., 2014).

FIGURE 10 | *Chauliodus sloani*, NPM 3287, 167 mm SL. Scale bar = 10 mm.

Chauliodus sloani is reported here based on specimens collected off Rio Grande do Norte, Paraíba, Pernambuco, the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 90 and 1,030 m (Fig. 7D).

Remarks. In addition to the 57 specimens reported here, 247 specimens of *C. sloani* collected in the ABRACOS expeditions were dissected in a study addressing the trophic ecology, vertical migration, and functional role of the species (Eduardo *et al*., 2020b).

Specimens examined. 57 (55–241 mm SL): NPM 3286, 1 (184 mm), AB1#22; NPM 3287, 1 (167 mm), AB1#14; NPM 4386, 11 (154–238 mm), AB2#41A; NPM 4389, 5 (84–153 mm), AB2#44A; NPM 4396, 2 (140–146 mm), AB2#21; NPM 4397, 2 (96–114 mm), AB2#39; NPM 4420, 5 (96–196 mm), AB2#16; NPM 4421, 9 (131–210 mm), AB2#35; NPM 4422, 15 (83–241 mm), AB2#42A; NPM 4447, 2 (90–219 mm), AB2#54B; NPM 4448, 3 (144–184 mm), AB2#49A; NPM 4921, 1 (55 mm), AB2#40A.

Stomiinae

Members of the Stomiinae can be recognized in the Stomiidae by an elongated to very elongated body; snout short; both the dorsal- and anal-fins about opposite to each other, located far behind the pelvic-fin; a long chin barbel, ending in a terminal swelling with either small filaments or appendages; 5–6 rows of closely spaced, scale-like, hexagonal cells; photophores present on each hexagonal cell; adipose fins absent (Gibbs, 1969; Harold, 2003; Nelson *et al*., 2016; Kenaley, Stewart, 2015f). A single genus (Fricke *et al*., 2022).

Stomias Cuvier, 1816

Diagnosis. Same as for the subfamily. A total of 11 valid species (Fricke *et al*., 2022).

Stomias danae Ege, 1933

(Fig. 11A)

Diagnosis. *Stomias danae* differs from congeners by the chin barbel stem with 2 filaments at base; terminal bulb of chin barbel without filaments; palatine with 2 teeth; 16–18 dorsal-fin rays; 20–21 anal-fin rays; six rows of hexagonal cells dorsal to lateral series of photophores; one photophore per hexagon cell in the upper two rows, usually 2–3 in the third row, and usually 3–5 in the fourth and fifth rows; total vertebrae 60–62 (Morrow, 1964d; Gibbs, 1969; Shcherbachev, Novikova, 1976).

Geographical distribution. Known from a few records in the western South Atlantic, western Indian and central Pacific oceans (Gibbs, 1969; Clarke, 1974; Shcherbachev, Novikova, 1976; Mundy, 2005). In the western South Atlantic, the species is known from one record off Trindade and Martin Vaz Archipelago (Brazil), and two records off northeastern Brazil, outside the country's EEZ (Shcherbachev, Novikova, 1976; Gibbs, 1969; Menezes *et al*., 2003; Judkins, Haedrich, 2018). *Stomias danae* is reported here based on one specimen collected off Paraíba State, at 800 m depth (Fig. 7E).

Specimen examined. 1. NPM 4768, 1 (95 mm), AB2#21.

Stomias longibarbatus (Brauer, 1902)

(Fig. 11B)

Diagnosis. *Stomias longibarbatus* differs from congeners by an extremely elongated chin barbel, 6–11 times longer than head length and up to 75% SL; body length 20-35 times body depth; IC>170; OA>135; VAV 58–73; total vertebrae 164–172 (Morrow, 1964d; Shcherbachev, Novikova, 1976; Kenaley, Stewart, 2015f; Sutton *et al*., 2020).

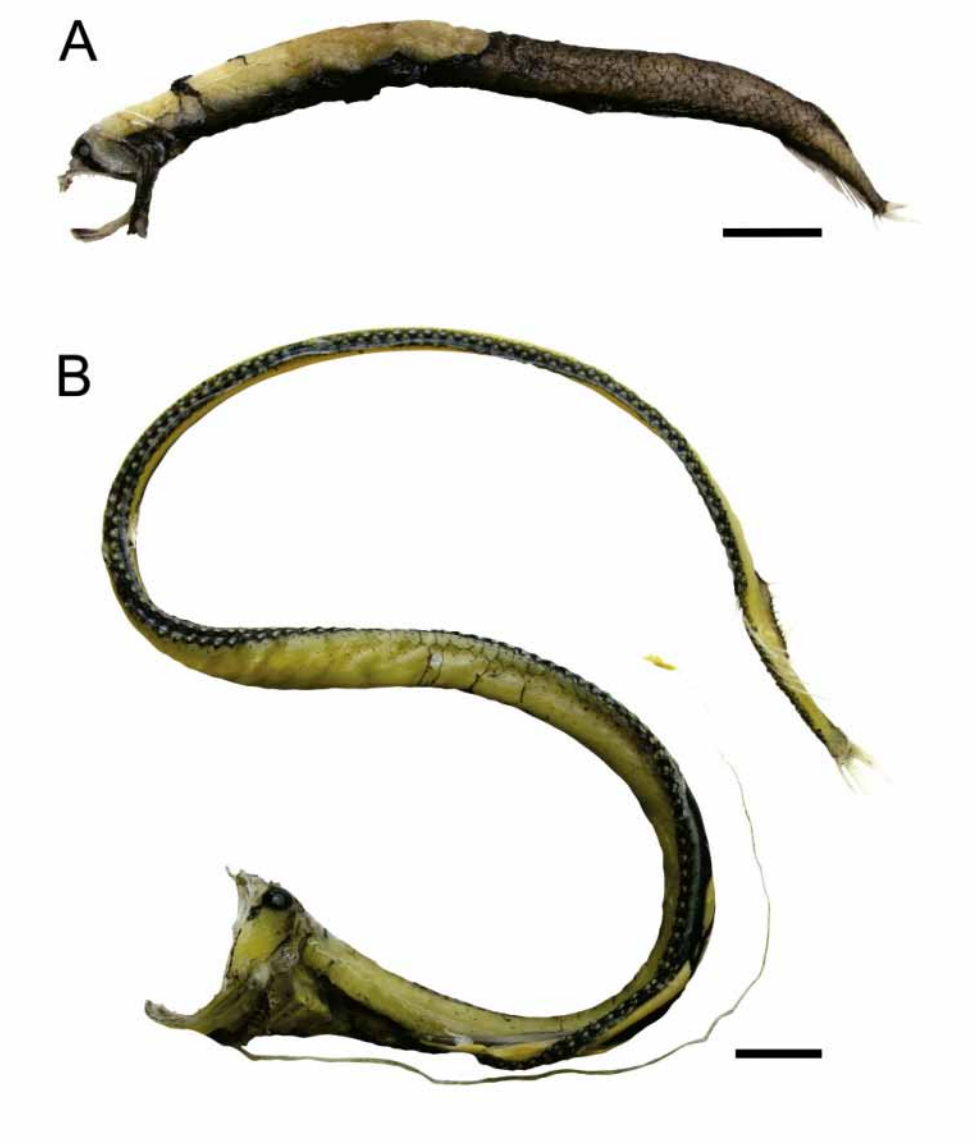

FIGURE 11 | **A.** *Stomias danae*, NPM 4768, 95 mm SL; **B.** *Stomias longibarbatus*, NPM 4598, 173 mm SL. Scale bars = 10 mm.

Geographical distribution. Circumglobal, between 43°N and 38°S (Shcherbachev, Novikova, 1976; Gibbs, 1986b, 1990b; Mundy, 2005; Kenaley, Stewart, 2015f; Cherel *et al*., 2020; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off United States, the Gulf of Mexico, Brazil, and Uruguay (McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Nión *et al*., 2016; Judkins, Haedrich, 2018). In Brazil, *S. longibarbatus* was reported from off the Fernando de Noronha Archipelago (Judkins, Haedrich, 2018). It is reported here based on specimens collected off Rio Grande do Norte State (near the seamounts), the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 260 and 1,020 m (Fig. 7E).

Specimens examined. 5 (173–390 mm SL): NPM 4390, 1 (390 mm), AB2#49A; NPM 4598, 1 (173 mm), AB2#56B; NPM 4599, 1 (272 mm), AB2#50A; NPM 4600, 1 (304 mm), AB2#58A; NPM 4601, 1 (267 mm), AB2#52B.

Malacosteinae

Members of the Malacosteinae can be recognized in the Stomiidae by the body moderately elongate; scales absent; snout short; mouth large to extremely large, jaws longer than skull; skin between mandibles absent, except in *Pachystomias* Günther, 1887; dorsal-fin origin over anal-fin origin and located far behind pelvic-fin origin; adipose fins absent; chin barbel present in most species, simple, without a complex distal tip; pectoral fin present or absent; 14–28 dorsal-fin rays; 17–32 anal-fin rays; caudal fin small, forked; one or more accessory orbital photophores anterior to orbit that often produces red light. Three genera (Nelson *et al*., 2016; Kenaley, Stewart, 2015g; Fricke *et al*., 2022).

Aristostomias Zugmayer, 1913

Diagnosis. *Aristostomias* can be distinguished in the Malacosteinae by the chin barbel present; pectoral-fin present; snout longer than eye diameter; 2 pairs of nostrils on either side of head; two rows of conspicuous photophores (lateral and ventral series) separated in groups (Morrow, 1964c; Goodyear, Gibbs, 1986; McEachran, Fechhelm, 1998; Kenaley, Stewart, 2015g; Sutton *et al*., 2020). Six valid species (Fricke *et al*., 2022).

Aristostomias grimaldii Zugmayer, 1913

(Fig. 12A)

Diagnosis. *Aristostomias grimaldii* differs from congeners by the presence of 7–10 pectoral-fin rays; 14–16 PV photophores in close-set groups (5 groups of 2–4 photophores each); luminous dots between eye and postorbital organ; barbel ending in a thickened terminal region with a poorly defined bulb (Morrow, 1964c; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Atlantic, eastern Indian, and central Pacific oceans, between 43°N and 35°S (Porteiro *et al*., 1999; Moore *et al*., 2003; Mundy, 2005; Goodyear,

1990; Nión *et al*., 2016; Sutton *et al*., 2020). In the western Atlantic, the species was reported from off the United States, Suriname, French Guiana, and Uruguay, including the Gulf of Mexico and Caribbean Sea (Bekker *et al*., 1975; Fujii, 1983c; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Nión *et al*., 2016; Judkins, Haedrich, 2018). *Aristostomias grimaldii* is reported for the first time in the Brazilian EEZ based on five specimens collected between depths of 260 and 850 m off Rio Grande do Norte State, near the seamounts, and the Fernando de Noronha Archipelago (Fig. 7F).

Specimens examined. 5 (65–86 mm SL): NPM 4622, 4 (65–86 mm), AB2#44A; NPM 4659, 1 (79 mm), AB2#56C

Aristostomias tittmanni Welsh, 1923

(Fig. 12B)

Diagnosis. *Aristostomias tittmanni* differs from congeners by the presence of 6–7 pectoral-fin rays; 15–19 PV photophores in 5–6 close-set groups of 2–4 photophores each; luminous dots between eye and postorbital organ; barbel with a well-defined bulb (Morrow, 1964c; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Atlantic (Morrow, 1964c; McAllister, 1990; Porteiro *et al*., 1999; Harold, 2003; Béarez *et al*., 2017; Carneiro *et al*., 2019; Sutton *et al*., 2020) and Pacific oceans (Pequeño, 1989; Mundy, 2005). In the western Atlantic, the species is reported from off Canada, United States, French Guiana, and northeastern Brazil (off Maranhão State) (McEachran, Fechhelm, 1998; McAllister, 1990; Judkins, Haedrich, 2018; Ramírez *et al*., 2019). *Aristostomias tittmanni* is reported here based on four specimens collected off Paraíba State, the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 50 and 800 m (Fig. 7F).

Specimens examined. 4 (32–76 mm SL): NPM 3278, 1 (39 mm), AB1#12; NPM 4595, 1 (32 mm), AB2#45B; NPM 4596, 1 (37 mm), AB2#21; NPM 4662, 1 (76 mm), AB2#42A.

Malacosteus Ayres, 1848

Diagnosis. *Malacosteus* can be distinguished in the Malacosteinae by the presence of the pectoral fin; a single nostril on either side of head; snout shorter than eye diameter; chin barbel absent; serial photophores reduced in size and arranged in groups; a small postorbital organ behind eye; suborbital organ large and comma-shaped (Morrow, 1964c; Kenaley, 2007; Kenaley, Stewart, 2015g; Sutton *et al*., 2020). Two valid species (Fricke *et al*., 2022).

Malacosteus niger Ayres, 1848

(Fig. 12C)

Diagnosis. *Malacosteus niger* can be distinguished from *M. australis* Kenaley, 2007

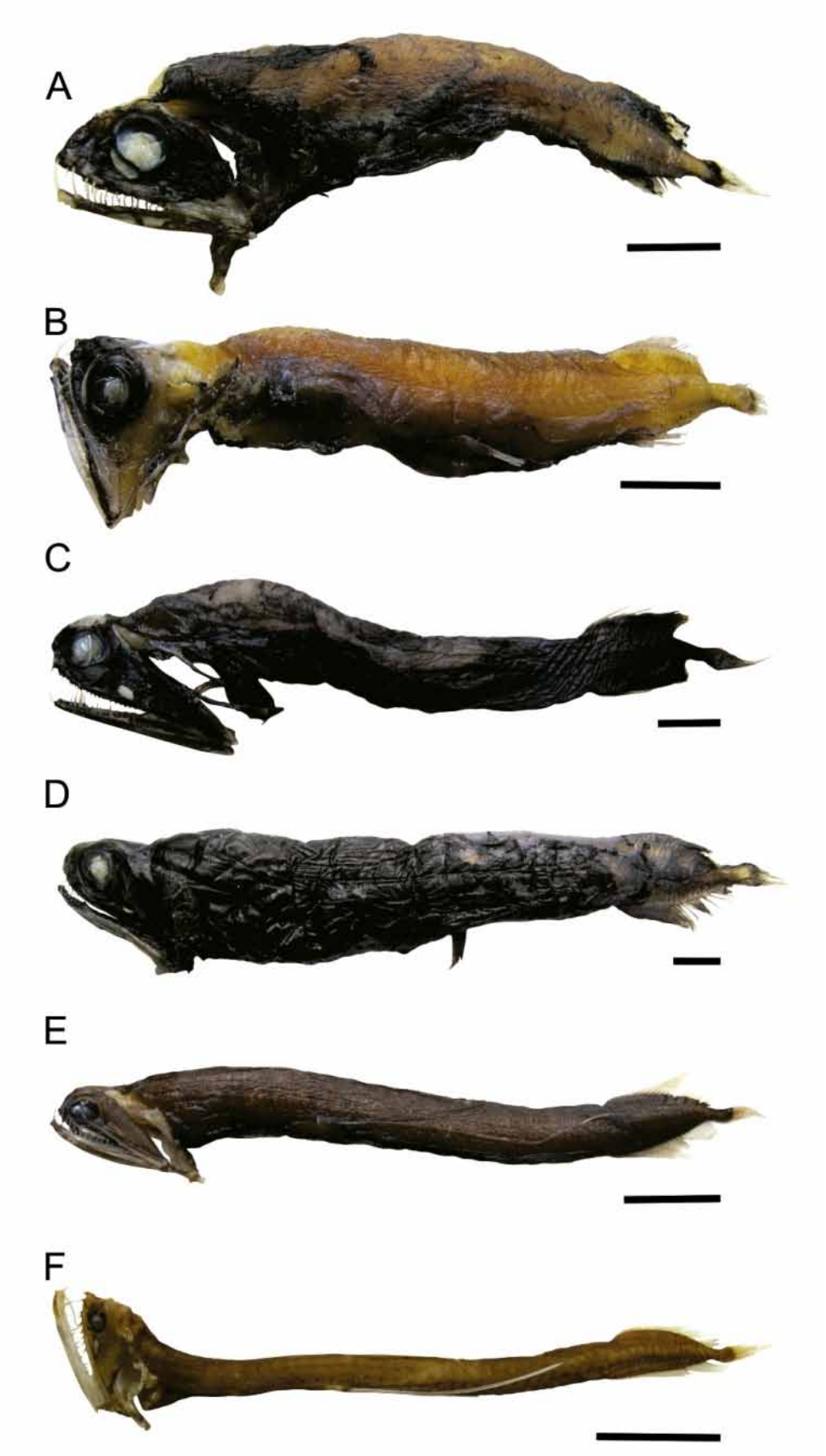

FIGURE 12 | **A.** *Aristostomias grimaldii*, NPM 4659, 79 mm SL; **B.** *Aristostomias tittmanni*, NPM 4662, 76 mm SL; **C.** *Malacosteus niger*, NPM 4331, 124 mm SL; **D.** *Pachystomias microdon*, NPM 4592, 150 mm SL; **E.** *Photostomias atrox*, NPM 4575, 67 mm SL; **F.** *Photostomias goodyeari*, NPM 4590, 64 mm SL. Scale bars = 10 mm.

by IP 3–5 in 3–5 groups (*vs*. IP 4–8 in 3–7 groups); PO 5.8–11.9% upper jaw length in males (*vs*. PO 3.7–6.4% upper jaw length in males); PO 2.8–8.1% upper jaw length in females (*vs*. PO 2.5–4.4% upper jaw length in females) (Kenaley, 2007; Kenaley, Stewart, 2015g).

Geographical distribution. Circumglobal, between 66°N and 40°S (Goodyear, 1990; Harold, 2003; Kenaley, 2007; Kenaley, Stewart, 2015g; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species is reported from off Greenland to Brazil, including the Gulf of Mexico and the Caribbean Sea (Parin *et al*., 1974; Bekker *et al*., 1975; Fujii, 1983c; McAllister, 1990; McEachran, Fechhelm, 1998; Kenaley, 2007; Coad, 2018b; Afonso *et al*., 2018; Judkins, Haedrich, 2018). In Brazil the species was previously reported from off the northeastern region and from Bahia to Rio de Janeiro States, in addition to the Saint Peter and Saint Paul Archipelago (Braga *et al*., 2007; Costa, Mincarone, 2010; Olivar *et al*., 2017; Eduardo *et al*., 2018a; Judkins, Haedrich, 2018). Records outside the Brazilian EEZ are also known off the Fernando de Noronha Archipelago (Kenaley, 2007). *Malacosteus niger* is reported here based on 43 specimens collected off Rio Grande do Norte State (including the seamounts), the Rocas Atoll, and the Fernando de Noronha Archipelago, between depths of 550 and 1,113 m (Fig. 7F).

Specimens examined. 43 (63–181 mm SL): NPM 4328, 10 (76–181 mm), AB2#44A; NPM 4331, 2 (106–124 mm), AB2#49A; NPM 4332, 1 (102 mm), AB2#42A; NPM 4333, 15 (71–111 mm), AB2#53A; NPM 4336, 2 (128–134 mm), AB2#54B; NPM 4337, 9 (65–181 mm), AB2#39; NPM 4338, 3 (63–125 mm), AB2#59A; NPM 4442, 1 (67 mm), AB2#52A.

Pachystomias Günther, 1887

Diagnosis. *Pachystomias* can be distinguished in the Malacosteinae by the very large and crescent-shaped suborbital organ, red or orange in fresh specimens; body depth about 13.8-20.0% SL; two nostrils on either side of head; a small postorbital organ below eye; mouth floor, *i.e*., the membrane between the mandibular symphysis and the hyoid, present; chin barbel without terminal bulb, its length shorter than head length in adults but about equal to 50% SL in juveniles; teeth uniserial in jaws, curved; 5–6 pectoral-fin rays, reduced in length; dorsal- and anal-fin bases approximately equal in length, anal-fin origin just posterior to dorsal-fin origin; photophores in both ventral and lateral series with long spaces separating them into clearly distinct groups (Morrow, Gibbs, 1964; Gibbs, 1986c; McEachran, Fechhelm, 1998; Kenaley, Stewart, 2015g; Sutton *et al*., 2020). A single valid species (Fricke *et al*., 2022).

Pachystomias microdon (Günther, 1878)

(Fig. 12D)

Diagnosis. Same as for the genus.

Geographical distribution. Circumglobal, from 58°N to 40°S (Gibbs, Barnett, 1990; Harold, 2003; Stevenson *et al*., 2009; Kenaley, Stewart, 2015g; Orlov, Tokranov,

2019; Sutton *et al*., 2020; Love *et al*., 2021). In the western Atlantic, the species was reported from off Canada to the Caribbean Sea (Morrow, Gibbs, 1964; McAllister, 1990; McEachran, Fechhelm, 1998; Moore *et al*., 2003). *Pachystomias microdon* is reported for the first time in the western South Atlantic based on nine specimens collected off Rio Grande do Norte State (including the seamounts), the Rocas Atoll, and the Fernando de Noronha Archipelago in the Brazilian EEZ, between depths of 610 and 1,030 m (Fig. 7F).

Specimens examined. 9 (39–181 mm SL): NPM 4587, 1 (168 mm), AB2#39; NPM 4588, 2 (173–176 mm), AB2#54B; NPM 4589, 1 (181 mm), AB2#44A; NPM 4591, 1 (85 mm), AB2#49A; NPM 4592, 1 (150 mm), AB2#52A; NPM 4594, 2 (39–109 mm), AB2#53A; NPM 4625, 1 (155 mm), AB2#41A.

Photostomias Collett, 1889

Diagnosis. *Photostomias* can be distinguished in the Malacosteinae by the pectoral fin present only in larvae and transformed juveniles up to about 27 mm SL, absent in large juveniles and adults; pelvic-fin origin well before midlength of body, greatly elongate, 36.8–52.3% SL; 6 pelvic-fin rays, proximal ray flattened and separate from remaining five elongate rays; halves of each pelvic-fin ray fused together along their anterior margins for most of their length; pelvic fins attached near base to pelvic girdle by a thin membrane; chin barbel absent; one row of photophores on each side of isthmus (Morrow, 1964c; Fink, 1985; Kenaley, Hartel, 2005; Sutton *et al*., 2020). Seven valid species (Fricke *et al*., 2022).

Photostomias atrox (Alcock, 1890)

(Fig. 12E)

Diagnosis. *Photostomias atrox* differs from congeners by the presence of three pairs of basibranchial tooth patches; 22–26 dorsal-fin rays; 26–30 anal-fin rays; sum of dorsal- and anal-fin rays 47–55, usually 50-54; male PO moderate to large in specimens greater than 60 mm, 72.1–197.2% fleshy orbit, 16.7–46.6% jaw length; AO large in specimens greater than 60 mm, 9.2–37.8% fleshy orbit, 2.1–9.6% jaw length (Kenaley, Hartel, 2005; Sutton *et al*., 2020).

Geographical distribution. Circumglobal in tropical and subtropical waters, except the eastern Pacific Ocean (Kenaley, Hartel, 2005; Kenaley, 2009; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off the United States to Brazil (Kaneley, Hartel, 2005; Hartel *et al*., 2008). In Brazil the species was recorded off the Trindade and Martin Vaz Archipelago, with additional records outside the EEZ off the north portion of the country and the Saint Peter and Saint Paul Archipelago (Kenaley, Hartel, 2005; Sutton *et al*., 2020). *Photostomias atrox* is reported here based on one specimen collected off Pernambuco, at 680 m depth (Fig. 7F).

Specimen examined. 1: NPM 4575, 1 (67 mm), AB2#16.

Photostomias goodyeari Kenaley & Hartel, 2005

(Fig. 12F)

Diagnosis. *Photostomias goodyeari* differs from congeners by the presence of three pairs of basibranchial tooth patches; 26–31 dorsal-fin rays, 30–33 anal-fin rays, sum of dorsal- and anal-fin rays 56–63, usually 57–61; male PO small to moderate in specimens larger than 60 mm, 54.5–103.2% fleshy orbit, 9.6–24.8% jaw length; male AO moderate in specimens larger than 60 mm, 11.2–25.1% fleshy orbit, 2.3–4.4% jaw length (Kenaley, Hartel, 2005; Sutton *et al*., 2020).

Geographical distribution. Atlantic Ocean, between 40°N and 5°S (Kenaley, Hartel, 2005; Hartel *et al*., 2008; Sutton *et al*., 2020). In the western Atlantic, the species was reported from off the United States, the Gulf of Mexico, the Caribbean Sea, Suriname, and northern Brazil, outside the EEZ (Kenaley, Hartel, 2005; Melo *et al*., 2020). *Photostomias goodyeari* was included in a list of Brazilian deep-sea fishes by Melo *et al.* (2020), without reference to voucher specimens. The occurrence of the species is therefore confirmed in the Brazilian EEZ based on one specimen collected off Rio Grande do Norte State, between depths of 600 and 860 m (Fig. 7F).

Specimen examined. 1: NPM 4590, 1 (64 mm), AB2#39.

Melanostomiinae

Members of the Melanostomiinae can be recognized in the Stomiidae by the body relatively elongate; snout short; mouth large to extremely large; chin barbel usually present, ranging from very short to longer than body, barbel simple to complex; skin between lower jaws present in all species; dorsal-fin origin usually opposite to anal-fin origin (except in *Eustomias* and *Flagellostomias*), both fins located far behind the pelvic fin; dorsal adipose fin absent, except in *Chirostomias* Regan & Trewavas, 1930; scales absent, body without hexagonal patterns; suborbital and postorbital light organs usually present, preorbital luminous organ absent; photophores in 2 continuous rows along flanks and ventral portion of the body (Gibbs, 1986c; Kenaley, Stewart, 2015h; Nelson *et al*., 2016). Sixteen genera (Fricke *et al*., 2022).

Bathophilus Giglioli, 1882

Diagnosis. *Bathophilus* can be distinguished in the Melanostomiinae by the absence of teeth on vomer; premaxilla with fixed teeth followed by a series of depressible teeth; suborbital organs reduced or absent; base of pelvic fin high on body, about near midlateral portion of body; dorsal- and anal-fin bases similar in length; presence of small photophores in the entire body (Morrow, Gibbs, 1964; Barnett, Gibbs Jr., 1968; Gibbs, 1986c; Kenaley, Stewart, 2015h; Sutton *et al*., 2020). A total of 19 valid species (Fricke *et al*., 2022).

Bathophilus nigerrimus Giglioli, 1882

(Fig. 13A)

Diagnosis. *Bathophilus nigerrimus* differs from congeners by the pelvic-fin origin below the body midline; 16–26 free pelvic-fin rays; a single group of 31–57 pectoral-fin rays; 13–15 dorsal- and anal-fin rays; about 22–24 photophores in lateral series (OV 12–13, VAL 9–12); about 33-35 photophores in ventral series (IP 4–5, PV 12–13, VAV 11–13, AC 3–6) (Morrow, Gibbs, 1964; Barnett, Gibbs Jr., 1968; Gibbs, 1986c; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Atlantic Ocean and the Mediterranean Sea (Gibbs, Barnett, 1990; Santos *et al*., 1997; Harold, 2003; Judkins, Haedrich, 2018; Sutton *et al*., 2020; Tsagarakis *et al*., 2021), western Pacific (Aizawa, 2002) and Indian oceans (Hutchins, 2001; Fricke *et al*., 2018). In the western Atlantic, the species is reported from off United States to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Morrow, Gibbs, 1964; Parin *et al*., 1974; McEachran, Fechhelm, 1998; Harold, 2003; Nión *et al*., 2016). *Batophilus nigerrimus* is reported here for the first time in the Brazilian EEZ based on two specimens collected off Rocas Atoll, between depths of 90 and 610 m (Fig. 14A). The likely occurrence of the species in Brazilian waters was previously mentioned by Bonecker, Castro (2006: 90) based on its wide distribution in the western Atlantic.

Specimens examined. 2 (84–95 mm SL): NPM 4593, 1 (84 mm), AB2#53A; NPM 4628, 1 (95 mm), AB2#49B.

Bathophilus pawneei Parr, 1927

(Fig. 13B)

Diagnosis. *Bathophilus pawneei* differs from congeners by the pelvic-fin origin close to, but slightly below, the body midline; 12–15 pelvic-fin rays; 2 pectoral-fin rays (rarely 1) in a single group; 14–17 dorsal-fin rays; 15–18 anal-fin rays; usually a small luminous spot behind the pelvic fin, and sometimes another luminous spot on the shoulder region; about 24–29 photophores in the lateral series (OV 11–14, VAL 13–15); about 36–42 photophores in the ventral series (IP 5, PV 12–15, VAV 13–15, AC 6–7) (Morrow, Gibbs, 1964; Barnett, Gibbs Jr., 1968; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Atlantic, Indian, and Pacific oceans, from 45°N to 27°S (Morrow, Gibbs, 1964; Clarke, 1974; Gibbs, Barnett, 1990; Aizawa, 2002; Shinohara *et al*., 2009; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off the United States to Brazil, including the Gulf of Mexico and the Caribbean Sea (Parr, 1927; Morrow, Gibbs, 1964; Parin *et al*., 1974; Gibbs, Barnett, 1990; McEachran, Fechhelm, 1998; Moore *et al*., 2003; Judkins, Haedrich, 2018). In Brazil the species was reported from off Fernando de Noronha and Saint Peter and Saint Paul archipelagos (Judkins,

FIGURE 13 | **A.** *Bathophilus nigerrimus*, NPM 4593, 84 mm SL; **B.** *Bathophilus pawneei*, NPM 4572, 124 mm SL. Scale bars = 10 mm.

Haedrich, 2018; Sutton *et al*., 2020), with additional records outside the Brazilian EEZ off the Rio de Janeiro State (Gibbs, Barnett, 1990). *Bathophilus pawneei* is reported here based on specimens collected off the Rocas Atoll and Fernando de Noronha Archipelago, between depths of 430 and 610 m (Fig. 14A).

Specimens examined. 4 (30–124 mm SL): NPM 4571, 1 (81 mm), AB2#41A; NPM 4572, 1 (124 mm), AB2#40A; NPM 4928, 2 (30–32 mm), AB2#53B.

Eustomias Vaillant, 1884

Diagnosis. *Eustomias* can be distinguished in the Melanostomiinae by the trunk slender, mouth large, snout tapering and longer than eye, upper jaw protrusible; three pairs of basibranchial teeth; no teeth on vomer or palatine; anal-fin origin well in advance of the dorsal-fin origin; anal-fin base distinctly longer than the dorsal-fin base; 0–13 pectoral-fin rays, lacking free rays; notochord forming a U-shaped or S-shaped bend behind head, with anterior 6 or 7 vertebrae incomplete; chin barbel with great anatomical variation (Morrow, Gibbs, 1964; Gibbs, 1986c; Kenaley, Stewart, 2015h; Sutton *et al*., 2020). A total of 128 valid species in 11 subgenera (Fricke *et al*., 2022).

Eustomias bibulbosus Parr, 1927

(Fig. 15A)

Diagnosis. *Eustomias bibulbosus* differs from congeners by the presence of 3 well developed pectoral-fin rays; long chin barbel (60–85% SL), with two terminal bulbs

separated by a long interspace; distal bulb usually 0.9–1.6% SL; terminal filament long (22–33% SL), rarely with 1 or 2 branches; chin barbel stem darkly pigmented; lower jaw about as long as upper jaw and not upturned at tip; deep groove on belly absent; preorbital and suborbital organs absent (Gibbs *et al*., 1983; McEachran, Fechhelm, 1998).

Geographical distribution. Previous records are restricted to the western North Atlantic, between 40°N and 13°N (Vinnichenko, 1997; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003), with records off United States, Bermudas and Suriname (Parr, 1927; Bekker *et al*., 1975; Gibbs *et al*., 1983; Judkins, Haedrich, 2018). *Eustomias bibulbosus* is therefore reported for the first time in the South Atlantic based on one specimen collected off Pernambuco State in the Brazilian EEZ, at 680 m depth (Fig. 14B).

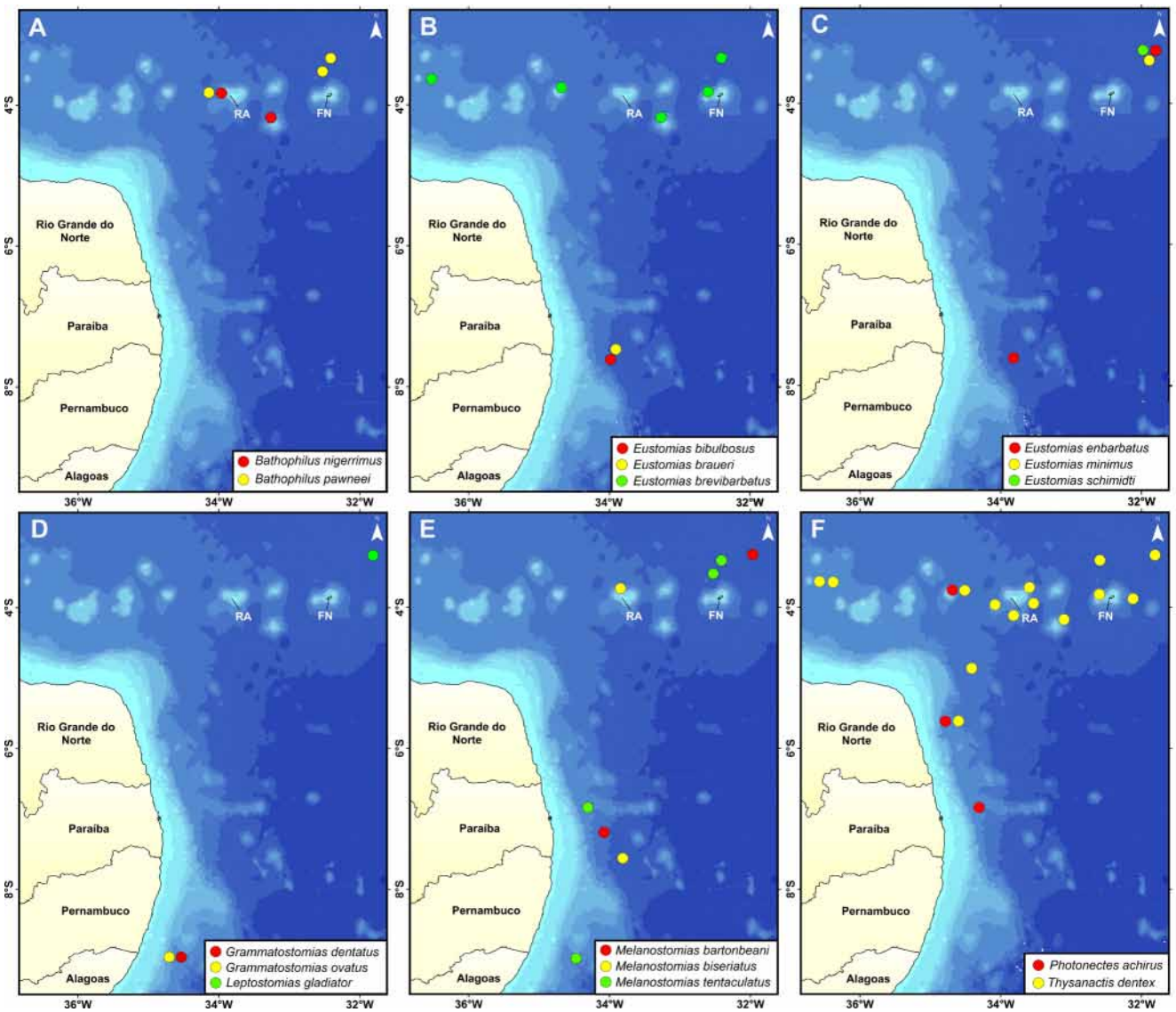

FIGURE 14 | Records of species of the Melanostomiinae (**A**–**F**) collected during the ABRACOS expeditions off northeastern Brazil. Oceanic islands: RA, Rocas Atoll; FN, Fernando de Noronha Archipelago.

Specimen examined. 1: NPM 4642, 1 (87 mm), AB2#16.

Eustomias braueri Zugmayer, 1911

(Fig. 15B)

Diagnosis. *Eustomias braueri* differs from congeners by the presence of 9–16 pectoral-fin rays; 8 pelvic-fin rays; chin barbel length approximately equal to head length, 12–17% SL; one ovoid terminal bulb at the chin barbel with two anterior filaments; chin barbel stem darkly pigmented; a series of luminous spots on lower side of body that resembles large photophores; lower jaw about as long as upper jaw and not upturned at tip; wide ventral groove extending from isthmus to behind pectoral-fin base present; preorbital and suborbital organs absent (Morrow, Gibbs, 1964; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Atlantic and western North Pacific oceans, between 40°N and 30°S (Morrow, Gibbs, 1964; Parin, Pokhilskaya, 1974; Bekker *et al*., 1975; Vinnichenko, 1997; McEachran, Fechhelm, 1998; Tatsuta *et al*., 2014; Sutton *et al*., 2020). Menezes *et al*. (2003) included the species in a list of Brazilian marine fishes based on Morrow, Gibbs (1964), but that record is outside the country's EEZ, off the northeastern region. Melo *et al*. (2020: 208), in turn, regarded the species as "not confirmed" in Brazil. Therefore, occurrence of *E. braueri* is confirmed in the Brazilian EEZ based on one specimen collected off Pernambuco State, at 680 m depth (Fig. 14B).

Specimen examined. 1: NPM 4816, 1 (56 mm), AB2#16.

Eustomias brevibarbatus Parr, 1927

(Fig. 15C)

Diagnosis. *Eustomias brevibarbatus* differs from congeners by the presence of two long and free pectoral-fin rays; barbel length 13–33% SL; chin barbel usually with two terminal bulbs separated by a short interspace (0.1–1.5% SL); anterior portion of distal bulb with distinctive black pigment; short terminal filament (0.3–2.5% SL) bifurcated or trifurcated near its base; barbel stem lightly to moderately pigmented; deep ventral groove on belly absent; preorbital and suborbital organs absent (Gomon, Gibbs, 1985; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Western Atlantic, between 35°N and 25°S, reported from off the United States to southeastern Brazil, including the Gulf of Mexico and the Caribbean Sea (Morrow, Gibbs, 1964; Bekker *et al*., 1975; Gomon, Gibbs, 1985; McEachran, Fechhelm, 1998; Harold, 2003). In Brazil the species was reported from off Fernando de Noronha Archipelago and Rio de Janeiro State, with additional records in the western South Atlantic outside the country's EEZ (Gomon, Gibbs, 1985; Menezes *et al*., 2003; Costa, Mincarone, 2010; Judkins, Haedrich, 2018; Sutton *et al*., 2020). *Eustomias brevibarbatus* is reported here based on specimens collected off Rio Grande

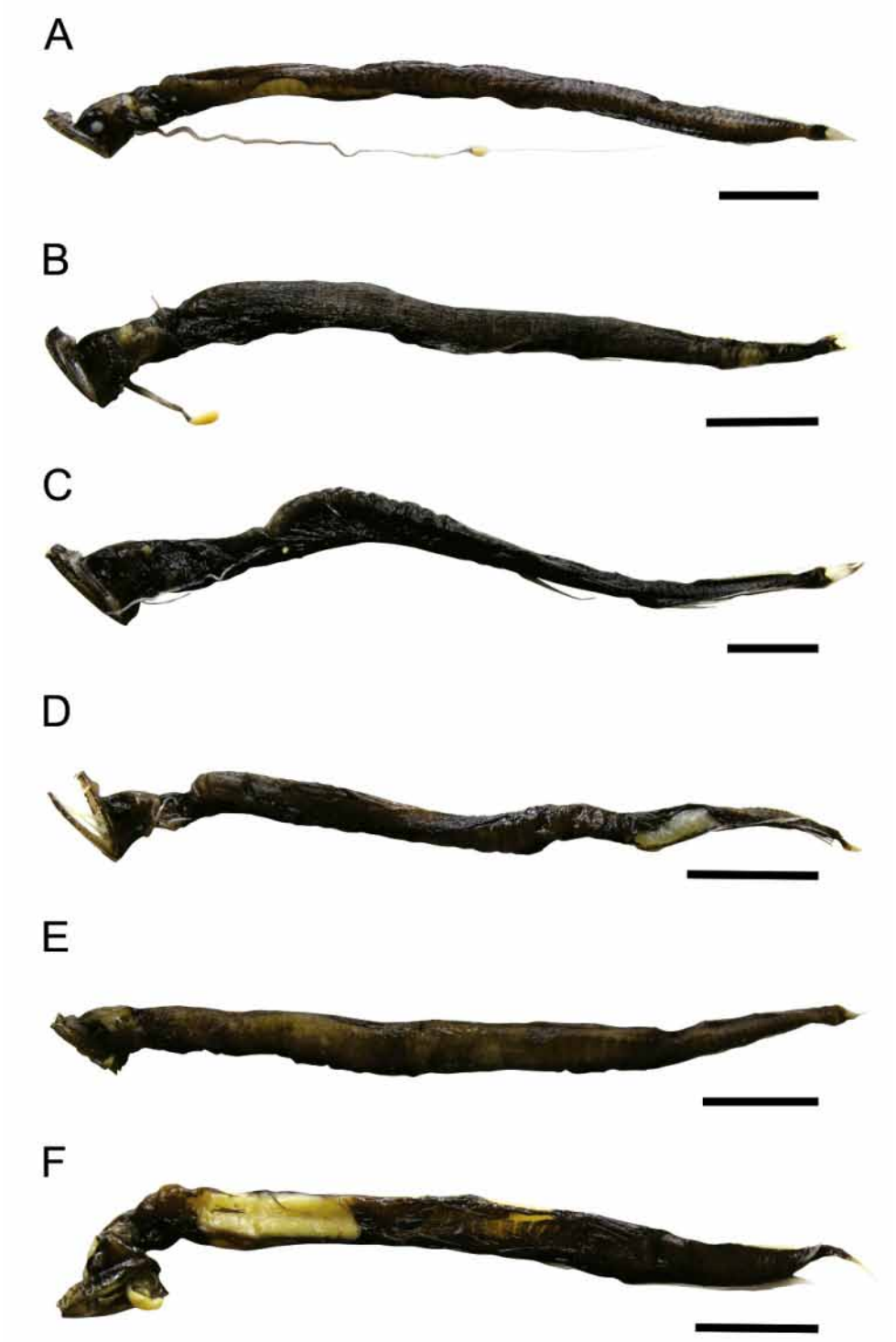

FIGURE 15 | **A.** *Eustomias bibulbosus*, NPM 4642, 87 mm SL; **B.** *Eustomias braueri*, NPM 4816, 56 mm SL; **C.** *Eustomias brevibarbatus*, NPM 4646, 95 mm SL; **D.** *Eustomias enbarbatus*, NPM 4819, 60 mm SL; **E.** *Eustomias minimus*, NPM 4881, 69 mm SL; **F.** *Eustomias schmidti*, NPM 4882, 68 mm SL. Scale bars = 10 mm.

do Norte State (near the seamounts), the Rocas Atoll, and the Fernando de Noronha Archipelago between depths of 90 and 1,030 m (Fig. 14B).

Specimens examined. 6 (85–128 mm SL): NPM 4643, 1 (87 mm), AB2#49A; NPM 4644, 1 (85 mm), AB2#41A; NPM 4645, 1 (128 mm), AB2#50A; NPM 4646, 1 (95 mm), AB2#49B; NPM 4689, 1 (85 mm), AB2#59A; NPM 5013, 1 (102 mm), AB2#54B.

Eustomias enbarbatus Welsh, 1923

(Fig. 15D)

Diagnosis. *Eustomias enbarbatus* differs from congeners by the presence of 3–4 (usually 3) well developed pectoral-fin rays; chin barbel 27.5–34.9% SL, with one terminal bulb; one filament before the terminal bulb, which ends in a branched stem or in a group of short filaments; deep groove on belly absent (Morrow, Gibbs, 1964; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. Atlantic, Indian, and Pacific oceans (Morrow, Gibbs, 1964; Parin, Pokhilskaya, 1974; Gibbs, Barnett, 1990; Aizawa, 2002; Harold, 2003; Mundy, 2005; Kenaley, Stewart, 2015h; Carneiro *et al*., 2019; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off the United States to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Parin *et al*., 1974; Morrow, Gibbs, 1964; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Nión *et al*., 2016). The species was recorded in Brazilian waters off Saint Peter and Saint Paul and Trindade and Martin Vaz archipelagos (Judkins, Haedrich, 2018; Sutton *et al*., 2020). *Eustomias enbarbatus* is reported here based on specimens collected between depths of 680 and 780 m off the Pernambuco State and the Fernando de Noronha Archipelago (Fig. 14C).

Specimens examined. 3 (54–60 mm SL): NPM 4818, 1 (54 mm), AB2#16; NPM 4819, 2 (55–60 mm), AB2#42A.

Eustomias minimus Clarke, 1999

(Fig. 15E)

Diagnosis. *Eustomias minimus* differs from congeners by the presence of 2 pectoral-fin rays; chin barbel with a single, simple and thin branch arising from the stem, branch length barely half that of distal barbel; terminal filaments of the chin barbel simple and short, not or barely reaching beyond bulb tip (Clarke, 1999).

Geographical distribution. Previously known from four poorly preserved specimens, including the holotype, collected in the central and western equatorial Pacific (Clarke, 1999). *Eustomias minimus* is reported for the first time in the Atlantic Ocean based on one specimen collected off the Fernando de Noronha Archipelago in the Brazilian EEZ, at 780 m depth (Fig. 14C).

Remarks. Morphometric and meristic data of the specimen examined are within the ranges reported for the species (Clarke, 1999), except for the barbel length, which is slightly shorter (7.5% SL) than in the original description (11–12.7% SL).

Specimen examined. 1: NPM 4881, 1 (69 mm), AB2#42A.

Eustomias schmidti Regan & Trewavas, 1930

(Fig. 15F)

Diagnosis. *Eustomias schmidti* differs from congeners by the presence of two pectoral-fin rays bound together in black tissue; chin barbel short, about 7–17% of SL; a distinct chin barbel anatomy, with three branches arising from the stem: the medial branch is stout, bulbous and with distal filaments, barely reaching to barbel tip, the lateral branches taper distally, extending well beyond end of barbel; terminal bulb of chin barbel unpigmented and long, occupying most of distal barbel, tightly constricted distally into a spheroidal terminal section, and with a terminal filament or single-based group of filaments arising ventrally from this constriction; deep ventral groove on belly relatively short, extending to PV 4–6; anal-fin base approximately twice as long as dorsal-fin base; postorbital photophore and barbel photophore probably glows green or blue (Morrow, Gibbs, 1964; Gibbs, 1986c; McEachran, Fechhelm, 1998; Clarke, 2000; Kenaley, Stewart, 2015h; Sutton *et al*., 2020).

Geographical distribution. Atlantic and Pacific oceans, between 40°N and 40°S (Morrow, Gibbs, 1964; Parin, Pokhilskaya, 1974; Bekker *et al*., 1975; Gibbs, 1986c; Gibbs, Barnett, 1990; Vinnichenko, 1997; Aizawa, 2002; Harold, 2003; Moore *et al*., 2003; Mundy, 2005; Kenaley, Stewart, 2015h; Carneiro *et al*., 2019; Sutton *et al*., 2020). In the western Atlantic the species is reported from off the United States to the Caribbean Sea, with a single record off southeastern Brazil, outside the country's EEZ (Clarke, 2000; Menezes *et al*., 2003; Judkins, Haedrich, 2018). Melo *et al*. (2020) also included *E. schmidti* in a list of deep-sea fishes of Brazil, without providing information on voucher specimens or locality data. Therefore, the occurrence of *E. schmidti* is confirmed in Brazilian waters based on one specimen collected off the Fernando de Noronha Archipelago, at 850 m depth (Fig. 14C).

Specimen examined. 1: NPM 4882, 1 (68 mm), AB2#42A.

Grammatostomias Goode & Bean, 1896

Diagnosis. *Grammatostomias* can be distinguished in the Melanostomiinae by the anal-fin origin below the dorsal-fin origin; adipose fin absent; 4–11 pectoral-fin rays, free from membrane, some of them bearing a mass of luminous tissue; premaxillary teeth with 2 large fangs followed by 7–16 smaller teeth; teeth on vomer absent; 2–4 palatine teeth in a single row; conspicuous line or loop of blue luminous tissue on flank (Morrow, Gibbs, 1964; Sutton *et al*., 2020). Four valid species (Fricke *et al*., 2022).

Grammatostomias dentatus Goode & Bean, 1896

(Fig. 16A)

Diagnosis. *Grammatostomias dentatus* differs from congeners by the luminous tissue on both sides of body forming a distinct line from the operculum to beyond the pelvic-fin base; 5 pectoral-fin rays; PV 15–16 (Morrow, Gibbs, 1964; Sutton *et al*., 2020).

Geographical distribution. North Atlantic, Indian, and western Pacific oceans (Gibbs, Barnett, 1990; Vinnichenko, 1997; Harold, 2003; Fricke, 2011; Carneiro *et al*., 2019; Sutton *et al*., 2020). In the western Atlantic the species is reported from off the United States and Bermudas, between 43°N and 28°N (Morrow, Gibbs, 1964; Harold, 2003; Moore *et al*., 2003; Judkins, Haedrich, 2018). Melo *et al*. (2020) included *G. dentatus* in a list of deep-sea fishes of Brazil, without providing information on voucher specimens or locality data. Previously known records of the species in the South Atlantic are actually outside the Brazilian EEZ (ISH 1364-1968; ISH 762-1966). Therefore, the occurrence of *G. dentatus* is confirmed in Brazilian waters based on one specimen collected off Pernambuco State, at depths between 45 and 200 m (Fig. 14D).

Specimen examined. 1: NPM 3184, 1 (114 mm), AB1#51.

Grammatostomias ovatus Prokofiev, 2014

(Fig. 16B)

Diagnosis. *Grammatostomias ovatus* differs from congeners by the luminous tissue on flank always longer than deep, forming an elongate circle with a wavy outline, ending far in advance of the pelvic-fin origin; 6–9 pectoral-fin rays; first pectoral-fin ray isolated and heavily pigmented, remaining rays unpigmented, with masses of luminescent tissue, enormously developed on the second ray; PV 17–18 (Prokofiev, 2014; Prokofiev, unpubl. data).

Geographical distribution. The species was recently described based only on the holotype from the Canary Basin (Prokofiev, 2014), but additional specimens are also known from the tropical Atlantic Ocean, between 20°N and 4°N (Prokofiev, unpub. data). *Grammatostomias ovatus* is therefore reported for the first time in the South Atlantic based on one specimen collected off Pernambuco State in the Brazilian EEZ, between depths of 45 and 200 m (Fig. 14D).

Remarks. Menezes *et al*. (2003) included a morphologically similar species, *G. circularis* Morrow, 1959, in a checklist of Brazilian marine fishes based on Morrow, Gibbs (1964), who actually did not record the species in the Brazilian EEZ. Melo *et al*. (2020: 208), in turn, considered the occurrence of *G. circularis* as not confirmed in Brazilian waters. In the description of *G. ovatus*, Prokofiev (2014) indicated that the species could be distinguished from *G. circularis* by the number of pectoral-fin rays (6 *vs*. 9). Examination of additional specimens of *G. ovatus* indicates that the number of

FIGURE 16 | A. *Grammatostomias dentatus*, NPM 3184, 114 mm SL; **B.** *Grammatostomias ovatus*, NPM 3191, 67 mm SL; **C.** *Leptostomias gladiator*, NPM 4782, 83 mm SL. Scale bars = 10 mm.

pectoral-fin rays is variable in the species (6–9). However, *G. circularis* is still distinct from *G. ovatus* in the shape of the luminous loop on the flank, which is nearly circular in the former (*e.g.*, Morrow, Gibbs, 1964). The degree of elongation of the luminous loop in *G. ovatus* is also somewhat variable, but it is always longer than deep in that species instead of almost as long as deep in the case of *G. circularis*. The luminous tissue associated with the pectoral-fin rays of *G. ovatus* is also conspicuously more developed than in *G. circularis*, even though some ontogenetic variation in this character might be expected. In summary, the additional specimens of *G. ovatus* examined after its description in 2014 supports the distinction between that species and *G. circularis*; the occurrence of the later in Brazilian waters has not yet been confirmed.

Specimen examined. 1: NPM 3191, 1 (67 mm), AB1#51.

Leptostomias Gilbert, 1905

Diagnosis. *Leptostomias* can be distinguished in the Melanostomiinae by a very long and slender body, maximum depth around 10% SL or less; anal-fin origin below the dorsal-fin origin, adipose fin absent; 10–12 pectoral-fin rays; 20–29 anal-fin rays; 16–22 dorsal-fin rays; one tooth on each side of vomer; one or two pairs of teeth on basibranchials; PV 36 or more; VAV 20–24 (Morrow, Gibbs, 1964; Gibbs, 1986c; Kenaley, Stewart, 2015h; Sutton *et al.*, 2020). A total of 12 valid species (Fricke *et al.*, 2022).

Leptostomias gladiator (Zugmayer, 1911)

(Fig. 16C)

Diagnosis. *Leptostomias gladiator* differs from congeners by the long chin barbel, 30–75% SL, the stem with 1–2 filaments near its base; terminal bulb of chin barbel not split, bearing one or more minute filaments or tubercles at tip; 19–22 dorsal-fin rays; 23–29 anal-fin rays; head small, 10.0–13.4% SL; PV 39–44; VAV 20–22; AC 11–13 (Morrow, Gibbs, 1964; Kenaley, Stewart, 2015h; Sutton *et al*., 2020).

Geographical distribution. Circumglobal, between 56°N and 45°S, except the western Indian and western Pacific oceans (Gibbs, Barnett, 1990; Porteiro *et al*., 1999; Bañón *et al*., 2010; Fricke *et al*., 2014; Kenaley, Stewart, 2015h; Orlov, Tokranov, 2019; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off United States to Uruguay, including the Gulf of Mexico and the Caribbean Sea (Morrow, Gibbs, 1964; McEachran, Fechhelm, 1998; Harold, 2003; Moore *et al*., 2003; Nión *et al*., 2016; Judkins, Haedrich, 2018). Menezes *et al*. (2003) included *L. gladiator* in a list of Brazilian marine fishes based on records outside the country's EEZ (Morrow, Gibbs, 1964; Gibbs, 1986c). The occurrence of the species in Brazilian waters was later considered as "not confirmed" by Melo *et al*. (2020: 208). Therefore, occurrence of *L. gladiator* is confirmed in the Brazilian EEZ based on one specimen collected off Fernando de Noronha Archipelago, at 780 m depth (Fig. 14D). One additional specimen, collected off Rio de Janeiro State in Brazilian waters (MNRJ 30806), is also known.

Specimen examined. 1: NPM 4782, 1 (83 mm), AB2#42A.

Melanostomias Brauer, 1902

Diagnosis. *Melanostomias* can be distinguished in the Melanostomiinae by the dorsal and anal fins placed posteriorly in the body, near the caudal-fin base; anal-fin origin below dorsal-fin origin; pectoral fin without isolated rays; 3–7 (usually 5) pectoral-fin rays; 13–18 dorsal-fin rays; 16–21 anal-fin rays; jaw teeth long and depressible; 8 teeth on premaxilla; 4–5 teeth on maxilla; two pairs of teeth on basibranchials; palatine with 5 teeth; vomer with 1 tooth on each side; postorbital organ large; chin barbel present; body depth larger than 10% SL (Morrow, Gibbs, 1964; Parin, Pokhilskaya, 1978; McEachran, Fechhelm, 1998; Sutton *et al*., 2020). A total of 18 valid species (Fricke *et al*., 2022).

Melanostomias bartonbeani Parr, 1927

(Fig. 17A)

Diagnosis. *Melanostomias bartonbeani* differs from congeners by the chin barbel length 17–33% SL; terminal end of chin barbel with masses of opaque material filling much of the membrane on both sides of the axis; barbel tip unpigmented, about 5 times longer than wide; relatively large, white spots on head; 12–16 dorsal-fin rays; 16–20 anal-fin rays; PV 22–26; VAV 12–16; AC 8–11; IC 55–60; OV 22–25; VAL 11–14

(Parr, 1927; Morrow, Gibbs, 1964; Parin, Pokhilskaya, 1978; Gibbs, 1986c; Sutton *et al*., 2020; specimens examined herein).

Geographical distribution. Atlantic and Indian oceans, between 70°N and 40°S (Morrow, Gibbs, 1964; De Groot, Nijssen, 1971; Gibbs, 1986c; Vinnichenko, 1997; Møller *et al*., 2010; Carneiro *et al*., 2019; Sutton *et al*., 2020). In the western Atlantic, the species was previously reported off Greenland, Canada, United States, Bermudas and Uruguay (Morrow, Gibbs, 1964; McAllister, 1990; Møller *et al*., 2010; Nión *et al*., 2016). The species was reported in Brazilian waters by Melo *et al*. (2020) likely based on one specimen collected off Espírito Santo State (MNRJ 30905). The occurrence of *M. bartonbeani* is therefore corfirmed in the Brazilian EEZ based on two specimens collected off Paraíba State and the Fernando de Noronha Archipelago, between depths of 90 and 780 m (Fig. 14E).

Remarks. Morphometric and meristic data of the two specimens examined are within the ranges reported for the species (Morrow, Gibbs, 1964; Gibbs, 1986c), except for the barbel length, which is longer (26–33% SL) than previously indicated (17–24% SL).

Specimens examined. 2 (50–185 mm SL): NPM 3422, 1 (50 mm), AB1#34; NPM 4609, 1 (185 mm), AB2#42A.

FIGURE 17 | **A.** *Melanostomias bartonbeani*, NPM 4609, 185 mm SL; **B.** *Melanostomias biseriatus*, NPM 4603, 177 mm SL; **C.** *Melanostomias tentaculatus*, NPM 3181, 201 mm SL. Scale bars = 10 mm.

Melanostomias biseriatus Regan & Trewavas, 1930

(Fig. 17B)

Diagnosis. *Melanostomias biseriatus* differs from congeners by the chin barbel length, about 20–40% SL; barbel with a slender stem and a flattened distal tip terminating in a prominent ovoid bulb; length of the expanded distal part of the chin barbel about 10 times longer than wide; the distal tip of chin barbel bears two narrow flattened wings with a row of small and discrete opaque luminous bodies on each side; PV 27–30; OV 26–28 (Morrow, Gibbs, 1964; McEachran, Fechhelm, 1998; Sutton *et al*., 2020).

Geographical distribution. North Atlantic, between 35° and 5° N, and a single record in the North Pacific Ocean (Gibbs, 1960; Morrow, Gibbs, 1964; Moore *et al*., 2003; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off the United States to French Guiana, including the Gulf of Mexico and the Caribbean Sea (Morrow, Gibbs, 1964; Bekkker *et al*., 1975; Fujii, 1983d; Judkins, Haedrich, 2018). *Melanostomias bisearіatus* is therefore reported for the first time in the western South Atlantic based on two specimens collected between depths of 610 and 680 m off Pernambuco State and the Rocas Atoll, in the Brazilian EEZ (Fig. 14E). Two additional specimens collected outside the Brazilian EEZ off north South America (MCZ 132252) and off northeastern Brazil (ISH 665-1966) likely represent further records of the species in the western South Atlantic.

Specimens examined. 2 (29–177 mm SL): NPM 4603, 1 (177 mm), AB2#53A; NPM 4815, 1 (29 mm), AB2#16.

Melanostomias tentaculatus (Regan & Trewavas, 1930)

(Fig. 17C)

Diagnosis. *Melanostomias tentaculatus* differs from congeners by the chin barbel not flattened, slender, its length about 2–3 times in HL or 25% to 50% SL; barbel with one or two pale elongated terminal bulbs, with very small terminal filaments; main stem of chin barbel extended as a free tentacle along the bulb; 5–7 pectoral-fin rays; anal-fin origin just posterior to dorsal-fin origin; PV 25–27; OV 24–26 (Morrow, Gibbs, 1964; Parin, Pokhilskaya, 1978; McEachran, Fechhelm, 1998; Kenaley, Stewart, 2015h; Sutton *et al*., 2020).

Geographical distribution. Atlantic, Indian, and western Pacific oceans (Parin, Pokhilskaya, 1978; Gibbs, Barnett, 1990; Vinnichenko, 1997; Bordes *et al*., 1999; Aizawa, 2002; Harold, 2003; Tatsuta *et al*., 2014; Kenaley, Stewart, 2015h; Carneiro *et al*., 2019; Sutton *et al*., 2020). In the western Atlantic, the species is reported from off the United States to Argentina, including the Gulf of Mexico and the Caribbean Sea (Parin *et al*., 1974; Morrow, Gibbs, 1964; Moore *et al*., 2003; McEachran, Fechhelm, 1998; Judkins, Haedrich, 2018). In Brazil the species was previously reported off Maranhão State and the east coast to about 8°S (McEachran, Fechhelm, 1998; Judkins, Haedrich,

2018). *Melanostomias tentaculatus* is reported here based on specimens collected off the Pernambuco State and Fernando de Noronha Archipelago, between depths of 45 and 800 (Fig. 14E).

Specimens examined. 4 (182–201 mm SL): NPM 3181, 1 (201 mm), AB1#51; NPM 4604, 1 (182 mm), AB2#40A; NPM 4605, 1 (194 mm), AB2#41A; NPM 4607, 1 (188 mm), AB2#21.

Photonectes Günther, 1887

Diagnosis. *Photonectes* can be distinguished in the Melanostomiinae by the dorsal and anal fins opposed, rays covered with black skin in some species, leaving only tips of rays visible; 0–3 pectoral-fin rays; lower jaw longer than upper jaw and strongly curved upwards; lower jaw teeth uniserial; retroarticular with a process directed backwards; vomer with one or two pairs of teeth, rarely toothless; postorbital organ well-developed; some species with white luminous tissue on top of head and/or in shoulder region, others with blue luminous tissue in spots on head, inside mouth or in bands or stripes along body; 48–67 vertebrae (Morrow, Gibbs, 1964; Gibbs, 1986c; Klepadlo, 2011; Flynn, Klepadlo, 2012; Kenaley, Stewart, 2015h; Prokofiev, 2016, 2019; Prokofiev, Klepadlo, 2019; Prokofiev, Frable, 2021). A total of 29 valid species (Fricke *et al*., 2022).

Photonectes achirus Regan & Trewavas, 1930

(Fig. 18A)

Diagnosis. *Photonectes achirus* differs from congeners by the absence of the pectoral fin; IV 31–36; one pair of luminous organs inside mouth; chin barbel length 70–80% HL, with a small terminal bulb and a terminal appendage with a secondary, small, bulb at its tip; presence of blue luminous tissue in a midventral band extending from the pectoral region to the pelvic fin, with short transverse streaks alternating with serial photophores, and in patches under OV-1 and OV-2 photophores, on sides of isthmus, under the lower jaw, above the posterior end of the maxilla, between the eyes, and above the occipito-vertical articulation; BR 6–8 (Morrow, Gibbs, 1964; Flynn, Klepadlo, 2012; Prokofiev, Klepadlo, 2019; Prokofiev, Frable, 2021).

Geographical distribution. Known from a few records in the western and central Pacific and western North Atlantic oceans, off United States and in the Caribbean Sea (McEachran, Fechhelm, 1998; Harold, 2003; Mundy, 2005; Klepadlo, 2011; Flynn, Klepadlo, 2012). *Photonectes achirus* is reported for the first time in the South Atlantic based on three specimens collected off Rio Grande do Norte (including the seamounts) and Paraíba States in the Brazilian EEZ, between depths of 70 and 800 m (Fig. 14F).

Remarks. Two specimens listed as *Photonectes* sp. (NPM 6867, 26–29 mm; AB2#42A) in the Supplementary Material **S1** likely represent *P. achirus*, but their identification could not be confirmed at species level due to their extremely small sizes.

FIGURE 18 | A. *Photonectes achirus*, NPM 4629, 79 mm SL; **B.** *Thysanactis dentex*, NPM 4639, 138 mm SL. Scale bars = 10 mm.

Specimens examined. 3 (33–79 mm SL): NPM 4629, 1 (79 mm), AB2#54B; NPM 4695, 1 (33 mm), AB2#21; NPM 4924, 1 (damaged), AB2#28.

Thysanactis Regan & Trewavas, 1930

Diagnosis. *Thysanactis* can be distinguished in the Melanostomiinae by the dorsal and anal fins placed posteriorly on body, anal-fin origin slightly anterior to dorsal-fin origin; first pectoral-fin ray long and isolated, ending in 5–6 filaments, followed by 10–11 additional pectoral-fin rays; chin barbel short, similar in length to head length, ending in a round terminal bulb covered with filaments; IP 20; PV 31–32; VAV 14–16; OV 30–32; VAL 14–16; AC 11–12 (Morrow, Gibbs, 1964; Sutton *et al*., 2020). A single valid species (Fricke *et al*., 2022).

Thysanactis dentex Regan & Trewavas, 1930

(Fig. 18B)

Diagnosis. Same as for the genus.

Geographical distribution. Atlantic, eastern Indian, and western and central Pacific oceans (Morrow, Gibbs, 1964; Clarke, 1974; Gibbs, Barnett, 1990; Hutchins, 2001; Aizawa, 2002; Harold, 2003; Fricke *et al*., 2011; Sutton *et al*., 2020). In the western Atlantic, the species is reported between 18°N and 7°S, from the Caribbean Sea to Brazil, where it was recorded off the northeastern region (Eduardo *et al*., 2018a; Judkins, Haedrich, 2018). *Thysanactis dentex* is reported here based on specimens collected from off Rio Grande do Norte State (including the seamounts), the Rocas Atoll, and the

Fernando de Noronha Archipelago, at depths between 90 and 1,113 m (Fig. 14F).

Specimens examined. 40 (43–150 mm SL): NPM 3281, 1 (52 mm), AB1#12; NPM 3282, 1 (50 mm), AB1#14; NPM 3421, 1 (damaged), AB1#22; NPM 4626, 2 (68–92 mm), AB2#41A; NPM 4627, 8 (67–131 mm), AB2#44A; NPM 4632, 3 (137–145 mm), AB2#52A; NPM 4633, 1 (135 mm), AB2#39; NPM 4635, 1 (94 mm), AB2#59B; NPM 4636, 1 (81 mm), AB2#54B; NPM 4637, 3 (132–145 mm), AB2#28; NPM 4638, 2 (113–145 mm), AB2#59A; NPM 4639, 2 (46–138 mm), AB2#52B; NPM 4640, 1 (51 mm), AB2#44B; NPM 4641, 1 (90 mm), AB2#42A; NPM 4649, 9 (43–55 mm), AB2#49B; NPM 4694, 2 (115–150 mm), AB2#50A.

DISCUSSION

Scientific expeditions conducted off the Brazilian coast in recent decades contributed significantly to the understanding of the deep-sea, especially the taxonomic composition and geographic distribution of different groups of fishes (Séret, Andreata, 1992; Figueiredo *et al*., 2002; Bernardes *et al*., 2005; Braga *et al*., 2007; Mincarone *et al*., 2008; Costa, Mincarone, 2010; Lima *et al*., 2011; Lins Oliveira *et al*., 2015; Melo *et al*., 2020). With the total number of 108 species of the Stomiiformes confirmed in the Brazilian EEZ, including 90 species previously recorded (Tab. 2), the order might be regarded as one of the most well-known groups of deep-sea fishes in the western South Atlantic. However, knowledge on deep-sea fishes in general remains highly unsatisfactory in the region (Irigoien *et al*., 2014; Reis *et al*., 2016; St. Jonh *et al*., 2016). One example of this is that, among the 12 new records for the Brazilian EEZ presented here, seven are also new for the western South Atlantic, the South Atlantic, or even the Atlantic.

Phosichthyidae is the least diverse family of the Stomiiformes in the Brazilian EEZ. Of the eigth species of the family confirmed for the region, four were identified here (Tab. 2). The second most well represented family of the Stomiiformes in the Brazilian EEZ is the Sternoptychidae, with 15 confirmed species, followed by the Gonostomatidae, with 14 species. Nine species of the Gonostomatidae were recorded here, including *Gonostoma denudatum*, a new record for the region. In the Sternoptychidae, there is also a likely new species of *Polyipnus* from off the central coast of Brazil that still lacks formal description (Lima *et al*., 2011). However, of the 18 new or confirmed records of stomiiforms presented here for Brazilian waters based on specimens we examined, 16 are members of the highly diverse Stomiidae. When the 50 additional species of the Stomiidae previously reported for the Brazilian EEZ are also considered, a total of 66 species of the family is confirmed for the region (Tab. 2). Our collections also include at least five species of *Eustomias* and one species of *Melanostomias* that likely represent new species awaiting formal description.

These results reinforce the vast amount of information still necessary for a more comprehensive knowledge of the deep-sea diversity of the western South Atlantic to emerge, even in relatively well-known families as the Stomiidae. The new records and geographic range extensions uncovered here based on just two collecting expeditions also highlight the need for additional mesopelagic surveys along the Brazilian coast.

TABLE 2 | Confirmed records of Stomiiformes in the Brazilian Exclusive Economic Zone.

Species	References
DIPLOPHIDAE	
Diplophos australis Ozawa, Oda & Ida, 1990	Figueiredo *et al.* (2002); Menezes *et al.* (2003); Melo *et al.* (2020); this study
Diplophos taenia Günther, 1873	Figueiredo *et al.* (2002); Menezes *et al.* (2003); Bonecker, Castro (2006); Braga *et al.* (2007); Bonecker *et al.* (2014); Pinheiro *et al.* (2015); Stocco, Joyeux (2015); Eduardo *et al.* (2020c); Melo *et al.* (2020); this study
Manducus maderensis (Johnson, 1890)	Mukhacheva (1978); Smith *et al.* (1991); Figueiredo *et al.* (2002); Menezes *et al.* (2003); Braga *et al.* (2007); Costa, Mincarone (2010); Pinheiro *et al.* (2015); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Triplophos hemingi (McArdle, 1901)	This study
GONOSTOMATIDAE	
Cyclothone acclinidens Garman, 1899	Bonecker *et al.* (2012, 2014); Stocco, Joyeux (2015); Olivar *et al.* (2017); Melo *et al.* (2020); Pinheiro *et al.* (2020)
Cyclothone alba Brauer, 1906	Séret, Andreata (1992); Bonecker *et al.* (2012; 2014); Olivar *et al.* (2017); Judkins, Haedrich (2018); Melo *et al.* (2020); Pinheiro *et al.* (2020)
Cyclothone braueri Jespersen & Tåning, 1926	Séret, Andreata (1992); Bonecker *et al.* (2012, 2014); Stocco, Joyeux (2015); Melo *et al.* (2020)
Cyclothone microdon (Günther, 1878)	Judkins, Haedrich (2018); Melo *et al.* (2020)
Cyclothone obscura Brauer, 1902	Mukhacheva (1974)
Cyclothone pallida Brauer, 1902	Olivar *et al.* (2017); Judkins, Haedrich (2018); Melo *et al.* (2020); Pinheiro *et al.* (2020)
Cyclothone parapallida Badcock, 1982	Olivar *et al.* (2017); Melo *et al.* (2020)
Cyclothone pseudopallida Mukhacheva, 1964	Mukhacheva (1974); Bonecker *et al.* (2012, 2014); Stocco, Joyeux (2015); Olivar *et al.* (2017); Judkins, Haedrich (2018); Melo *et al.* (2020)
Gonostoma atlanticum Norman, 1930	Mukhacheva (1972); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Gonostoma denudatum Rafinesque, 1810	This study
Margrethia obtusirostra Jespersen & Tåning, 1919	Figueiredo *et al.* (2002); Menezes *et al.* (2003); Braga *et al.* (2007); Bonecker *et al.* (2012, 2014); Melo *et al.* (2020); this study
Sigmops bathyphilus (Vaillant, 1884)	Costa, Mincarone (2010); Melo *et al.* (2020); this study
Sigmops elongatus (Günther, 1878)	Mukhacheva (1972); Figueiredo *et al.* (2002); Menezes *et al.* (2003); Bernardes *et al.* (2005); Braga *et al.* (2007); Haimovici *et al.* (2008); Bonecker *et al.* (2012, 2014); Mincarone *et al.* (2017); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Zaphotias pedaliotus (Goode & Bean, 1896)	Mukhacheva (1976); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
STERNOPTYCHIDAE	
Maurolicinae	
Argyripnus atlanticus Maul, 1952	Braga *et al.* (2007); Lima *et al.* (2011); Melo *et al.* (2020)
Maurolicus stehmanni Parin & Kobyliansky, 1993	Figueiredo *et al.* (2002); Bernardes *et al.* (2005); Braga *et al.* (2007); Haimovici *et al.* (2008); Lima *et al.* (2011); Bonecker *et al.* (2012, 2014); Pinheiro *et al.* (2015); Stocco, Joyeux (2015); Melo *et al.* (2020), Rees *et al.* (2020)
Maurolicus weitzmani Parin & Kobyliansky, 1993	Judkins, Haedrich (2018); Rees *et al.* (2020)
Valenciennellus tripunctulatus (Esmark, 1871)	Figueiredo *et al.* (2002); Bonecker *et al.* (2014); Olivar *et al.* (2017); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Sternoptychinae	
Argyropelecus aculeatus Valenciennes, 1850	Borodulina (1978); Figueiredo *et al.* (2002); Menezes *et al.* (2003); Bernardes *et al.* (2005); Braga *et al.* (2007); Haimovici *et al.* (2008); Costa, Mincarone (2010); Lima *et al.* (2011); Bonecker *et al.* (2014); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Eduardo *et al.* (2020a); Melo *et al.* (2020); this study

TABLE 2 | (Continued)

Species	References
Argyropelecus affinis Garman, 1899	Borodulina (1978); Eduardo *et al.* (2018a); Eduardo *et al.* (2020a); Melo *et al.* (2020); this study
Argyropelecus gigas Norman, 1930	Borodulina (1978); Bernardes *et al.* (2005); Haimovici *et al.* (2008); Melo *et al.* (2020); this study
Argyropelecus hemigymnus Cocco, 1829	Borodulina (1978); Figueiredo *et al.* (2002); Menezes *et al.* (2003); Bernardes *et al.* (2005); Haimovici *et al.* (2008); Costa, Mincarone (2010); Lima *et al.* (2011); Bonecker *et al.* (2014); Olivar *et al.* (2017); Judkins, Haedrich (2018); Eduardo *et al.* (2020a); Melo *et al.* (2020); this study
Argyropelecus lychnus Garman, 1899	Judkins, Haedrich (2018)
Argyropelecus sladeni Regan, 1908	Baird (1971); Borodulina (1978); Menezes *et al.* (2003); Lima *et al.* (2011); Bonecker *et al.* (2014); Olivar *et al.* (2017); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Polyipnus clarus Harold, 1994	Lins Oliveira *et al.* (2015); Melo *et al.* (2020)
Polyipnus laternatus Garman, 1899	Lins Oliveira *et al.* (2015); Melo *et al.* (2020)
Polyipnus sp.	Lima *et al.* (2011)
Sternoptyx diaphana Hermann, 1781	Baird (1971); Borodulina (1978); Séret, Andreata (1992); Figueiredo *et al.* (2002); Menezes *et al.* (2003); Braga *et al.* (2007); Costa, Mincarone (2010); Lima *et al.* (2011); Bonecker *et al.* (2012, 2014); Lins Oliveira *et al.* (2015); Olivar *et al.* (2017); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Eduardo *et al.* (2020a); Melo *et al.* (2020); Pinheiro *et al.* (2020); this study
Sternoptyx pseudobscura Baird, 1971	Baird (1971); Menezes *et al.* (2003); Braga *et al.* (2007); Costa, Mincarone (2010); Lima *et al.* (2011); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Eduardo *et al.* (2020a); Melo *et al.* (2020); this study
Sternoptyx pseudodiaphana Borodulina, 1977	Costa, Mincarone (2010); Lima *et al.* (2011); Lins Oliveira *et al.* (2015); Mincarone *et al.* (2017); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
PHOSICHTHYIDAE	
Ichthyococcus australis Mukhacheva, 1980	Krefft (1983); Menezes *et al.* (2003); Melo *et al.* (2020)
Ichthyococcus ovatus (Cocco, 1838)	Bonecker *et al.* (2014); Judkins, Haedrich (2018); Melo *et al.* (2020)
Ichthyococcus polli Blache, 1964	Krefft (1983); Melo *et al.* (2020); this study
Phosichthys argenteus Hutton, 1872	Figueiredo *et al.* (2002); Bernardes *et al.* (2005); Braga *et al.* (2007); Haimovici *et al.* (2008); Melo *et al.* (2020); this study
Pollichthys mauli (Poll, 1953)	Figueiredo *et al.* (2002); Bernardes *et al.* (2005); Bonecker, Castro (2006); Braga *et al.* (2007); Haimovici *et al.* (2008); Costa, Mincarone (2010); Goçalo *et al.* (2011); Bonecker *et al.* (2012, 2014); Pinheiro *et al.* (2015); Melo *et al.* (2020); this study
Polymetme thaeocoryla Parin & Borodulina, 1990	Haimovici *et al.* (1994); Mincarone *et al.* (2004); Bernardes *et al.* (2005); Braga *et al.* (2007); Haimovici *et al.* (2008); Lins Oliveira *et al.* (2015); Mincarone *et al.* (2017); Melo *et al.* (2020)
Vinciguerria nimbaria (Jordan & Williams, 1895)	Gorbunova (1972); Figueiredo *et al.* (2002); Bonecker, Castro (2006); Braga *et al.* (2007); Goçalo *et al.* (2011); Bonecker *et al.* (2012, 2014, 2019); Pinheiro *et al.* (2015, 2020); Stocco, Joyeux (2015); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Vinciguerria poweriae (Cocco, 1838)	Figueiredo *et al.* (2002); Stocco, Joyeux (2015); Melo *et al.* (2020)
STOMIIDAE	
Astronesthinae	
Astronesthes atlantica Parin & Borodulina, 1996	Parin, Borodulina (1996); Judkins, Haedrich (2018); this study
Atronesthes barbata Kner, 1860	Kner (1860); Parin, Borodulina (2002); Melo *et al.* (2020)

TABLE 2 | (Continued)

Species	References
Astronesthes boulengeri Gilchrist, 1902	Parin *et al.* (1999)
Astronesthes gemmifer Goode & Bean, 1896	Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Astronesthes gudrunae Parin & Borodulina, 2002	This study
Astronesthes haplophos Parin & Borodulina, 2002	Parin, Borodulina (2003); Melo *et al.* (2020)
Astronesthes illuminata Parin, Borodulina & Hulley, 1999	Parin *et al.* (1999)
Astronesthes macropogon Goodyear & Gibbs, 1970	Parin, Borodulina (1997); Figueiredo *et al.* (2002); Braga *et al.* (2007); Costa, Mincarone (2010); Mincarone *et al.* (2017); Melo *et al.* (2020)
Astronesthes micropogon Goodyear & Gibbs, 1970	Parin, Borodulina (2003); Judkins, Haedrich (2018)
Astronesthes richardsoni (Poey, 1852)	Parin, Borodulina (2000, 2003); Judkins, Haedrich (2018); this study
Astronesthes similus Parr, 1927	Braga *et al.* (2007); Pinheiro *et al.* (2015); Eduardo *et al.* (2020c); Melo *et al.* (2020); this study
Borostomias elucens (Brauer, 1906)	This study
Heterophotus ophistoma Regan & Trewavas, 1929	Judkins, Haedrich (2018); Klautau *et al.* (2020); Marceniuk *et al.*, (2021); this study
Chauliodontinae	
Chauliodus danae Regan & Trewavas, 1929	Judkins, Haedrich (2018); Melo *et al.* (2020)
Chauliodus minimus Parin & Novikova, 1974	Parin, Novikova (1974); Bernardes *et al.* (2005); Haimovici *et al.* (2008); Melo *et al.* (2020)
Chauliodus schmidti Ege, 1948	Judkins, Haedrich (2018)
Chauliodus sloani Bloch & Schneider, 1801	Parin, Novikova (1974); Figueiredo *et al.* (2002); Menezes *et al.* (2003); Bernardes *et al.* (2005); Bonecker, Castro (2006); Braga *et al.* (2007); Haimovici *et al.* (2008); Bonecker *et al.* (2014); Lins Oliveira *et al.* (2015); Judkins, Haedrich (2018); Eduardo *et al.* (2020b); Melo *et al.* (2020); this study
Stomiinae	
Stomias affinis Günther, 1887	Haimovici *et al.* (1994); Figueiredo *et al.* (2002); Bernardes *et al.* (2005); Bonecker, Castro (2006); Braga *et al.* (2007); Haimovici *et al.* (2008); Costa, Mincarone (2010); Bonecker *et al.* (2014); Mincarone *et al.* (2017); Melo *et al.* (2020)
Stomias boa (Risso, 1810)	Shcherbachev, Novikova (1976); Gibbs (1969); Melo *et al.* (2020)
Stomias colubrinus Garman, 1899	Séret, Andreata (1992); Melo *et al.* (2020)
Stomias danae Ege, 1933	Gibbs (1969); Menezes *et al.* (2003); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Stomias longibarbatus (Brauer, 1902)	Judkins, Haedrich (2018); this study
Idiacanthinae	
Idiacanthus atlanticus Brauer, 1906	Figueiredo *et al.* (2002); Mincarone *et al.* (2004); Bernardes *et al.* (2005); Haimovici *et al.* (2008); Melo *et al.* (2020)
Malacosteinae	
Aristostomias grimaldii Zugmayer, 1913	This study
Aristostomias tittmanni Welsh, 1923	Judkins, Haedrich (2018); this study
Aristostomias xenostoma Regan & Trewavas, 1930	Judkins, Haedrich (2018)
Malacosteus niger Ayres, 1848	Braga *et al.* (2007); Costa, Mincarone (2010); Olivar *et al.* (2017); Mincarone *et al.* (2017); Eduardo *et al.* (2018a); Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Pachystomias microdon (Günther, 1878)	This study
Photostomias atrox (Alcock, 1890)	Kenaley, Hartel (2005); Melo *et al.* (2020); this study
Photostomias goodyeari Kenaley & Hartel, 2005	Melo *et al.* (2020); this study
Photostomias guernei Collett, 1889	Bonecker, Castro (2006); Melo *et al.* (2020)

TABLE 2 | (Continued)

Species	References
Melanostomiinae	
Bathophilus brevis Regan & Trewavas, 1930	Judkins, Haedrich (2018); Sutton *et al.* (2020)
Bathophilus nigerrimus Giglioli, 1882	This study
Bathophilus pawneei Parr, 1927	Judkins, Haedrich (2018); Sutton *et al.* (2020); this study
Echiostoma barbatum Lowe, 1843	Menezes *et al.* (2003); Melo *et al.* (2020)
Eustomias arborifer Parr, 1927	Gibbs *et al.* (1983); Judkins, Haedrich (2018); Melo *et al.* (2020)
Eustomias bibulbosus Parr, 1927	This study
Eustomias bigelowi Welsh, 1923	Clarke (2000)
Eustomias braueri Zugmayer, 1911	Melo *et al.* (2020); this study
Eustomias brevibarbatus Parr, 1927	Gomon, Gibbs (1985); Menezes *et al.* (2003); Costa, Mincarone (2010); Melo *et al.* (2020); this study
Eustomias curtifilis Clarke, 2000	Clarke (2000); Melo *et al.* (2020)
Eustomias enbarbatus Welsh, 1923	Judkins, Haedrich (2018); this study
Eustomias filifer (Gilchrist, 1906)	Menezes *et al.* (2003); Melo *et al.* (2020)
Eustomias fissibarbis (Pappenheim, 1914)	Judkins, Haedrich (2018)
Eustomias ignotus Gomon & Gibbs, 1985	Gomon, Gibbs (1985); Melo *et al.* (2020)
Eustomias longibarba Parr, 1927	Menezes *et al.* (2003); Melo *et al.* (2020)
Eustomias macronema Regan & Trewavas, 1930	Clarke (2000)
Eustomias minimus Clarke, 1999	This study
Eustomias posti Gibbs, Clarke & Gomon, 1983	Gibbs *et al.* (1983); Judkins, Haedrich (2018); Melo *et al.* (2020)
Eustomias satterleei Beebe, 1933	Clarke (2000); Judkins, Haedrich (2018)
Eustomias schmidti Regan & Trewavas, 1930	Melo *et al.* (2020); this study
Eustomias spherulifer Gibbs, Clarke & Gomon, 1983	Gibbs *et al.* (1983); Melo *et al.* (2020)
Eustomias tetranema Zugmayer, 1913	Costa, Mincarone (2010); Melo *et al.* (2020)
Melanostomiinae	
Flagellostomias boureei (Zugmayer, 1913)	Bernardes *et al.* (2005); Bonecker, Castro (2006); Haimovici *et al.* (2008); Melo *et al.* (2020)
Grammatostomias dentatus Goode & Bean, 1896	Melo *et al.* (2020); this study
Grammatostomias ovatus Prokofiev, 2014	This study
Leptostomias gladiator (Zugmayer, 1911)	Melo *et al.* (2020); this study
Leptostomias longibarba Regan & Trewavas, 1930	Judkins, Haedrich (2018); Melo *et al.* (2020)
Melanostomias bartonbeani Parr, 1927	Melo *et al.* (2020); this study
Melanostomias biseriatus Regan & Trewavas, 1930	This study
Melanostomias niger Gilchrist & von Bonde, 1924	Haimovici *et al.* (1994); Figueiredo *et al.* (2002); Bernardes *et al.* (2005); Haimovici *et al.* (2008); Melo *et al.* (2020)
Melanostomias tentaculatus (Regan & Trewavas, 1930)	Judkins, Haedrich (2018); Melo *et al.* (2020); this study
Melanostomias valdiviae Brauer, 1902	Menezes *et al.* (2003); Melo *et al.* (2020)
Photonectes achirus Regan & Trewavas, 1930	This study
Photonectes mirabilis Parr, 1927	Bonecker, Castro (2006); Judkins, Haedrich (2018); Melo *et al.* (2020)
Thysanactis dentex Regan & Trewavas, 1930	Eduardo *et al.* (2018a); Judkins, Haedrich (2018); this study

ACKNOWLEDGMENTS

We thank the French oceanographic fleet for funding the at-sea survey ABRACOS and the officers and crew of the RV *Antea* for their contribution to the success of the operations. This study could not have been carried out without the support of the team members of the BIOIMPACT (UFRPE) and LIZ (NUPEM/UFRJ) labs. We thank Alexei Orlov (P.P. Shirshov Institute of Oceanology) and Sergei Evseenko (*in memorian*) for providing literature. Thanks, are also due to Alfredo Carvalho-Filho and an anonymous reviewer for insightful comments and suggestions to the manuscript. CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico – PROTAX 443302/2020) and CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) provided scholarships to Bárbara Villarins. CNPq Research Grants were provided to Flávia Lucena-Frédou, and Michael Mincarone (grants 308554/2019–1 and 314644/2020–2, respectively). Artem Prokofiev is supported by the Russian Science Foundation (grant 19-14-00026). The NPM Fish Collection is supported by FUNBIO (grant 104/2016 – "Pesquisa Marinha e Pesqueira") and FAPERJ (grant E–26/210.290/2021). This study is a contribution to the LMI TAPIOCA, CAPES/COFECUB program (88881.142689/2017–01), and EU H2020 TRIATLAS project (grant agreement 817578). This is part of the study conducted by the first author to obtain the BSc Degree in Biological Sciences at the Universidade Federal do Rio de Janeiro (UFRJ). We are especially grateful to members of the examination board, Cristiano Moreira (MNRJ) and Luciano Fischer (NUPEM/UFRJ) for comments and suggestions.

REFERENCES

- **Afonso GVF, Di Dario F, Eduardo LN, Lucena-Frédou F, Bertrand A, Mincarone MM.** Taxonomy and distribution of deep-sea bigscales and whalefishes (Teleostei: Stephanoberycoidei) collected off northeastern Brazil, including seamounts and oceanic islands. Ichthyol Herpetol. 2021; 109(2):467–88. http://doi.org/10.1643/i2020069
- **Afonso NR, Coad BW, Sawatzky CD, Reist JD.** Distributional records for marine fishes of Artic Canada. Canadian Data Report of Fisheries and Aquatic Sciences 1287. Winnipeg: Fisheries and Oceans Canada, Central and Arctic Region; 2018. Available from: https://publications.gc.ca/site/eng/9.860626/publication.html
- **Aizawa M.** Stomiiformes. In: Nakabo T, editor. Fishes of Japan with pictorial keys to the species. Eng ed. Tokyo: Tokai University Press; 2002. p.305–46.
- **Akbora HD, Ayas D, Soydemir Çiftçi N.** The presence of bristlemouth *Gonostoma denudatum* (Rafinesque, 1810), from the coast of Northern Cyprus (Northeastern Mediterranean). Mar Sci Technol Bull. 2020; 9(1):42–45. http://doi.org/10.33714/masteb.667602
- **Badcock J, Baird RC.** Remarks of systematics, development, and distribution of the hatchetfish genus *Sternoptyx* (Pisces, Stomiatoidei). Fish Bull (Wash DC). 1980; 77(4):803–20. Available from: https://spo.nmfs.noaa.gov/sites/default/files/pdf-content/1979/774/badcock.pdf
- **Badcock J.** A new species of the deep-sea fish genus *Cyclothone* Goode & Bean (Stomiatoidei, Gonostomatidae) from the tropical Atlantic. J Fish Biol. 1982; 20(2):197–211. https://doi.org/10.1111/j.1095-8649.1982.tb03920.x
- **Baird RC.** The systematics, distribution, and zoogeography of the marine hatchetfishes (family Sternoptychidae). Bull Mus Comp Zool. 1971; 142(1):1–128.

- **Baird RC.** Tribe Sternoptychini. In: Smith MM, Heemstra PC, editors. Smiths' sea fishes. New York: Springer-Verlag; 1986. p.255–59.
- **Balushkin AV.** Findings of the silver lightfish *Phosichthys argenteus* (Phosichthyidae) at the Pulkovo Ridge (South-Central Pacific). J Ichthyol. 2017; 57(6):821–26. https://doi.org/10.1134/S0032945217060029
- **Bañón R, Villegas-Ríos D, Serrano A, Mucientes G, Arronte JC.** Marine fishes from Galicia (NW Spain): An updated checklist. Zootaxa. 2010; 2667(1):1–27. https://doi.org/10.11646/zootaxa.2667.1.1
- **Bariche M, Fricke R.** The marine ichthyofauna of Lebanon: An annotated checklist, history, biogeography, and conservation status. Zootaxa. 2020; 4775(1):1–157. https://doi.org/10.11646/zootaxa.4775.1.1
- **Barnett MA, Gibbs Jr. RH.** Four new stomiatoid fishes of the genus *Bathophilus* with a revised key to the species of *Bathophilus*. Copeia. 1968; 1968(4):826–32. https://doi.org/10.2307/1441850
- **Bayhan YK, Ergüden D.** First record of *Gonostoma denudatum*, Rafinesque 1810 (Family: Gonostomatidae) from Mersin Bay (Northeastern Mediterranean, Turkey). Turk J Marit Marine Sci. 2019; 5(1):64–68. Available from: https://dergipark.org.tr/en/pub/trjmms/issue/48946/595962
- **Béarez P, Pruvost P, Feunteun E, Iglésias SP, Francour P, Causse R, De Mazieres J, Tercerie S, Bailly N.** Checklist of the marine fishes from metropolitan France. Cybium. 2017; 41(4):351–71. https://doi.org/10.26028/CYBIUM/2017-414-006
- **Bekker VE, Shcherbachev YN, Tchuvasov VM.** Deep-sea pelagic fishes of the Caribbean Sea, Gulf of Mexico, and Puerto Rican Trench. Tr Inst Okeanol im P P Shirshova Akad Nauk SSSR. 1975; 100:289–336.
- **Bernal A, Toresen R, Riera R.** Mesopelagic fish composition and diets of three myctophid species with potential incidence of microplastics, across the southern tropical gyre. Deep Sea Res 2 Top Stud Oceanogr. 2020; 179:104706. https://doi.org/10.1016/j.dsr2.2019.104706
- **Bernardes RA, Figueiredo JL, Rodrigues AR, Fischer LG, Vooren CM, Haimovici M, Rossi-Wongtschowski CLDB.** Peixes da zona econômica exclusiva da região Sudeste-Sul do Brasil: Levantamento com armadilhas, pargueiras e rede de arrasto de fundo. São Paulo: Editora da Universidade de São Paulo; 2005.
- **Bertrand A**. ABRACOS cruise, RV Antea. 2015. http://doi.org/10.17600/15005600
- **Bertrand A**. ABRACOS 2 cruise, RV Antea. 2017. https://doi.org/10.17600/17004100
- **Bilecenoglu M, Taskavak E, Mater S, Kaya M.** Checklist of the marine fishes of Turkey. Zootaxa. 2002; 113(1):1–194. https://doi.org/10.11646/zootaxa.113.1.1
- **Blache PJ.** *Ichthyococcus polli* nov. sp. (Gonostomidae), poisson téléostéen bathypélagique nouveau de l'Atlantique tropical africain. Bull Mus Natl Hist Nat. 1963; 35(5):468–72.
- **Bonecker ACT, Castro MS.** Atlas de larvas de peixes da região central da Zona Econômica Exclusiva brasileira. Rio de Janeiro: Museu Nacional; 2006.
- **Bonecker ACT, Castro MS, Costa PG, Bianchini A, Bonecker SLC.** Larval fish assemblages of the coastal area affected by the tailings of the collapsed dam in Southeast Brazil. Reg Stud Mar Sci. 2019; 32:100848. https://doi.org/10.1016/j.rsma.2019.100848
- **Bonecker ACT, Katsuragawa M, Castro MS, Gomes EAP, Namiki CAP, Zani-Teixeira ML.** Larval fish of the Campos Basin, southeastern Brazil. Check List. 2012; 8(6):1280–91. https://doi.org/10.15560/8.6.1280
- **Bonecker ACT, Namiki CAP, Castro MS, Campos PN.** Catálogo dos estágios iniciais de desenvolvimento dos peixes da Bacia de Campos. Série Zoologia: Guias e manuais de Identificação. Curitiba: Sociedade Brasileira de Zoologia; 2014. Available from: http://books.scielo.org/id/q7vqn
- **Bordes F, Uiblein F, Castillo R, Barrera A, Castro JJ, Coca J, Gomez J, Hansen K, Hernandez V, Merrett N, Miya M, Moreno T, Perez F, Ramos A, Sutton T, Yamaguchi M.** Epi- and mesopelagic fishes, acoustic data, and SST images collected off Lanzarote, Fuerteventura, and Gran Canaria, Canary Islands, during cruise "La Bocaina 04-97". Inf Téc Inst Canario Cienc Mar. 1999; 5:1–45. Available from: https://nsuworks.nova.edu/occ_facreports/59/

- **Borodulina OD.** A new species of hatchetfish, *Sternoptyx pseudodiaphana* (Sternoptychidae, Osteichthyes) from the waters of the Southern Hemisphere. Vopr Ikhtiol. 1977; 17(5):938–41.
- **Borodulina OD.** Materials on the systematics and distribution of the oceanic hatchetfishes genera *Argyropelecus* and *Sternoptyx* (Sternoptychidae, Osteichthyes). Tr Inst Okeanol im P P Shirshova Akad Nauk SSSR. 1978; 111:28–60.
- **Braga AC, Costa PAS, Lima AD, Nunam GW, Olavo G, Martins AS.** Padrões de distribuição de teleósteos epi- e mesopelágicos na costa central (11–22°S) brasileira. In: Costa PAS, Olavo G, Martins AS, editors. Biodiversidade da fauna marinha profunda na costa central brasileira. Rio de Janeiro: Museu Nacional; 2007. p.63–86.
- **Bruun AF.** On some new fishes of the family Gonostomatidae. Preliminary note. Vidensk Meddel Naturhist Foren Kjøbenhavn. 1931; 92:285–91.
- **Burton EJ, Lea RN.** Annotated checklist of fishes from Monterey Bay National Marine Sanctuary with notes on extralimital species. Zookeys, 2019; 887:1–119. https://doi.org/10.3897/zookeys.887.38024
- **Carneiro M, Martins R, Reiner F, Batista I.** Ichthyofauna of Portugal: taxonomic diversity, common and scientific names of marine fishes. Vol. 1. Lisboa: Instituto Português do Mar e da Atmosfera; 2019. Available from: https://www.ipma.pt/resources.www/docs/publicacoes.site/Ictiofauna-de-Portugal-VOL1.pdf
- **Cherel Y, Romanov EV, Annasawmy P, Thibault D, Ménard F.** Micronektonic fish species over three seamounts in the southwestern Indian Ocean. Deep-Sea Res II: Top Stud Oceanogr. 2020; 176:104777. https://doi.org/10.1016/j.dsr2.2020.104777
- **Clarke TA.** Some aspects of the ecology of stomiatoid fishes in the Pacific Ocean near Hawaii. Fish Bull. 1974; 72(2):337–51. Available from: https://spo.nmfs.noaa.gov/content/some-aspects-ecology-stomiatoid-fishes-pacific-ocean-near-hawaii
- **Clarke TA.** Pelagic fishes of the genus *Eustomias* (Melanostomiidae) presently associated with *Eustomias achirus* Parin and Pokhilskaya with the description of five new species. Copeia. 1998; 1998(3): 676–86. https://doi.org/10.2307/1447797
- **Clarke TA.** Pelagic fishes of the genus *Eustomias* (Melanostomiidae) similar to *Eustomias dendriticus* Regan and Trewavas with the description of seven new species. Copeia. 1999; 1999(4):1002–13. https://doi.org/10.2307/1447975
- **Clarke TA.** Review of nine species of North Atlantic *Eustomias*, subgenus *Dinematochirus* (Pisces: Stomiidae), with the description of two new species. Copeia. 2000; 2000(1):96–111. https://doi.org/10.1643/0045-8511(2000)2000[0096:RONSON]2.0.CO;2
- **Clarke TA.** Pelagic fishes of the genus *Eustomias*, subgenus *Dinematochirus* (Stomiidae), in the Indo-Pacific with the descriptions of twelve new species. Copeia. 2001; 2001(3):683–99. http://doi.org/10.1643/0045-8511(2001)001[0683:PFOTGE]2.0.CO;2
- **Coad BW.** Family Gonostomatidae. In: Coad BW, Reist JD, editors. Marine fishes of Arctic Canada. Can Data Rep Fish Aquat Sci. 2018a; 1287:302–04.
- **Coad BW.** Family Stomiidae. In: Coad BW Reist JD, editors. Marine fishes of Arctic Canada. Can Data Rep Fish Aquat Sci. 2018b; 1287:307–15.
- **Costa PAS, Mincarone MM.** Ictiofauna demersal. In: Lavrado HP, Brasil ACS, editors. Biodiversidade da região oceânica profunda da Bacia de Campos: Megafauna e ictiofauna demersal. Rio de Janeiro: Sag Serv; 2010. p.293–373.
- **Czudaj S, Giesemann A, Hoving H-J, Koppelmann R, Lüskov F, Möllmann C, Fock HO.** Spatial variation in the trophic structure of micronekton assemblages from the eastern tropical North Atlantic in two regions of differing productivity and oxygen environments. Deep-Sea Res I: Oceanogr Res Pap. 2020; 163:103275. https://doi.org/10.1016/j.dsr.2020.103275
- **De Groot SJ, Nijssen H.** Notes on the fishes collected by the R.V. "Tridens" on the north west African shelf, 19-25 Janurary 1969. Bijdr Dierkd. 1971; 41(1):3–09.

- **Duhamel G, Hulley P-A, Causse R, Koubbi P, Vacchi M, Pruvost P, Vigetta S, Irisson J-O, Mormède S, Belchier M, Dettai A, Detrich HW, Gutt J, Jones CD, Kock K-H, Lopez ALJ, Van de Putte AP.** Chapter 7. Biogeographic patterns of fish. In: De Broyer C, Koubbi P, Griffiths HJ, Raymond B, d'Udekem d'Acoz C, Van de Putte AP, Danis B, David B, Grant S, Gutt J, Held C, Hosie G, Huettmann F, Post A, Ropert-Coudert Y, editors. Biogeographic atlas of the Southern Ocean. Cambridge: Scientific Committee on Antartic Research; 2014. p.328–62.
- **Eduardo LN, Bertrand A, Mincarone MM, Martins JR, Frédou T, Assunção RV, Lima RS, Ménard F, Le Loc'h F, Lucena-Frédou F.** Distribution, vertical migration, and trophic ecology of lanternfishes (Myctophidae) in the Southwestern Tropical Atlantic. Prog Oceanogr. 2021; 199:102695. https://doi.org/10.1016/j.pocean.2021.102695
- **Eduardo LN, Bertrand A, Mincarone MM, Santos LV, Frédou T, Assunção RV, Silva A, Ménard F, Schwamborn R, Le Loc'h F, Lucena-Frédou F.** Hatchetfishes (Stomiiformes: Sternoptychidae) biodiversity, trophic ecology, vertical niche partitioning and functional roles in the western tropical Atlantic. Prog Oceanogr. 2020a; 187:102389. https://doi.org/10.1016/j.pocean.2020.102389
- **Eduardo LN, Lucena-Frédou F, Mincarone MM, Soares APC, Le Loc'k F, Fredou T, Menard F, Bertrand A.** Trophic ecology, habitat, and migratory behaviour of the viperfish *Chauliodus sloani* reveal a key mesopelagic player. Sci Rep. 2020b; 10:1–13. https://doi.org/10.1038/s41598-020-77222-8
- **Eduardo LN, Mincarone MM, Lucena-Frédou F, Martins JR, Afonso GVF, Villarins BT, Frédou T, Lira AS, Bertrand A.** Length-weight relationship of twelve mesopelagic fishes from the western tropical Atlantic. J Appl Ichthyol. 2020c; 36(6):845–48. https://doi.org/10.1111/jai.14084
- **Eduardo LN, Mincarone MM, Villarins BT, Frédou T, Lira AS, Bertrand A, Lucena-Frédou F.** Length-weight relationships of eleven mesopelagic fishes from oceanic islands of the southwestern tropical Atlantic. J Appl Ichthyol. 2018a; 35(2):605–07. https://doi.org/10.1111/jai.13840
- **Eduardo LN, Villarins BT, Lucena-Frédou F, Frédou T, Lira AS, Bertrand A, Mincarone MM.** First record of the intermediate scabbardfish *Aphanopus intermedius* (Scombriformes: Trichiuridae) in the western South Atlantic Ocean. J Fish Biol. 2018b; 93:992–95. https://doi.org/10.1111/jfb.13796
- **Eduardo LN, Villarins BT, Martins JR, Lucena-Frédou F, Frédou T, Souza AL, Travassos PE, Bertrand A, Mincarone MM.** Deep-sea oceanic basslets (Perciformes, Howellidae) from Brazil: new records and range extensions. Check List. 2019; 15:965–71. https://doi.org/10.15560/15.6.965
- **Elbaraasi H, Elabar B, Elaabidi S, Bashir A, Elsilini O, Shakman E, Azzurro E.** Updated checklist of bony fishes along the Libyan coast (southern Mediterranean Sea). Mediterr Mar Sci. 2019; 20(1):90–105. https://doi.org/10.12681/mms.15570
- **Figueiredo JL, Santos AP, Yamaguti N, Bernardes RA, Rossi-Wongtschowski CLB.** Peixes da zona econômica exclusiva da Região Sudeste-Sul do Brasil: levantamento com rede de meia-água. São Paulo: Editora da Universidade de São Paulo; 2002.
- **Fink WL.** Phylogenetic interrelationships of the stomiid fishes. Misc Publ Mus Zool Univ Mich. 1985; 171:1–127. https://hdl.handle.net/2027.42/56415
- **Flynn AJ, Klepadlo C.** Two new species of *Photonectes* (Teleostei: Stomiidae) from the Indo-Pacific, and a re-examination of *P. achirus*. Mem Mus Victoria. 2012; 69:259–67. https://doi.org/10.24199/j.mmv.2012.69.04
- **Fricke R, Allen GR, Andréfouet S, Chen W-J, Hamle MA, Laboute P, Mana R, Tan HH, Uyeno D.** Checklist of the marine and estuarine fishes of Madang District, Papua New Guinea, western Pacific Ocean, with 820 new records. Zootaxa. 2014; 3832(1):1–247. https://doi.org/10.11646/zootaxa.3832.1.1
- **Fricke R, Eschmeyer W, Van der Lann R.** Eschmeyer's Catalog of Fishes: Genera, species, references. San Francisco: California Academy of Science; 2022. Available from: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp.

- **Fricke R, Kulbicki M, Wantiez L.** Checklist of the fishes of New Caledonia, and their distribution in the Southwest Pacific Ocean (Pisces). Stuttg Beitr Naturkd A. 2011; 4: 341–463. Available from: https://www.documentation.ird.fr/hor/fdi:010061070
- **Fricke R, Mahafina J, Behivoke F, Jaonalison H, Léopold M, Ponton D.** Annotated checklist of the fishes of Madagascar, Southwestern Indian Ocean, with 158 new records. Fishtaxa. 2018; 3(1):1–432. https://www.biotaxa.org/ft/article/view/3-1
- **Fricke R, Mulochau T, Durville P, Chabanet P, Tessier E, Letourneur Y.** Annotated checklist of the fish species (Pisces) of La Réunion, including a red list of threatened and declining species. Stuttg Beitr Naturkd A. 2009; 2:1–168.
- **Fujii E.** Family Gonostomatidae. In: Uyeno T, Matsuura K, Fujii E, editors. Fishes trawled off Suriname and French Guiana. Tokyo: Japan Marine Fishery Resource Research Center; 1983a. p.132–36.
- **Fujii E.** Family Astronesthidae. In: Uyeno T, Matsuura K, Fujii E, editors. Fishes trawled off Suriname and French Guiana. Tokyo: Japan Marine Fishery Resource Research Center; 1983b. p.144–48.
- **Fujii E.** Family Malacosteidae. In: Uyeno T, Matsuura K, Fujii E, editors. Fishes trawled off Suriname and French Guiana. Tokyo: Japan Marine Fishery Resource Research Center; 1983c; p.155–56.
- **Fujii E.** Family Melanostomiidae. In: Uyeno T, Matsuura K, Fujii E, editors. Fishes trawled off Suriname and French Guiana. Tokyo: Japan Marine Fishery Resource Research Center; 1983d. p.149–54.
- **Gibbs RH Jr.** The Stomiatoid fish genera *Eustomias* and *Melanostomias* in the Pacific, with descriptions of two new species. Copeia. 1960; 1960(3):200–03. https://doi.org/10.2307/1439656
- **Gibbs RH Jr.** Family Astronesthidae. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr, Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964; p.311–50.
- **Gibbs RH Jr.** Taxonomy, sexual dimorphism, vertical distribution, and evolutionary zoogeography of the bathypelagic fish genus *Stomias* (family Stomiatidae). Smithson Contrib Zool, 1969; 31:1–25. https://doi.org/10.5479/si.00810282.31
- **Gibbs RH Jr.** Notes on fishes of the genus *Eustomias* (Stomiatoidei, Melanostomiatidae) in Bermuda waters, with the description of a new species. Proc Biol Soc Wash. 1971; 84(29):235–44. Available from: https://www.biodiversitylibrary.org/part/44329
- **Gibbs RH Jr.** Family Chauliodontidae. In: Smith MM, Heemstra PC, editors. Smiths' Sea Fishes. Johannesburg: Macmillan; 1986a. p.230. https://doi.org/10.1007/978-3-642-82858-4
- **Gibbs RH Jr.** Family Stomiidae. In: Smith MM, Heemstra PC, editors. Smiths' Sea Fishes. Johannesburg: Macmillan; 1986b. p.229–30. https://doi.org/10.1007/978-3-642-82858-4
- **Gibbs RH Jr.** Family Melanostomiidae. In: Smith MM, Heemstra PC, editors. Smiths' Sea Fishes. Johannesburg: Macmillan; 1986c. p.236–43. https://doi.org/10.1007/978-3-642-82858-4
- **Gibbs RH Jr.** Astronesthidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990a. p.300–07.
- **Gibbs RH Jr.** Stomiidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990b. p.296–99.
- **Gibbs RH Jr, Amaoka K, Haruta C.** *Astronesthes trifibulatus*, a new Indo-Pacific stomioid fish (family Astronesthidae) related to the Atlantic *A. similis*. Japan J Ichthyol. 1984; 31(1):5–14. https://doi.org/10.11369/jji1950.31.5
- **Gibbs RH Jr, Barnett MA.** Melanostomiidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990. p.308–37.
- **Gibbs RH Jr, Clarke TA, Gomon JR.** Taxonomy and distribution of the stomioid fish genus *Eustomias* (Melanostomiidae), I: Subgenus *Nominostomias*. Smithson Contrib Zool. 1983; 380:1–139. https://doi.org/10.5479/si.00810282.380

- **Gibbs RH Jr, Craddock JE.** *Eustomias crucis* (Stomiatoidei, Melanostomiatidae), a new species of deepsea fish from the eastern South Pacific, and contributions to the knowledge of *Eustomias trewavasae* Norman. Proc Biol Soc Wash. 1973; 86(13):153–61. Available from: https://www.biodiversitylibrary.org/part/44093
- **Gjøsaeter J, Kawaguchi K.** A review of the world resources of mesopelagic fish. FAO Fish Tech Pap. 1980; 193:123–34.
- **Goçalo CG, Katsuragawa M, Silveira ICA.** Patterns of distribution and abundance of larval Phosichthyidae (Actinopterygii, Stomiiformes) in southeastern Brazilian waters. Braz J Oceanogr. 2011; 59(3):213–29. https://doi.org/10.1590/S1679-87592011000300002
- **Golani D.** The marine ichthyofauna of the eastern Levant – history, inventory, and characterization. Isr J Zool. 1996; 42(1):15–55. https://doi.org/10.1080/00212210.1996.10688830
- **Gomon JR, Gibbs RH Jr.** Taxonomy and distribution of the stomioid fish genus *Eustomias* (Melanostomiidae), II: *Biradiostomias*, new subgenus. Smithson Contrib Zool. 1985; 409:1–58. https://doi.org/10.5479/si.00810282.409
- **Gon O.** Gonostomatidae. In: Gon O, Heemstra PC, editors. Fishes of the Southern Ocean. Grahamstown: JLB Smith Institute of Ichthyology; 1990a. p.116–22.
- **Gon O.** Sternoptychidae. In: Gon O, Heemstra PC, editors. Fishes of the Southern Ocean. Grahamstown: JLB Smith Institute of Ichthyology; 1990b. p.123–26.
- **Gon O.** Stomiidae. In: Gon O, Heemstra PC, editors. Fishes of the Southern Ocean. Grahamstown: JLB Smith Institute of Ichthyology; 1990c. p.127–33.
- **Goodyear RH.** Malacosteidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990. p.338–40.
- **Goodyear RH, Gibbs RH Jr.** Family Malacosteidae. In: Smith MM, Heemstra PC, editors. Smiths' Sea Fishes. Johannesburg, Macmillan; 1986. p.235–36.
- **Gorbunova NN.** Systematics, distribution and biology of the fishes of the genus *Vinciguerria* (Pisces: Gonostomatidae). Tr Inst Okeanol Akad Nauk SSSR. 1972; 93:70–109.
- **Grey M.** Family Gonostomatidae. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr., Grey M, Morrow JE Jr, Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964; p.78–240.
- **Haimovici M, Martins AS, Figueiredo JL, Vieira PC.** Demersal bony fish of the outer shelf and upper slope of the Southern Brazil Subtropical Convergence ecosystem. Mar Ecol Prog Ser. 1994; 108:59–77. https://doi.org/10.3354/meps108059
- **Haimovici M, Rossi-Wongtschowski CLDB, Bernardes RA, Fisher LG, Vooren CM, Santos RA, Rodrigues AR, Santos S.** Prospecção pesqueira de espécies demersais com rede de arrasto-de-fundo na região Sudeste-Sul do Brasil. Série Documentos Revizee. São Paulo: Edusp; 2008. https://doi.org/10.13140/2.1.3461.0247
- **Harold AS.** Phylogenetic relationships of the Gonostomatidae (Teleostei: Stomiiformes). Bull Mar Sci, 1998; 62(3):715–41. Available from: https://www.ingentaconnect.com/contentone/umrsmas/bullmar/1998/00000062/00000003/art00001
- **Harold AS.** Order Stomiiformes. In: Carpenter KE, editor. The living marine resources of the western central Atlantic. Volume 2. Bony fishes part 1 (Acipenseridae to Grammatidae). FAO Spec Ident Guid Fish Purp, ASIH Spec Publ 5. Rome: FAO; 2003. p.881–912.
- **Harold AS, Stewart AL, Roberts CD.** Family Sternoptychidae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Vol. 2. Wellington: Te Papa Press; 2015. p.446–68.
- **Harold AS, Weitzman SH.** Interrelationships of stomiiform fishes. In: Stiassny MLJ, Parenti LR, Johnson GD, editors. Interrelationship of Fishes. San Diego: Academic Press; 1996. p.333–53.
- **Hartel KE, Kenaley CP, Galbraith JK, Sutton TT.** Additional records of deep-sea fishes from off greater New England. Northeast Nat. 2008; 15(3):317–34. https://doi.org/10.1656/1092-6194-15.3.317
- **Hubbs CL, Lagler KF.** Fishes of the Great Lakes region. Cranbrook Inst Sci Bull. 1958; 26: 1–213.

- **Hutchins JB.** Checklist of the fishes of Western Australia. Rec West Aust Mus. 2001(Suppl.); 63:9–50. https://doi.org/10.18195/issn.0313-122x.63.2001.009-050
- **Irigoien X, Klevjer TA, Røstad A, Martinez U, Boyra G, Acuña JL, Bode A, Echevarria F, Gonzalez-Gordillo JI, Hernandez-Leon S, Agusti S, Asknes DL, Duarte CM, Kaartvedt S.** Large mesopelagic fishes biomass and trophic efficiency in the open ocean. Nat Commun. 2014; 5:3271. https://doi.org/10.1038/ncomms4271
- **Johnson RK.** A new species of *Diplophos* (Salmoniformes: Gonostomatidae) from the western Pacific. Copeia. 1970; 1970(3):437–43. https://doi.org/10.2307/1442270
- **Johnson RK, Feltes RM.** A new species of *Vinciguerria* (Salmoniformes: Photichthyidae) from the Red Sea and Gulf of Aqaba, with comments on the depauperacy of the Red Sea mesopelagic fish fauna. Fieldiana Zool (New Series). 1984; 22:1–35.
- **Judkins DC, Haedrich RL.** The deep scattering layer micronektonic fish faunas of the Atlantic mesopelagic ecoregions with comparison of the corresponding decapod shrimp faunas. Deep-Sea Res I: Oceanogr Res Pap. 2018; 136:1–30. https://doi.org/10.1016/j.dsr.2018.04.008
- **Kenaley CP.** Revision of the stoplight loosejaw genus *Malacosteus* (Teleostei: Stomiidae: Malacosteinae), with description of a new species from the temperate Southern Hemisphere and Indian Ocean. Copeia. 2007; 2007(4):886–900. https://doi.org/10.1643/0045-8511(2007)7[886:ROTSLG]2.0.CO;2
- **Kenaley CP.** Revision of Indo-Pacific species of the loosejaw dragonfish genus *Photostomias* (Teleostei: Stomiidae: Malacosteinae). Copeia. 2009: 2009(1):175–89. https://doi.org/10.1643/CI-07-224
- **Kenaley CP, Hartel KE.** A revision of Atlantic species of *Photostomias* (Teleostei: Stomiidae: Malacosteinae), with a description of a new species. Ichthyol Res, 2005; 52(3):251–63. https://doi.org /10.1007/s10228-005-0281-7
- **Kenaley CP, Stewart AL.** Order Stomiiformes. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015a. p.418–19.
- **Kenaley CP, Stewart AL.** Family Diplophidae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015b. p.420–22.
- **Kenaley CP, Stewart AL.** Family Gonostomatidae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015c. p.421–35.
- **Kenaley CP, Stewart AL.** Family Phosichthyidae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015d. p.436–45.
- **Kenaley CP, Stewart AL.** Family Stomiidae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015e. p.469–70.
- **Kenaley CP, Stewart AL.** Subfamily Stomiinae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015f. p.487–91.
- **Kenaley CP, Stewart AL.** Subfamily Malacosteinae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015g. p.524–30.
- **Kenaley CP, Stewart AL.** Subfamily Melanostomiinae. In: Roberts AL, Stewart AL, Struthers CD, editors. The fishes of New Zealand, vol. 2. Wellington: Te Papa Press; 2015h. p.494–520.
- **Klautau AGCM, Cintra IHA, Rotundo MM, Carvalho-Filho A, Caires RA, Marceniuk AP.** The deep-sea teleost fish fauna of the Brazilian north coast. Neotrop Ichthyol. 2020; 18(3):e200030. https://doi.org/10.1590/1982-0224-2020-0030
- **Klepadlo C.** Three new species of the genus *Photonectes* (Teleostei: Stomiiformes: Stomiidae: Melanostomiinae) from the Pacific Ocean. Copeia. 2011; 2011(2):201–10. https://doi.org/10.1643/CG-10-184
- **Kner R.** Über einige noch unbeschriebene Fische. Sitzungsber Kaiserl Akad Wiss, Math-Naturwiss Cl: 1860: 39(4):531–46.
- **Koeda K, Ho H-C.** A new portholefish of the genus *Diplophos* (Stomiiformes: Gonostomatidae) from the western Pacific Ocean. Zootaxa. 2019; 4702(1):107–13. https://doi.org/10.11646/zootaxa.4702.1.15

- **Krefft G.** Taxonomy and distribution of the fish-genus *Ichthyococcus* (Bonaparte, 1841) (Photichthyidae Weitzman, 1974) in the Atlantic Ocean. Invest Pesq. 1983; 47(2):295–309.
- **Liao Y-C, Chen L-S, Shao K-T.** Review of the astronesthid fishes (Stomiiformes: Stomiidae: Astronesthinae) from Taiwan with a description of one new species. Zool Stud. 2006; 45(4):517–28.
- **Lima AT, Costa PAS, Braga AC, Nunan GWA, Mincarone MM**. Fishes of the family Sternoptychidae (Stomiiformes) collected on the Brazilian continental slope between 11° and 23°S. Zootaxa. 2011; 2742:34–48. https://doi.org/10.11646/zootaxa.2742.1.2
- **Lins Oliveira JE, Nóbrega MF, Garcia Jr J, Sampaio CLS, Di Dario F, Fischer LG, Mincarone MM**. Biodiversidade marinha da Bacia Potiguar/RN. Rio de Janeiro: Museu Nacional; 2015. https://doi.org/10.13140/RG.2.1.5066.0244
- **Lipej L, Dulčić J.** Checklist of the Adriatic Sea fishes. Zootaxa. 2010; 2589:1–92. https://doi.org/10.11646/zootaxa.2589.1.1
- **Lloris D.** Peces capturados, en el SO africano, durane la campana "Benguela II" (julio-septiembre 1980). Res Exp Cient. 1982; 10:3–15.
- **Love MS, Bizzarro JJ, Cornthwaite AM, Frable BW, Maslenikov KP.** Checklist of marine and estuarine fishes from the Alaska – Yukon Border, Beaufort Sea, to Cabo San Lucas, Mexico. Zootaxa. 2021; 5053:1–285. https://doi.org/10.11646/zootaxa.5053.1.1
- **Marceniuk AP, Caires RA, Carvalho-Filho A, Klautau AGCM, Santos WCR, Wosiacki WB, Montag L, Rotundo MM.** Teleostei fishes of the north coast of Brazil. Rev CEPSUL Biodivers Conserv Mar. 2021; 10:e2021006. https://doi.org/10.37002/revistacepsul.vol10.1969e2021006
- **Marks AD, Kerstetter DW, Wyanski DM, Sutton TT.** Reproductive ecology of dragonfishes (Stomiiformes: Stomiidae) in the Gulf of Mexico. Front Mar Sci. 2020; 7(101):1–17. https://doi.org/10.3389/fmars.2020.00101
- **McAllister DE.** A list of the fishes of Canada. Syllogeus. 1990; 64:1–310.
- **McEachran JD, Fechhelm JD.** Fishes of the Gulf of Mexico, Volume 1: Myxiniformes to Gasterosteiformes. Austin: University of Texas Press; 1998. https://doi.org/10.7560/752061
- **Mecklenburg CW, Lynghammar A, Johannesen E, Byrkjedal I, Christiansen JS, Dolgov AV, Karamushko OJ, Meckenburg TA, Møller PR, Steinke D, Wienerroither RM.** Marine fishes of the Arctic region. Volume I. CAFF Monit Ser Rep. 2018; 28:1–454. Available from: http://hdl.handle.net/11374/2116
- **Melo MRS, Caires RA, Sutton TT.** The scientific explorations for deep-sea fishes in Brazil: the known knowns, the known unknowns, and the unknown unknowns. In: Sumida PYG, Bernardino AF, De Léo FC, editors. Brazilian Deep-Sea Biodiversity. Switzerland: Springer Nature; 2020. p.153–216. Available from: https://link.springer.com/chapter/10.1007/978-3-030-53222-2_7
- **Menezes NA, Buckup PA, Figueiredo JL, Moura RL.** Catálogo das espécies de peixes marinhos do Brasil. São Paulo: Museu de Zoologia de Universidade de São Paulo; 2003.
- **Milkova V, Hanke G, Gillespie G, Fong K, Boutillier J, Bedard J.** Range records for ten species of stomiiform, aulopiform, and myctophiform fishes in British Columbia, Canada. Northwest Nat. 2016; 97:113–23. https://doi.org/10.1898/NWN15-11.1
- **Mincarone MM, Afonso GVF, Di Dario F, Eduardo LN, Frédou T, Lucena-Frédou F, Bertrand A, Pietsch TW.** Deep-sea anglerfishes (Lophiiformes: Ceratioidei) from off northeastern Brazil, with remarks on the ceratioids reported from the Brazilian Exclusive Economic Zone. Neotrop Ichthyol. 2021; 19(2):e200151. https://doi.org/10.1590/1982-0224-2020-0151
- **Mincarone MM, Consulim CEN, Kitahara MV, Lima AT, Lima e Silva CM, Neves RD, Soto JMR, Souza Filho MB.** Report on the demersal fishes sampled by onboard observers off Southern Brazil. Mare Magnum. 2004; 2(1–2):127–44.
- **Mincarone MM, Martins AS, Costa PAS, Braga AC, Haimovici M.** Peixes marinhos da Bacia de Campos: uma revisão da diversidade. In: Curbelo-Fernandez MP, Braga AC, editors. Comunidades demersais e bioconstrutores: caracterização ambiental regional da Bacia de Campos, Atlântico Sudoeste. Rio de Janeiro: Elsevier; 2017. p.187–216.

- **Mincarone MM, Martins JR, Di Dario F, Eduardo LN, Frédou T, Lucena-Frédou F, Bertrand A.** Deep-sea smelts, pencil smelts, and barreleyes (Teleostei: Argentiniformes) from oceanic islands and seamounts off northeastern Brazil. Mar Biol Res. 2020; 16(10):762–73. https://doi.org/10.1080/17451000.2021.1891806
- **Mincarone MM, Nielsen JG, Costa PAS.** Deep-sea ophidiiform fishes collected on the Brazilian continental slope, between 11° and 23°S. Zootaxa. 2008; 1770:41–64. https://doi.org/10.11646/zootaxa.1770.1.2
- **Mincarone MM, Villarins BT, Eduardo LN, Caires RA, Lucena-Frédou F, Frédou T, Lira AS, Bertrand A.** Deep-sea manefishes (Perciformes: Caristiidae) from oceanic islands and seamounts off northeastern Brazil, with comments on the caristiids previously reported in Brazilian waters. Mar Biol Res. 2019; 15:297–304. https://doi.org/10.1080/17451000.2019.1636281
- **Miya M, Nishida M.** Molecular systematics of the deep-sea fish genus *Gonostoma* (Stomiiformes: Gonostomatidae): two paraphyletic clades and resurrection of *Sigmops*. Copeia. 2000; 2000(2):378–89. https://doi.org/10.1643/0045-8511(2000)000[0378:MSOTDS]2.0.CO;2
- **Møller PR, Nielsen JG, Knudsen SW, Poulsen JY, Sünksen K, Jørgensen OA.** A checklist of the fish fauna of Greenland waters. Zootaxa. 2010; 2378:1–84. https://doi.org/10.11646/zootaxa.2378.1.1
- **Moore JA, Hartel KE, Craddock JE, Galbraith JK.** An annotated list of deepwater fishes from off the New England region, with new area records. Northeast Nat. 2003; 10(2):159–248. https://doi.org/10.1656/1092-6194(2003)010[0159:AALODF]2.0.CO;2
- **Morrow JE Jr.** Suborder Stomiatoidea. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr., Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964a; p.71–77.
- **Morrow JE Jr.** Family Chauliodontidae. In Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr., Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964b; p.274–89.
- **Morrow JE Jr.** Family Malacosteidae. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr., Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964c; p.523–49.
- **Morrow JE Jr.** Family Stomiatidae. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr., Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964d; p.290–310.
- **Morrow JE Jr, Gibbs RH Jr.** Family Melanostomiatidae. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr., Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964; p.351–511.
- **Mukhacheva VA.** On the genus *Cyclothone* (Gonostomidae, Pisces) in the Pacific Ocean. Tr Inst Okeanol Akad Nauk SSSR. 1964; 73:93–138.
- **Mukhacheva VA.** On systematics, distribution and biology of the *Gonostoma* species (Pisces: Gonostomatidae). Tr Inst Okeanol Akad Nauk SSSR. 1972; 93:205–49.
- **Mukhacheva VA.** Cyclothones (gen. *Cyclothone*, fam. Gonostomatidae) of the world and their distribution. Tr Inst Okeanol Akad Nauk SSSR. 1974; 96:189–254.
- **Mukhacheva VA.** Systematics and distribution of *Bonapartia* Goode et Bean and *Margrethia* Jespersen et Taning (Gonostomatidae, Osteichthyes). Tr Inst Okeanol Akad Nauk SSSR. 1976; 104:73–91.

- **Mukhacheva VA.** A review of the species of *Diplophos* Gunther (Gonostomatidae, Osteichthyes) and their vertical and geographical distribution. Tr Inst Okeanol Akad Nauk SSSR. 1978; 111:10–27.
- **Mukhacheva VA.** A review of the genus *Ichthyococcus* Bonaparte (Photichthyidae). Vopr Ikhtiol, 1980; 20(6):771–86.
- **Mundy BC.** Checklist of the fishes of the Hawaiian Archipelago. Bishop Mus Bull Zool. 2005; 6:1–703.
- **Nakabo, T.** Fishes of Japan: with pictorial keys to the species. Tokyo: Tokai University Press: 2002.
- **Nakayama N, Ohashi S, Tanaka F.** A new species of *Astronesthes* (Actinopterygii, Stomiidae, Astronesthinae) snaggletooth from the tropical western Pacific, with comments on the occurrence of *Astronesthes luetkeni* Regan and Trewavas in Japanese waters. Ichthyol Res. 2021; 69:82–89. https://doi.org/10.1007/s10228-021-00813-6
- **Nazarkin MV.** Fossil bristlemouth *Cyclothone mukhachevae* sp. nov. (Stomiiformes: Gonostomatidae) from the Neogene of western Sakhalin, Russia. Paleontol J. 2015: 49:162–75. https://doi.org/10.1134/S0031030115020045
- **Nelson JS.** Fishes of the world. 4th ed. Hoboken: John Wiley & Sons; 2006.
- **Nelson JS, Grande TC, Wilson MVH.** Fishes of the world. 5th ed. Hoboken: John Wiley & Sons; 2016.
- **Nión H, Ríos C, Meneses P.** Peces del Uruguay: Lista sistemática y nombres comunes. 2nd ed. Montevideo: Dinara; 2016.
- **Norman JR.** Fishes. The John Murray expedition 1933–34. Scient Rep, John Murray Exped. 1939; 7(1):1–116.
- **Olivar PM, Hulley AP, Castellón A, Emelianov M, López C, Tuset VM, Contretas T, Molí B.** Mesopelagic fishes across the tropical and equatorial Atlantic: Biogeographical and vertical patterns. Prog Oceanogr. 2017; 151:116–37. https://doi.org/10.1016/j.pocean.2016.12.001
- **Orlov AM, Tokranov AM.** Checklist of deep-sea fishes of the Russian northwestern Pacific Ocean found at depths below 1000 m. Prog Oceanogr. 2019; 176:e102143. https://doi.org/10.1016/j.pocean.2019.102143
- **Ozawa T, Oda K, Ida T.** Systematics and distribution of the *Diplophos taenia* species complex (Gonostomatidae), with a description of a new species. Japan J Ichthyol. 1990; 37(2):98–115. https://doi.org/10.11369/jji1950.37.98
- **Parin NV, Andriashev AP, Borodulina OD, Tchuvasov VM.** Midwater fishes of the Southwestern Atlantic Ocean. Tr Inst Okeanol Akad Nauk SSSR. 1974; 98:70–140.
- **Parin NV, Borodulina OD.** Revision of the *Astronesthes indicus* species group (Astronesthidae), with descriptions of five new species. J Ichthyol. 1996; 36(8):551–65.
- **Parin NV, Borodulina OD.** Review of the "*Astronesthes cyaneus* species group" (Astronesthidae), with description of two new species. J Ichthyol. 1997; 37(9):737–48.
- **Parin NV, Borodulina OD.** Redescriptions and new data on the distribution of six rare and poorly known species of the mesopelagic fish genus *Astronesthes* (Astronesthidae). J Ichthyol. 2000; 40(S1):S15–S30.
- **Parin NV, Borodulina OD.** Preliminary review of species group *Astronesthes niger* (Astronesthidae, Stomiiformes) with description of six new species from the Atlantic and Indian oceans. J Ichthyol. 2002; 42(7):495–515.
- **Parin NV, Borodulina OD.** Phylogeny, systematics, and zoogeography of the mesopelagic genus *Astronesthes* (Astronesthidae, Stomiiformes). J Ichthyol. 2003; 43(8):557–76.
- **Parin NV, Borodulina OD, Hulley PA.** A review of the *Astronestes boulengeri* species group (Astronesthidae, Stomiiformes), with description of two new species. J Ichthyol. 1999; 39(8):557–70.
- **Parin NV, Novikova NS.** Taxonomy of viperfishes (Chauliodontidae, Osteichthyes) and their distribution in the world ocean. Tr Inst Okeanol Akad Nauk SSSR. 1974; 96:255–315.
- **Parin NV, Pokhilskaya GN.** A review of the Indo-Pacific species of the genus *Eustomias* (Melanostomiatidae, Osteichthyes). Tr Inst Okeanol Akad Nauk SSSR. 1974; 96:316–68.
- **Parin NV, Pokhilskaya GN.** On the taxonomy and distribution of the mesopelagic fish genus *Melanostomias* Brauer (Melanostomiatidae, Osteichthyes). Tr Inst Okeanol Akad Nauk SSSR. 1978; 111:61–86.

- **Parr AE.** The stomiatoid fishes of the suborder Gymnophotodermi (Astronesthidae, Melanostomiatidae, Idiacanthidae) with a complete review of the species. Bull Bingham Oceanogr Coll. 1927; 3(2):1–124.
- **Pequeño G.** Peces de Chile: Lista sistemática revisada y comentada. Rev Biol Mar. 1989; 24(2):1–132. Available from: https://revbiolmar.uv.cl/escaneados/322-77.pdf
- **Perez JAA, Pereira BN, Pereira DA, Schroeder R.** Composition and diversity patterns of megafauna discards in the deep-water shrimp trawl fishery off Brazil. J Fish Biol. 2013; 83(4):804–25. https://doi.org/10.1111/jfb.12141
- **Pinheiro HT, Macena BCL, Francini-Filho RB, Ferreira CEL, Albuquerque FV, Bezerra NPA, Carvalho-Filho A, Ferreira RCP, Luiz OJ, Mendonça SA, Nunes DM, Pimentel CR, Soares-Gomes A, Viana DL, Hazin FHV, Rocha LA.** Fish biodiversity of Saint Peter and Saint Paul's Archipelago, mid-Atlantic Ridge, Brazil: New records and a species database. J Fish Biol. 2020; 94(4):1143–53. https://doi.org/10.1111/jfb.14484
- **Pinheiro HT, Mazzei E, Loura RL, Amado-Filho GM, Carvalho-Filho A, Braga AC, Costa PAS, Ferreira BP, Ferreira CEL, Floeter SR, Francini-Filho RB, Gasparini JL, Macieira RM, Martins AS, Olavo G, Pimentel CR, Rocha LA, Sazima I, Simon T, Teixeira JB, Xavier LB, Joyeux J-C.** Fish biodiversity of the Vitória-Trindade seamount chain, southwestern Atlantic: An updated database. PLoS ONE. 2015; 10(3):1–38. https://doi.org/10.1371/journal.pone.0118180
- **Porteiro FM, Hartel KE, Craddock JE, Santos RS.** Deep-sea pelagic fishes from the Azores (eastern North Atlantic) deposited in the Museum of Comparative Zoology. Breviora. 1999; 507:1–42.
- **Prokofiev AM.** Systematics and phylogeny of the stomiiform fishes (Neoteleostei: Stomiiformes) from the Paleogene – Neogene of Russia and adjacent regions. J Ichthyol. 2005; 45(Suppl. 1):S89–S162.
- **Prokofiev AM.** *Grammatostomias ovatus* sp. nova (Melanostomiidae). Vopr Ikhtiol. 2014; 54(6):483–84. https://doi.org/10.7868/S0042875214040109
- **Prokofiev AM.** New species of *Eustomias* (Melanostomiidae) from the Canary Basin with notes on *E. parri*. J Ichthyol. 2015; 55(1):125–27. https://doi.org/10.1134/S0032945215010142
- **Prokofiev AM.** New species of the genus *Photonectes* (Melanostomiidae) with blue luminous tissue on the body. J Ichthyol. 2016; 56:613–15. https://doi.org/10.1134/S003294521604010X
- **Prokofiev AM.** Materials for revision of the genus *Photonectes* (Melanostomiidae). J Ichthyol. 2019; 59(4):449–76. https://doi.org/10.1134/S003294521904012X
- **Prokofiev AM.** On some little-known Melanostomiidae with the description of a new species of *Eustomias*. J Ichthyol. 2020; 60(3):345–54. https://doi.org/10.1134/S0032945220030121
- **Prokofiev AM, Frable BW.** A new species of *Photonectes* from the Pacific Ocean off Oahu, Hawaii with a revised identification key for the genus (Teleostei: Stomiidae: Melanostomiinae). Ichthyol Herpetol. 2021; 109(3):720–27. https://doi.org/10.1643/i2020148
- **Prokofiev AM, Klepadlo C.** Two new species of *Photonectes* with blue luminous tissue on body, and a re-examination of *P. mirabilis* (Teleostei: Stomiidae). Zootaxa. 2019; 4590 (2):270–82. https://doi.org/10.11646/zootaxa.4590.2.4
- **Quéro JC, Njock JC, de la Hoz MM.** Gonostomatidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990a. p.283–92.
- **Quéro JC, Njock JC, de la Hoz MM.** Sternoptychidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990b. p.275–82.
- **Quéro JC, Njock JC, de la Hoz MM.** Photichthyidae. In: Quéro JC, Hureau JC, Karrer C, Post A, Saldanha L, editors. Check-list of the fishes of the eastern tropical Atlantic, Clofeta. Paris: UNESCO, SEI, JNICT; 1990c. p.343–48.
- **Ramírez JM, Vázquez-Bader AR, Gracia A.** Ichthyofaunal list of the continental slope of the southern Gulf of Mexico. Zookeys. 2019; 846:117–32. https://dx.doi.org/10.3897%2Fzookeys.846.31944

- **Randall JE, Lim KKP.** A checklist of the fishes of the South China Sea. Raffles Bull Zool (Suppl.). 2000; 8:569–667.
- **Rees DJ, Poulsen JY, Sutton TT, Costa PAS, Landaeta MF.** Global phylogeography suggests extensive eucosmopolitanism in mesopelagic fishes (*Maurolicus*: Sternoptychidae). Scient Rep. 2020; 10:e20544. https://doi.org/10.1038/s41598-020-77528-7
- **Regan CT, Trewavas E.** The fishes of the families Astronesthidae and Chauliodontidae. Danish Dana Expedition 1920–22 in the North Atlantic and the Gulf of Panama. Oceanogr Rep. 1929; 2(5):1–39.
- **Regan CT, Trewavas E.** The fishes of the families Stomiatidae and Malacosteidae. Danish Dana Expedition 1920–22 in the North Atlantic and the Gulf of Panama. Oceanogr Rep. 1930; 2(6):1–146.
- **Reis RE, Albert JS, Di Dario F, Mincarone MM, Petry A, Rocha LA.** Fish Biodiversity and conservation in South America. J Fish Biol. 2016; 89:12–47. https://doi.org/10.1111/jfb.13016
- **Román E, Alemany F, Carbonell A.** First record of *Gonostoma elongatum* Günther, 1878 (Osteichthyes: Gonostomatidae) in the North-western Mediterranean. Boll Soc Hist Nat Balears. 2000; 43:27–31. Available from: https://core.ac.uk/download/pdf/71775056.pdf
- **Saavedra-Díaz LM, Roa-Varón A, Acero A, Mejia LS.** Nuevos registros ícticos en el talud superior del Caribe Colombiano (órdenes Albuliformes, Anguiliformes, Osmeriformes, Stomiiformes, Ateleopodiformes, Aulopiformes y Pleyronectiformes). Bol Invest Mar Cost. 2004; 33:181–207.
- **Sabaj MH.** Codes for natural history collections in ichthyology and herpetology. Copeia. 2020; 108(3):593–669. https://doi.org/10.1643/ASIHCODONS2020
- **Sangster, G.** The correct genus name of *Bonapartia pedaliota* (Teleostei: Gonostomatidae). Zootaxa. 2021; 5068(4):595–96. https://doi.org/10.11646/zootaxa.5068.4.9
- **Santos RS, Porteiro FM, Barreiros JP.** Marine fishes of the Azores. An annotated checklist and bibliography. Arquipelago Life Mar Sci. 1997; (Suppl. 1):1–244. http://hdl.handle.net/10400.3/1561
- **Schaefer S, Johnson RK, Babcock J.** Gonostomatidae. In: Smith MM, Heemstra PC, editors. Smiths' Sea Fishes. Johannesburg: MacMillan; 1986a. p.247–53. https://doi.org/10.1007/978-3-642-82858-4
- **Schaefer S, Johnson RK, Babcock J.** Photichthyidae. In: Smith MM, Heemstra PC, editors. Smiths' Sea Fishes. Johannesburg: MacMillan; 1986b. p.243–47. https://doi.org/10.1007/978-3-642-82858-4
- **Schmitter-Soto JJ, Vásquez-Yeomans L, Aguilar-Perera A, Curiel-Mondragón C, Vázques JAC.** Lista de peces marinos del Caribe Mexicano. Anal Inst Biol Univ Nac Auto Mexico (Zool.). 2000; 71(2):143–77. Available from: http://revistas.unam.mx/index.php/zoo/article/view/7237
- **Schultz LP.** Family Sternoptychidae. In: Bigelow BH, Cohen DM, Dick MM, Gibbs RH Jr, Grey M, Morrow JE Jr, Schultz LP, Walters V, editors. Fishes of the western North Atlantic, Part 4 Soft-Rayed Bony Fishes: Orders Isospondyli and Giganturoidei: Argentinoids, Stomiatoids, Pickerels, Bathylaconids, Giganturids. Mem Sears Found Mar Res. 1964; p.241–73.
- **Séret B, Andreata JV.** Deep-sea fishes collected during cruise MD-55 off Brazil. Cybium. 1992; 16(1):81–100.
- **Shcherbachev YN, Novikova NS.** Materials on distribution and taxonomy of the mesopelagic fishes of the family Stomiatidae (Osteichthyes). Tr Inst Okeanol Akad Nauk SSSR. 1976; 104:92–112.
- **Shcherbachev YN, Parin NV, Pakhorukov NP, Piotrovsky AS.** Mesobenthic and mesobenthopelagic fishes from submarine rises in the western Indian Ocean. Tr Inst Okeanol Akad Nauk SSSR. 1986, 121:195-214.
- **Shinohara G, Narimatsu Y, Hattori T, Ito M, Takata Y, Matsuura K.** Deep-sea fauna and pollutants off Pacific coast of northern Japan. Natl Mus Nat Sci Monogr. 2009; 39:683–735.
- **Shinohara G, Sato T, Aonuma Y, Horikawa H, Matsuura K, Nakabo T, Sato K.** Annotated checklist of deep-sea fishes from the waters around the Ryukyu Islands, Japan. Deep-sea fauna and pollutants in the Nansei Islands. Monographs of the National Science Museum Tokyo. 2005; 29:385–452.

- **Smith DG, Hartel KE, Craddock JE.** Larval development, relationships, and distribution of *Manducus maderensis*, with comments on the transformation of *M. greyae* (Pisces, Stomiiformes). Breviora. 1991; 491:1–17.
- **Stevenson DE, Kenaley CP, Raring N.** First records of rare mesopelagic fishes from the Gulf of Alaska. Northwest Nat (Olymp Wash). 2009; 90(1):24–34. https://doi.org/10.1898/1051-1733-90.1.24
- **Stewart AL.** Subfamily Chauliodontinae. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Vol. 2. Wellington: Te Papa Press; 2015. p.492–93.
- **Stewart AL, Kenaley CP.** Subfamily Idiacanthinae. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Vol. 2. Wellington: Te Papa Press; 2015a. p.521–23.
- **Stewart AL, Kenaley CP.** Subfamily Astronesthinae. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Vol. 2. Wellington: Te Papa Press; 2015b. p.471–86.
- **Stocco LB, Joyeux J-C.** Distribution of fish larvae on the Vitória-Trindade chain, southwestern Atlantic. Check List. 2015; 11(2):1–11. https://doi.org/10.15560/11.2.1590
- **Sutton TT, Hulley PA, Wienerroither R, Zaera-Perez D, Paxton JR.** Identification guide to the mesopelagic fishes of the central and southeast Atlantic Ocean. FAO Species Identification Guide for Fishery Purposes. Rome: FAO; 2020. https://doi.org/10.4060/cb0365en
- **Tatsuta N, Imamura H, Nakaya K, Kawai T, Abe T, Sakaoka K, Takagi S, Yabe M.** Taxonomy of mesopelagic fishes collected around the Ogasawara Islands by the T/S Oshoro-Maru. Mem. Fac. Eng. Kyushu Univ. 2014; 56(1):1–64.
- **Tsagarakis K, Agius Darmanin S, Al Mabruk SAA, Auriemma R, Azzurro E, Badouvas N, Bakiu R, Bariche M, Battaglia P, Betti F, Borme D, Cacciamani R, Calì F, Corsini-Foka M, Crocetta F, Dalyan C, Deidun A, Digenis M, Domenichetti F, Dragičević B, Dulčić J, Durucan F, Guy-Haim T, Kesici NB, Lardi P-I, Manitaras Y, Michailidis N, Piraino S, Rizgalla J, Siapatis A, Soldo A, Stipa MG, Terbiyik Kurt T, Tiralongo F, Tsiamis K, Vella A, Vella N, Zava B, Gerovasileiou V.** New records of rare species in the Mediterranean Sea (October 2021). Mediterr Mar Sci. 2021; 22(3):627–52. http://doi.org/10.12681/mms.26669
- **Uyeno T, Aizawa M.** Family Sternoptychidae. In: Uyeno T, Matsuura K, Fujii E, editors. Fishes trawled off Suriname and French Guiana. Tokyo: Japan Marine Fishery Resource Research Center; 1983. p.137–41.
- **Vasconcelos-Filho AL, Guedes DS, Acioli FD.** Peixes coletados pela Expedição JOPS – II "Victor Hensen" no Nordeste do Brasil. Trab Oceanog Univ Fed PE. 1996; 24:145–56.
- **Vélez J.** Stomiiformes. In: Nakaya K, Yabe M, Imamura H, Romero Camarena M, Yoshida M, editors. Deep-sea fishes of Peru. Tokyo: Japan Deep Sea Trawlers Association; 2009. p.118–31.
- **Vinnichenko VI.** Russian investigations and deep-water fishery on the Corner Rising Seamount in subarea 6. NAFO Sci Counc Stud. 1997; 30:41–49.
- **Wang X, Zhang J, Zhao X, Chen Z, Ying Y, Li Z, Xu D, Liu Z, Zhou M.** Vertical distribution and diel migration of mesopelagic fishes on the northern slope of the South China sea. Deep Sea Res 2 Top Stud Oceanogr. 2019; 167:128–41. https://doi.org/10.1016/j.dsr2.2019.05.009
- **Yamamoto E.** Astronesthidae. In: Okamura O, Amaoka K, Mitani F, editors. Fishes of the Kyushu-Palau Ridge and Tosa Bay. The intensive research of unexploited fishery resources on continental slopes. Tokyo: Japan Fisheries Resource Conservation Association; 1982. p.79–81.

AUTHORS' CONTRIBUTION

Bárbara T. Villarins: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing-original draft, Writing-review and editing.

Fabio Di Dario: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Validation, Writing-original draft, Writing-review and editing.

Leandro N. Eduardo: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing-original draft, Writing-review and editing.
Flávia Lucena-Frédou: Data curation, Funding acquisition, Project administration, Supervision, Writing-review and editing.
Arnaud Bertrand: Data curation, Funding acquisition, Project administration, Supervision, Writing-review and editing.
Artem M. Prokofiev: Investigation, Methodology, Writing-original draft, Writing-review and editing.
Michael M. Mincarone: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing-original draft, Writing-review and editing.

ETHICAL STATEMENT

The authors state that all methods were approved and conducted in accordance with guidelines and regulations of the Ministério do Meio Ambiente (SISBIO authorization number: 47270–5). Operations of the RV Antea were approved by the Brazilian Navy Authority ("Estado-Maior da Armada") under the Ordinances 178 (08/09/2015) and 4 (24/01/2017).

COMPETING INTERESTS

The authors declare no competing interests.

HOW TO CITE THIS ARTICLE

- **Villarins BT, Di Dario F, Eduardo LN, Lucena-Frédou F, Bertrand A, Prokofiev AM, Mincarone MM.** Deep-sea dragonfishes (Teleostei: Stomiiformes) collected from off northeastern Brazil, with a review of the species reported from the Brazilian Exclusive Economic Zone. Neotrop Ichthyol. 2022; 20(2):e220004. https://doi.org/10.1590/1982-0224-2022-0004

Neotropical Ichthyology

OPEN ACCESS

Official Journal of the
Sociedade Brasileira de Ictiologia
SBI