Diversity of Monogenoidea parasitizing scombrid fishes from Rio de Janeiro coast, Brazil

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Abstract: Eleven known species of Monogenoidea were found parasitizing six different species of scombrid fishes collected from Rio de Janeiro coast, Southwestern Atlantic Ocean: Capsala biparasitica, Capsala katsuwonii, Capsala notosinense, Nasicola brasiliensis, Nasicola klawei, Allopseudaxinoides euthynmi, Sibitrema poonui, Hexostoma albsmithi, Hexostoma euthynmi, Hexostoma keokeo and Hexostoma sibi. Katsuwonus pelamis is reported as a new host to A. euthynmi and Thunnus obesus to H. albsmithi. Capsala notosinense, A. euthynmi, H. albsmithi and H. sibi are referred for the first time in Brazil, Southwestern Atlantic Ocean. Morphological and morphometric features are presented for each species.

Key words: Axinidae, Capsalidae, Hexostomatidae, Gastrocotylidae, Monogenoidea, Scombridae

INTRODUCTION
During a survey of helminth parasites of Scombridae from the coast of the Rio de Janeiro, Brazil, Southwestern Atlantic Ocean, species of Monogenoidea were found parasitizing Auxis thazard (Lacepède, 1800), Euthynnus alletteratus (Rafinesque, 1810), Katsuwonus pelamis (Linnaeus, 1758), Thunnus albacares (Bonnaterre, 1788), Thunnus atlanticus (Lesson, 1831) and Thunnus obesus (Lowe, 1839). These fishes support very important commercial and recreational fisheries as well as substantial artisanal fisheries throughout the tropical and temperate waters of the world (Collette and Nauen 1983). Considering that Brazil has a large canned-fish industry, these species are very important economically.

In South America monogenean parasites of scombrid fishes are represented by 16 genera (see Cohen et al. 2013). Research on monogeneoid parasites of scombrid fishes from Brazil had been conducted by Abdallah et al. (2002), Alves and Luque (2006), Kohn and Justo (2006), Kohn et al. (2003), Kohn et al. (2004), Mogrovejo and Santos (2002), Mogrovejo et al. (2004), Oliva et al. (2008), Price (1938), Rego and Santos (1983), Rohde (1986), Rohde and Hayward (1999) and Rohde and Watson (1985). The aim of this study is to contribute to the increase of the knowledge and expansion of the geographical distribution of monogeneoid parasites in different species of Scombridae in the area of the Southwestern Atlantic Ocean.

MATERIAL AND METHODS
A total of 230 specimens of scombrid fishes were examined between January 2004 to April 2007: 20 Auxis thazard (29–54 cm in total body length and 0.65–2.5 kg in weight), 31 Euthynnus alletteratus (27–71 cm in total body length and 0.50–4.0 kg in weight), 61 Katsuwonus pelamis (26–73 cm in total body length and 1.0–9.0 kg in weight), 38 Thunnus albacares (34–76 cm in total body length and 0.55–7.8 kg in weight), 45 Thunnus atlanticus (38–61 cm in total body length and 1.2–5.5 kg in weight) and 35 Thunnus obesus (39–67 cm in total body length and 1.2–6.3 kg in weight).

The fishes were obtained by local fishermen from the coastal zone of the state of Rio de Janeiro, Brazil (22°52'46" S, 042°01'07" W). The parasites collected were fixed under light cover-glass pressure in 5% formaldehyde, stained with Langeron’s alcoholic-acid carmine, dehydrated in an ethyl alcohol series, cleared in beechwood creosote and mounted in Canada balsam as permanent slides. Measurements are in micrometers, unless otherwise specified, with the mean in parentheses followed by the number of specimens measured in brackets, where applicable. The material studied was deposited in the Helminthological Collection of the “Instituto Oswaldo Cruz” (CHIOC), Rio de Janeiro, Brazil.

RESULTS AND DISCUSSION
Eleven cosmopolitan species of four families of monogenoideans, already referred in different fish and oceans were found. Allopseudaxinoides euthynmi

LISTS OF SPECIES

Abstract: Eleven known species of Monogenoidea were found parasitizing six different species of scombrid fishes collected from Rio de Janeiro coast, Southwestern Atlantic Ocean: Capsala biparasitica, Capsala katsuwonii, Capsala notosinense, Nasicola brasiliensis, Nasicola klawei, Allopseudaxinoides euthynmi, Sibitrema poonui, Hexostoma albsmithi, Hexostoma euthynmi, Hexostoma keokeo and Hexostoma sibi. Katsuwonus pelamis is reported as a new host to A. euthynmi and Thunnus obesus to H. albsmithi. Capsala notosinense, A. euthynmi, H. albsmithi and H. sibi are referred for the first time in Brazil, Southwestern Atlantic Ocean. Morphological and morphometric features are presented for each species.

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RESULTS AND DISCUSSION
Eleven cosmopolitan species of four families of monogenoideans, already referred in different fish and oceans were found. Allopseudaxinoides euthynmi
Yamaguti, 1966 (Aixinidae); Capsala biparasitica (Goto, 1894), Capsala katsuwoni (Ishii, 1936), Capsala notosinense (Mamaev, 1968), Hexostoma albsmithi Dollfus, 1962, Nasicola brasiliensis Kohn, Baptista-Farias, Santos & Gibson, 2004, Nasicola klawei (Stunkard, 1962) (Capsalidae); Hexostoma euthynni Meserve, 1938, Hexostoma keokeo Yamaguti, 1968, Hexostoma sibi Yamaguti, 1968 (Hexostomatidae) and Sibitrema poomui Yamaguti, 1966 (Gastrocotylidae).

The most prevalent species were N. klawei parasitizing T. albacares (81.6%) and N. brasiliensis parasitizing T. obesus (77.1%) and T. atlanticus (68.9%). New host records are reported: K. pelamis to A. euthynni and T. obesus to H. albsmithi. C. notosinense, A. euthynni, H. albsmithi and H. sibi are reported for the first time in the Rio de Janeiro coast, Southwestern Atlantic Ocean.

Lists of parasite species
Phylum Platyhelminthes Gegenbaur, 1859
Class Monogenoidea Bychowsky, 1937
Subclass Polyonchoinea Bychowsky, 1937
Subfamily Capsalinae Baird, 1853
Class Monogenoidea Bychowsky, 1937
Phylum Platyhelminthes Gegenbaur, 1859

Capsala biparasitica (Goto, 1894) Price, 1938
Synonyms: Caballerocotyla abidjani Bussiéras & Baudin-Laurencin, 1970; Caballerocotyla neothunni Yamaguti, 1968
Hosts: T. albacares, T. atlanticus and T. obesus
Site: Gills
Prevalence: T. albacares (21.1%); T. atlanticus (4.4%); T. obesus (5.7%)
Mean intensity: T. albacares (2.0 ± 1.23); T. atlanticus (0.07 ± 0.07); T. obesus (1.50 ± 0.98)
Material studied: CHIOC 36612 a-c, 36613, 37976, 37977
Main measurements (based on six adults and one immature specimen). Adult specimens: Body elongate, 8.0–9.4 (8.7) mm × 3.6–4.8 (4.4) mm with two pairs of eye spots; single longitudinal row of dorsolateral spines, 57–73 on right side and 57–74 on left side in number, with 9–12 cuspsids each. Cephalic suckers 600–800 (703) × 1.00–1.04 (1.03) mm, concave ventrally. Haptor sessile measuring 2.5–3.0 (2.7) mm × 2.5–2.8 (2.6) mm, surrounded by delicate marginal membrane 140–150 wide. One pair of anchors, 65–135 (84) long. Pharynx muscular, composed of two unequal bulbs, the posterior smaller than the anterior, 780–1.04 (900) total length by 920–1.16 (1.03) largest wide. Mouth opening ventrally at anterior end of pharynx. Testes about 60, rounded, 195–370 (248) × 100–250 (133), confined to the interceleral field. Seminal receptacle 230 × 155. Ovary, 600–700 (658) × 700–900 (820), immediately pretesticular. Copulatory organ papillate, near to vaginal pore. Egg tetrahedral, with 4 filaments.

Immature specimen: Body elongate, 4.2 mm × 1.3 mm, with two pairs of eye spots; single longitudinal row of dorsolateral spines, 57 on right side and 62 on left side in number, with 9–12 cuspsids each. Cephalic sucker 480 × 580, concave ventrally. Haptor sessile measuring 1.2 mm × 1.1 mm. One pair of anchors measuring 85 long. Pharynx muscular, composed of two unequal bulbs, the posterior smaller than anterior, 440 total length by 420 largest wide. Testes rounded, 75 × 65 confined to the interecaecal field. Seminal receptacle 170 × 95. Ovary 240 × 150, immediately pretesticular.

Remarks: Chisholm and Whittington (2007) published a revision of the subfamily Capsalinae Baird, 1853 based on literature and examination of type-material and considered only 36 valid species. These authors proposed Caballerocotyla Price, 1960 as synonymous of Capsala Bosc, 1811 and considered Caballerocotyla abidjani and Caballerocotyla neothunni synonymous of Capsala biparasitica. Capsala biparasitica was originally described from a copepod parasitizing T. albacares from Pacific Ocean. In 1960, Price revised Capsalinae and proposed Caballerocotyla for the type species C. biparasitica. Yamaguti (1968) described and figured this species as Capsala (Caballerocotyla) biparasitica. Also from the Pacific, Egorova (2000) referred it as Caballerocotyla neothunni. From the Atlantic Ocean, Capsala biparasitica was described as Caballerocotyla abidjani by Bussiéras and Baudin-Laurencin (1970) and by Bussiéras (1972) and as Caballerocotyla neothunni by Kohn and Justo (2006).

Capsala katsuwoni (Ishii, 1936) Price, 1938
Synonym: Caballerocotyla llewelyni Kohn & Justo, 2006 [sic]
Hosts: K. pelamis and T. atlanticus (new host record)
Site: Gills
Prevalence: K. pelamis (11.4%) and T. atlanticus (6.6%)
Mean intensity: K. pelamis (3.0 ± 1.64); T. atlanticus (one parasitized by one parasite)
Material studied: CHIOC 36611 a-b, 37975
Main measurements (based on one adult specimen parasitizing T. atlanticus): Body 6.2 mm, excluding haptor by 6.0 in maximum width. Haptor 1.9 × 1.7 mm. Anchors 150 long. Anterior end of body with pair of cephalic lobes and a pair of sucker-like attachment organs, 800 in diameter. Pharynx muscular, 600 in total length by 920 wide. Testes rounded, 37 in number 210 × 150. Few Goto's glands scattered among testes. Ovary subglobular, pre-equatorial, median, 740 by 800. Seminal receptacle round, 240 by 200. Vitelline reservoir 300 by 400, immediately preovarian.

Remarks: Capsala katsuwoni was described by Ishii (1936) as Tristoma katsuounum from Pacific. This species was included by Price (1938) in the genus Capsala and later in the new genus Caballerocotyla proposed by the
same author in 1960, but not recognized by Chisholm and Whittington (2007). Kohn and Justo (2006) described the new species Caballerocotyla llewelyni from the Atlantic Ocean, which was considered as synonym of Capsala katsuwoni by Chisholm and Whittington (2007). We present only the main measurements of the specimen from T. atlanticus, which is comparative larger than those found in K. pelamis reported by Ishii (1936), Murugesh (1995) and Kohn and Justo (2006).

**Capsala notosinense** (Mamaev, 1968) Chisholm & Whittington 2007

Synonyms: Capsala andhraensis Raju & Rao, 1980; Caballerocotyla chilensis Pillai & Pillai, 1976; Capsala katuo Iwata, 1990; Capsala naffari Iwata, 1990; Capsala notosinense Kohn and Justo (2006). Murugesh (1995) and than those found in specimen from (2007). We present only the main measurements of the of the Atlantic Ocean, which was considered as synonym described the new species and Whittington (2007). Kohn and Justo (2006) same author in 1960, but not recognized by Chisholm (99). Egg tetrahedral.

**Main measurements (based on five adult specimens):**

- **Body oval to elliptical, 2.2–4.2 (3.3) mm × 0.9–2.2 (1.6) mm.** Dorosomal body sclerites comprise 2–3 rows of unicuspids sclerites, extending to posterior part of the body, except at to the posterior end near the haptor. Haptor discoid, without anchors 48–77 (61) long and 14 marginal hooklets.
- **Remarks:** Capsala notosinense was described by Mamaev (1968) from gills from Euthynnus affinis (Cantor, 1850) in South China as Caballerocotyla notosinense. Chisholm and Whittington (2007) considered Capsala andhraensis, Caballerocotyla chilensis, Capsala naffari and Capsala katuo as synonyms of Caballerocotyla notosinense. In this opportunity, Capsala notosinense is reported by the first time in Brazil, Southwestern Atlantic Ocean.

**Nasicola klawei** (Stunkard, 1962) Yamaguti, 1968


- **Host:** T. albacares
- **Site:** Nasal cavity
- **Prevalence:** 81.6%
- **Main measurements (based on five adult specimens):**
  - **Body 9.0–14.2 (13.0) long mm × 9.0–13.0 (11.0) mm in maximum width.** Row of spines close to margin on each side of body, small, irregularly disposed, with broad base and 2–5 digitiform cusps inner; row of larger spines, on each side of body, with broad base and conical tip with 1–2 digitiform points. Haptor 2.5–3.3 mm (3.0) in diameter, divided by 7 septa forming central polygonal loculus and 7 triangular loculi, with 2 similar accessory sclerites and 14 small peripheral marginal hooklets. Cephalic lobe with pair of sucker-like attachment organs, 440–640 (540) × 500–680 (595). Mouth opening at level of eyespots; pharynx with papillae distributed over inner surface, anterior region 0.70–0.84 (0.77) mm × 1.02–1.44 (1.23) mm and posterior region, 0.44–0.60 (0.53) mm × 0.73–1.14 (0.94) mm. Intestinal ceca ramified. Testes 28–33 in number, 140 × 80. Cirrus-sac flask-shaped. Vaginal pore opens immediately posterior to genital

Remarks: *N. klaweii* was originally described by Stunkard (1962) as a species of *Caballerocotyla* Price, 1960, from the nasal cavity of *T. albacares* (as *Neothunnus macrطورus*) from the Pacific Ocean. In 1968, Yamaguti studied specimens from the same host and from *T. obesus* (as *Parathunnus sibi*) from off Hawaii and erected *Nasicola* to accommodate this species. In the Pacific Ocean it was reported by Egorova (2000) from an unidentified scombrid fish. *N. klaweii* was referred in the Atlantic Ocean parasitizing *T. albacares* by Bussiéras and Baudin-Laurencin (1967, 1973), Bussiéras (1972), Williams Jr. and Bunkley-Williams (1996) and redescribed by Kohn et al. (2004). Ours specimens correspond to the description presented by Kohn et al. (2004) from same host and locality.

Subclass Oligonchoinea Bychowsky, 1937
Family Axinidae Monticelli, 1903
Subfamily Allopseudaxininae Yamaguti, 1963
*Allopseudaxinoidea* Yamaguti, 1965

*Allopseudaxinoidea euthynni* Yamaguti, 1965

- Host: *K. pelamis* (new host record).
- Site: Gill
- Prevalence: 4.5%
- Mean intensity: Only one specimen was infected
- Material studied: CHIOC 37059, 37060
- Main measurements (based on two adult specimens):
  - Body large, 8.2 and 8.6 mm by 2.6 and 2.8 mm. Haptor unilateral, extending obliquely in the posterior half of the body, with a row of 14-15 clamps and a prominent digitiform caudal appendage which is provided at its blunt end with two pairs of anchors; outer anchor 55 long, inner 25. Clamps 220 and 240 in diameter, constituted by two valves. Rounded anterior end of body, 175 and 205 wide, with two paired oral suckers, 50–51 × 42; pharynx pyriform, 87 × 37. Testes 20 in number, irregular in shape. Genital atrium spherical, 52 and 55 in diameter, with thick wall of radial muscle fibers, armed inside with a corona about 20 spines long and bifid. Genital pore midventral. Ovary 2.04 mm by 0.40 mm, in midregion of body, with both ends directed backwards. Vitellaria co-extensive with intestine and its branches. Vitelline reservoir Y-shaped. Eggs not visualized.
- Remarks: *Allopseudaxinoidea euthynni* was described by Yamaguti (1965) from gills of *Euthynnus affinis* (as *Euthynnus yaito*) from Hawaii and redescribed in 1968 in the same host and locality. In this opportunity, it is referred for the first time in Southwestern Atlantic Ocean and in a new host, *K. pelamis*.

Family Gastrocotylidae Price, 1943
Subfamily Gastrocotylinae Sproston, 1946

*Sibitrema* Yamaguti, 1966

*Sibitrema poonui* Yamaguti, 1966

- Synonym: *Metapseudaxine ventrosicula* Mamaev, 1967
- Host: *T. obesus*
- Site: Gill
- Prevalence: 5.7%
- Mean intensity: Only one specimen was infected
- Material studied: CHIOC 37038, 37039
- Main measurements (based on one adult specimen):
  - Total body measuring 9.20 mm by 1.10 mm in the region of the ovary and testes. Haptor long, 1.60 mm × 0.54 mm, with single row of 49 clamps, and terminal appendices with two pairs of anchors of different sizes. Two buccal suckers, 35 × 30; pharynx larger than suckers, 54 × 38. Testes rounded, about 70 in number. Vas deferens strongly winding. Muscular genital atrium with single circle of curved terminally bifurcated spines. Ovary tubular. Vitelline follicles small, co-extensive with intestinal branches. Vitelline reservoir Y-shaped. Egg fusiform, 210 × 90, with one filament at each pole.
- Remarks: *Sibitrema poonui* was originally described by Yamaguti (1966) from gills of *T. albacares* (as *N. macrطورus*) and *T. obesus* (as *P. sibi*) in the Pacific Ocean, Hawaii and redescribed by Rohde (1978) from *Cibyso sarda elegans* (Whitley, 1935) and *E. alletteratus* from Australia. Bussiéras and Baudin-Laurencin (1973) also referred this species parasitizing *T. albacares* from Antilles Islands. In Brazil, *S. poonui* was reported by Kohn et al. (2003) from *T. albacares* and *T. obesus* and by Alves and Luque (2006) as *M. ventrosicula*, parasitizing *E. alletteratus* and *Sarda sarda* (Bloch, 1793).

Family Hexostomatidae Price, 1936
*Hexostoma* Rafinesque, 1815

*Hexostoma albsmithi* Dollfus, 1962

- Host: *T. obesus* (new host record).
- Site: Gill
- Prevalence: 5.7%
- Mean intensity: 16.5 ± 30.38
- Material studied: CHIOC 37056 a-j
- Main measurements (based on 10 adult specimens):
  - Body elongated, tapered anteriorly 9.24–17 (14.2) mm × 2.30–3.50 (2.80) mm, containing two small suckers 40–62 (51) × 30–47 (40); pharynx 65–110 (86) × 40–87 (66). Intestinal caeca form network of thin canals in dorsal and ventral region of the body. Numerous testes, 60–80 in number. Ovary located in the middle portion of the body. Vagina 100–160 (133) × 95–150 (116). Vitelline follicles dispersed throughout the body, except in the anterior region and the haptor region. Haptor 3.30–5.70 (4.40) mm long, containing 4 pairs of oval clamps: 3 larger pairs with similar size, 420–610 (520) × 370–540 (450), including a delicate membrane that surrounds the...
clamps, measuring 35–62 (43) wide; one pair of clamps median, 130–250 (207) × 120–260 (170) including the membrane that measures 20–40 (28). Each clamp presents 3 muscular sclerites: 2 lateral small sclerites and one median sclerite X-shaped, with 3–6 perforations. Two pairs of similar anchors: one pair 72–96 (87) long and one small pair 15–38 (21) long. Eggs 200–275 (233) × 95–175 (131), with two polar filaments: opercular filament, 100–155 (130) long and posterior filament, 105–162 (148) long. Uterus containing 2–16 eggs.

Remarks: Hexostoma albsmithi was described by Dollfus (1962) from gills of the Thunnus thynnus (Linnaeus, 1758) (as Thynnus saliens) from California, Pacific Ocean. In this paper, this species is reported by the first time from Brazil, Southwestern Atlantic Ocean and in a new host record T. obesus.

**Hexostoma euthynni** Meserve, 1938


Hosts: A. thazard and E. alletteratus

Site: Gills

Prevalence: A. thazard (25%); E. alletteratus (16.1%)

Mean intensity: A. thazard (1.4 ± 0.51); E. alletteratus (4.8 ± 3.64)

Material studied: CHIOC 37050, 37051, 37052, 37053

Main measurements (based on four adult specimens):

Body elongate, 4.3–7.3 (6.1) mm × 1.2–1.5 (1.3) mm, presenting a constriction in pretesticular region, tapering from level of ovary to anterior end. Haptor continuous with body proper, each side with four sessile clamps decreasing in size; clamps of uniform structure sucker-like, larger clamps 190–350 (303) × 160–250 (210) and smaller clamps 175–245 (214) × 165–175 (167); each clamp encloses three sclerites, the middle one X-shaped, while the two lateral ones are straight; one pair of large and one pair of small terminal hooks. Two buccal elliptical suckers, 40 and 47 × 35; small pharynx; short esophagus bifurcating anterior to genital pore. Genital pore ventral, median. Testes post-ovarian, 22–26 in number. Ovary median, U-shaped. Vagina opens dorsal, 75–90 (82) × 60–87 (71), immediately posterior to genital atrium, provided with pair of denticulate bodies. Vitelline consist of irregular follicles. Uterus near midline of body. Eggs fusiform, 200–260 (220) × 100–180 (130) [n=3], with one filament at each pole, measuring 150–230 long.

Remarks: Hexostoma euthynni was described by Meserve (1938) from the gills of E. alletteratus from Galapagos Island, Pacific Ocean. It was also referred from the same ocean as H. macracanthum by Fuji (1944) from E. alletteratus; as Neohexostoma pricei by Koratha (1955) from Sarda sarda and as N. euthynni from A. thazard and E. affinis by Mamaev (1968). H. euthynni was redescribed from Euthynnus lineatus Kishinouye, 1920 from Pacific Ocean by Millemann (1956), who considered H. macracanthum as synonym. In 1978, Rohde studied this species from Euthynnus alletteratus affinis (Cantor, 1849) from Australia and considered Neohexostoma synonymous of Hexostoma. In the Atlantic Ocean this species was referred by Williams Jr. and Bunkley-Williams (1996) and by Alves and Luque (2006) from gills of E. alletteratus in the genus Neohexostoma.

**Hexostoma keokeo** Yamaguti, 1968

Host: A. thazard

Site: Gills

Mean intensity: 1.33 ± 0.70

Prevalence: 15%

Material studied: CHIOC 37054 e 37055

Main measurements (based on two adult specimens):

Body elongate, anterior region tapered, 3.6 and 5.7 mm; greatest at width ovary level, 1.1 and 2.2mm. Haptor papillate, 1 and 1.8 mm, with two lateral papillate lobes; four pairs of clamps 210–225 (217) × 160–230 (195), arranged horizontally, similar, sessile, sucker-like, each clamp presenting three sclerites enclosed in two muscular and oval bands. Two pairs of terminal anchors, outer anchors large, 110 long. Mouth subterminal, surrounded by spherical buccal suckers, 35 × 37. Pharynx small, esophagus long, caeca with lateral diverticula reaching to haptor. Testes 18 in number, post-ovarian. Bulbous muscular cirrus. Ovary anterior to mid half of body, U-shaped. Vitelline follicular. Vagina with two symmetrical elongate pads densely covered with conical teeth, 75 and 100 × 60 and 90. Uterus midventral. Egg fusiform 200 × 90, filaments on each pole, equal in size, 192 long.

Remarks: Hexostoma keokeo was described by Yamaguti (1968) from gills of A. thazard off Hawaii, Pacific Ocean. In 1995, Murugesh proposed that H. keokeo should be considered a synonym of Hexostoma auxisi Palombi, 1943. However, Mogrovejo et al. (2004), based on scanning electron microscopy studies of specimens of H. keokeo from Rio de Janeiro coast, did not considered the validity of the synonymy.

**Hexostoma sibi** Yamaguti, 1968

Hosts: T. albacares and T. obesus

Site: Gills

Prevalence: T. albacares (10.5%); T. obesus (22.9%)

Mean intensity: T. albacares (5.00±3.39); T. obesus (12.75±4.44)

Material studied: CHIOC 37040, 37041, 37042, 37043, 37044, 37045, 37046, 37047, 37048, 37049

Main measurements (based on ten adult specimens):

Body 15.2–22.4 (18.2) mm × 4.1–6.4 (5.6) mm, divided into four regions of different width: the first region is very narrow and pointed, 80–170 (125) in the greatest

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width, comprising a pair of cephalic suckers, 38–50 (44) × 28–50 (36), pharynx and anterior part of esophagus. The second region is nearly uniform in width, between the first region and the genital pore, 210–500 (400) wide; the third region occupies the greater middle portion of the body; the fourth region comprises the haptor, 4.1–6.1 (5.2) mm wide, with four pairs of ventral haptoral suckers: three major pairs, 520–790 (650) × 480–630 (540) and two small pairs 200–330 (270) × 200–220 (210); two pairs of median external anchors, 70–100 (82) long and two pairs of median internal anchors 20–40 (23) long. Testes rounded, 110 in number. Ovary tubular. Vitelline follicles extend along from region of intestinal bifurcation to constriction, between third and fourth region. Eggs oval to elliptical, 200–250 (220) × 80–190 (130) [n=10]; filament, 110–170 (140) of opercular pole and 110–210 (160) long of opposite pole.

Remarks: *Hexostoma sibi* was originally described by Yamaguti (1968) from the gills of *T. albacares* (as *N. macropterus*), *T. obesus* (as *P. sibi*) and *T. alalunga* from Hawaii, Pacific Ocean. In this opportunity this species is referred by the by the first time in Brazil, Southwestern Atlantic Ocean.

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LITERATURE CITED


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