Larval tapeworms (Platyhelminthes, Cestoda) from sciaenid fishes of the southern coast of Brazil

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ABSTRACT
Cestode larvae were collected from 10 species of sciaenid fishes from the coast of Rio Grande do Sul, Brazil. Eleven species of Trypanorhyncha and two unindentified larvae are reported: *Pterobothrium heteracanthum*, *P. crassicolle*, *Callitetrarhynchus gracilis*, *C. speciosus*, *Dasyrhynchus pacificus*, *Heteronybelinia nipponica*, *H. annakohnae* n. sp., *H. estigmena*, *Nybelinia bisulcata*, *Progrillotia dollfusi*, *Dollfusiella* sp., an unidentified species of plerocercoid larva, and an unidentified species of procercoid larva. *Heteronybelinia annakohnae* n. sp. is described based on specimens from four host species. It is characterized by a long pars postbulbosa and by bothridial margins covered with spines and that overlap the bulbs. *Progrillotia dollfusi* is redescribed based on paratypes and specimens collected in the present study. The basal tentacular armature, the presence of a prebulbar organ and of a pars postbulbosa, the attachment of the retractor muscle of the tentacle in the first third of the bulb, and the presence of gland cells in the interior of the bulbs, are reported in this species for the first time. These characteristics support and amend the diagnosis of *Progrillotia*. A procercoid larva is described for the first time from fish in Brazil. Measurements, descriptions, and drawings of the specimens of those species which are insufficiently or incompletely known are presented.

KEY WORDS
Platyhelminthes,
Cestoda,
Trypanorhyncha,
Heteronybelinia,
Nybelinia,
Progrillotia,
larval tapeworms,
Sciaenidae,
coast of Brazil.

RÉSUMÉ

Cestodes larvaires (Platyhelminthes, Cestoda) de poisson Sciaenidae de la côte sud du Brésil.

Des larves de cestodes ont été collectées chez 10 espèces de poissons sciaenidés provenant de la côte de Rio Grande do Sul, Brésil. Onze espèces de trypanorhynques et deux larves non identifiées sont signalées : *Pterobothrium heteracanthum*, *P. crassicolle*, *Callitetrarhynchus gracilis*, *C. speciosus*, *Dasyrhynchus pacificus*, *Heteronybelinia nipponica*, *H. annakohnae* n. sp., *H. estigmena*, *Nybelinia bisulcata*, *Progrillotia dollfusi*, *Dollfusiella* sp., une espèce non identifiée de larve plerocercoïde ainsi qu'une espèce indéterminée de larve procercoïde. *Heteronybelinia annakohnae* n. sp. est décrit sur la base de spécimens collectés chez quatre espèces d'hôtes. Ce cestode est caractérisé par une longue pars postbulbosa et par les marges des bothridies qui sont couvertes d'épines et qui chevauchent le bulbe. *Progrillotia dollfusi* est redécrit sur la base des paratypes et des spécimens collectés lors de cette étude. L'armature tentaculaire de base, la présence d'un organe prébulbaire et de la pars postbulbosa, l'attachement du muscle rétracteur du tentacule au niveau du premier tiers du bulbe et la présence de glandes cellulaires à l'intérieur des bulbes sont observées pour la première fois chez cette espèce. Ces caractéristiques soutiennent et modifient la diagnose de *Progrillotia*. Une larve procercoïde est décrite pour la première fois chez un poisson brésilien. Les mesures, descriptions et dessins des spécimens de cette espèce, qui sont insuffisamment ou incomplètement connues, sont présentés dans ce travail.

MOTS CLÉS
Platyhelminthes,
Cestoda,
Trypanorhyncha,
Heteronybelinia,
Nybelinia,
Progrillotia,
ténias larvaires,
Sciaenidae,
côte du Brésil.

INTRODUCTION

Cestodes from fishes off the coast of Rio Grande do Sul have been previously reported by Santos & Zogbi (1971), São Clemente & Gomes (1989a, b, 1992), São Clemente *et al.* (1991) and Pereira (1993), all of which are records of species of Trypanorhyncha. In the present study, cestode larvae from 10 species of Sciaenidae collected from the coast of Rio Grande do Sul are reported. A new species of *Heteronybelinia* Palm, 1999 is described, the diagnosis of *Progrillotia* Dollfuss, 1946 is amended, and *P. dollfusi* Carvajal & Rego, 1983 is redescribed.

MATERIALS AND METHODS

Fish hosts were obtained from fishermen of the city of Rio Grande, State of Rio Grande do Sul, Brazil. Blastocysts, when present, were opened with the help of probes and the larva kept for 24 h in refrigerated distilled water. The worms were fixed in AFA (Humason 1979) for 24 h and preserved in 70% ethanol. Cestodes were stained with Semichon's carmine or Delafield's hematoxilin and mounted in Canada balsam. Histological sections (15 mm) were stained with hematoxylin and eosin. Terminology for hooks and armature types is that proposed by Dollfus (1942), Campbell & Beveridge (1994), and Beveridge & Campbell (1989), respectively. The classification used herein is that of Campbell & Beveridge (1994), and of Palm (1999) for Tentaculariidae. Paratypes of *P. dollfusi* Carvajal & Rego, 1983, deposited in the Helminthological Collection of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (CHIOC 32018 b-d), were examined for comparison. Drawings were made with the aid of a drawing tube. Descriptions, measurements, and drawings are presented for those species for which systematic and/or morphological knowledge are/is incomplete. Measurements were made either with an ocular micrometer or a digital image system using the program Sigma Scan Pro (Jandel Scientific Software) and are presented in mm, unless otherwise indicated in the respective descriptions; the mean and standard deviation (±) is presented followed by the range in parentheses when more than two specimens are available.

ABBREVIATIONS

Used in Host sections

IGD	incresed geographical distribution;
LH	smallest and largest length (cm) of parasitized host;
MI	mean intensity (*sensu* Bush *et al.* 1997);
MA	mean abundance (*sensu* Bush *et al.* 1997);
NH	new host record;
P	prevalence.

Material depositories

CHIOC	Helminthological Collection of the Instituto Oswaldo Cruz, Rio de Janeiro;
HWML	Harold W. Manter Laboratory of the University of Nebraska State Museum, Lincoln, Nebraska;
MNHN	Helminthological Collection of Muséum national d'Histoire naturelle, Paris.
USNPC	US National Parasite Collection, Beltsville, Maryland;

RESULTS

Specimens of Trypanorhyncha were collected from 180 specimens of *Micropogonias furnieri* (Desmarest, 1823), 116 *Umbrina canosai* Berg, 1895, 134 *Paralonchurus brasiliensis* (Steindachner, 1875), 105 *Cynoscion guatucupa* (Cuvier, 1830), 60 *C. jamaicensis* (Vaillant & Bocourt, 1883), 59 *Menticirrhus littoralis* (Holbrook, 1860), 49 *M. americanus* (Linnaeus, 1758), 33 *Pogonias cromis* (Linnaeus, 1766), 33 *Ctenosciaena gracilicirrhus* (Metzellar, 1919), and 60 *Macrodon ancylodon* (Bloch & Schneider, 1801). A taxonomical account for their cestode species follows.

Order TRYPANORHYNCHA Diesing, 1863
Family TENTACULARIIDAE Poche, 1926
Genus *Heteronybelinia* Palm, 1999

Heteronybelinia nipponica (Yamaguti, 1952) (Fig. 1)

HOSTS. — *Menticirrhus americanus* (NH) (LH = 39.7; P = 2.04; MI = 1.0; MA = 0.02); *Umbrina canosai* (NH) (LH = 11.9; P = 0.86; MI = 1.0; MA = 0.01).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33786, 33787.

DESCRIPTION (based on two specimens)

Scolex craspedote, 0.75-0.88 long. Maximum width 0.25-0.33 at the posterior level of the bothridia. Four bothridia 0.32-0.41 long, overlapping apices of bulbs. Internal margins of bothridia densely covered by long spines, other groupings of cuticular spines spread throughout surface of tegument, and sensory fossette near the margin at the center of each bothridium (observed in a single specimen). Tentacle sheath long, irregularly coiled. Bulbs 0.17-0.30 long, 0.04-0.05 wide. Velum 0.06-0.07 long; appendix 0.13-0.15 long. Hooks in continuous spirals. Basal row with uncinate hooks 6-7 µm long, base 2-3 µm wide. Rows 2-4 with similar, "serpe à bec" hooks, longer, and more robust than hooks of other rows, forming a basal armature. Hooks of third row larger than others, 22-25 µm long, base 4-5 µm wide. Hooks of the fifth row rose-thorn shaped, 22 µm (20-25) long, base 9 µm (8-10) wide.

REMARKS

This species was originally described as *Nybelinia nipponica* by Yamaguti (1952) from Japan. Dollfus (1960) describes *Nybelinia rougetcampanae* based on a single larva collected from *Liosaccus cutaneus* (Günter, 1870), captured off the coast of Dakar. This species was later transferred to *Heteronybelinia* by Palm (1999). The adult form was described by São Clemente & Gomes (1992) based on six specimens collected from *Sphyrna lewini* (Cuvier, Griffith & Smith, 1834) from the coast of Rio Grande do Sul. Knoff (2001) reports adults of *H. rougetcampanae* from *Sphyrna zigaena* (Linnaeus, 1758) and *H. nipponica* from *Carcharinus signatus* (Poey, 1868) from the coast of the state of Santa Catarina as distinct species. Palm & Walter (2000) considered *H. rougetcampanae* a junior synonym of *H. nipponica*.

Measurements of the material collected in the present study are similar to those reported by São Clemente & Gomes (1992) but are smaller than those presented by Dollfus (1960). The tentacular armature observed in the material examined herein also corresponds with the previously

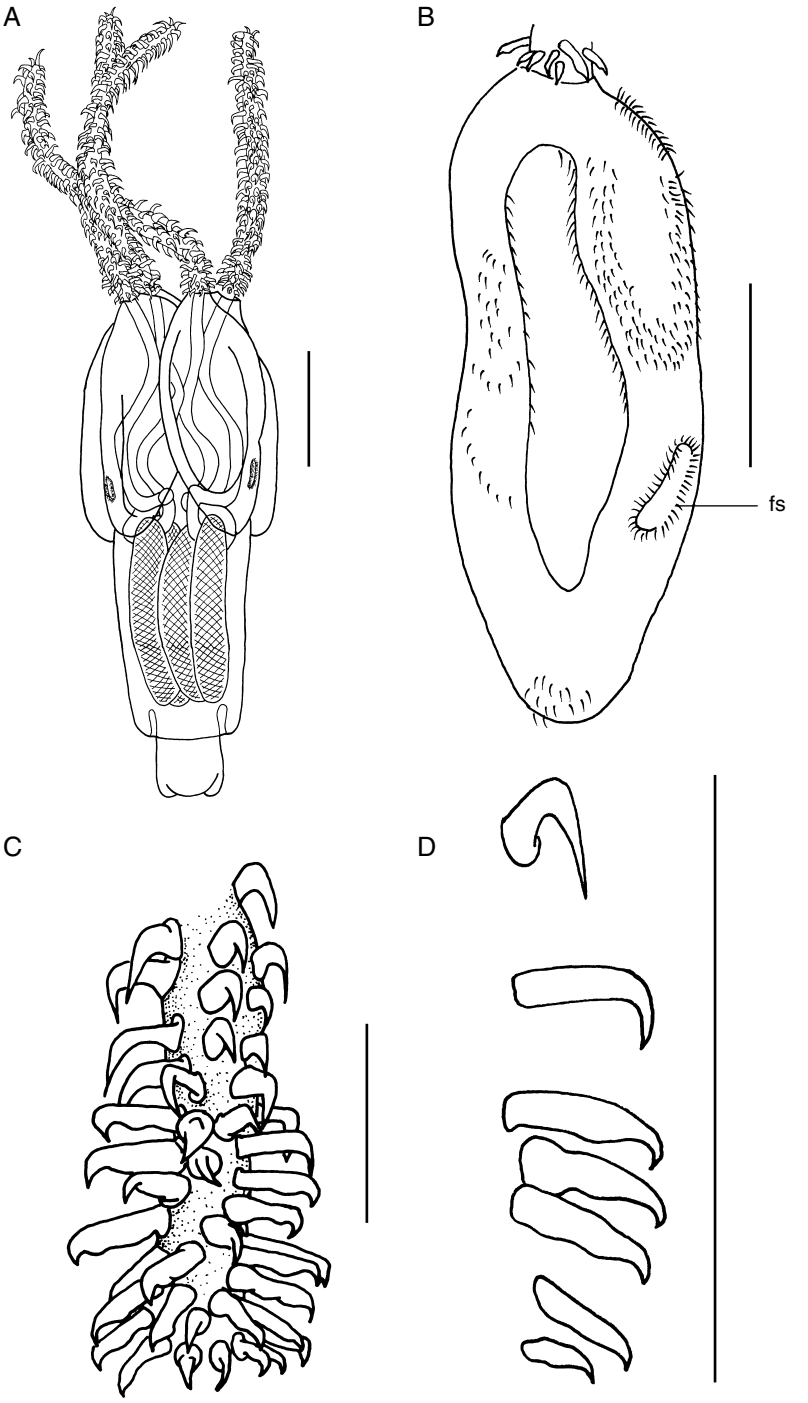

FIG. 1. — *Heteronybelinia nipponica* (Yamaguti, 1952); **A**, larva *in toto*; **B**, bothridium; **C**, basal armature; **D**, hooks of the first seven rows of the tentacles. Abbreviation: **fs**, sensory fossette. Scale bars: A, B, 0.5 mm; C, 0.1 mm; D, 100 µm.

reported descriptions. However, the marginal spines and the sensory fossettes in the bothridia were not described in the previous taxonomic accounts of the species (listed above). The unusual shape of the hooks of the base of the tentacles and the presence of sensory fossettes in the margin of the bothridia observed in *H. nipponica* are similar to those of *Pseudonybelinia odontacantha* Dollfus, 1966, based on the description of larvae collected from the plankton. Dollfus (1967) provided additional information on this species and suggested that the presence of the sensory fossettes placed *P. odontacantha* in the Otobothriidae Dollfus, 1942. However, Paranybeliniidae Schmidt, 1970 was proposed to include *Pseudonybelinia* with sensory fossetes and two bothridia. The specimens studied here are clearly members of *H. nipponica* sensu Palm & Walter (2000). Species of *Pseudonybelinia* bear two bothridia and the armature is homeacanth and invariabily homeomorphous, whereas species of *Heteronybelinia* have four bothridia and the metabasal armature is homeacanthous with heteromorphous hooks, according to the diagnosis of Palm (1999) and Palm & Walter (2000). These authors also report the presence of cuticular spines (hook-like microtriches) in species of *Heteronybelinia*. They did not provide redescriptions of *H. rougetcampanae* or *H. nipponica*. Knoff (2001) reports that hook-like microtriches were not observed in *H. yamaguti* and *H. nipponica*. However, these structures are very fragile and can easily be lost. This is the first time that this character is formally described for *H. nipponica*.

Several phylogenetic reconstructions of Trypanorhyncha utilized the presence of sensory fossettes as a character (Campbell & Beveridge 1994; Palm 1995, 1997a; Beveridge *et al.* 1999). Beveridge *et al.* (1999), however, prior to the proposal of *Heteronybelinia* and *Mixonybelinia* Palm, 1999 (see Palm 1999), state that the character is homoplastic, appearing independently in many genera. This character, is thus not as evolutionarily informative as considered by Palm (1995, 1997). Further, as described by São Clemente & Gomes (1992), *H. rougetcampana*e has an I-shaped uterus. All these characters suggest that *Nybelinia* Poche, 1926 requires further revision, as also indicated by Beveridge *et al.* (1999), despite the previous efforts of Palm (1999) and Palm & Walter (2000).

Heteronybelinia annakohnae n. sp.
(Fig. 2A-C)

TYPE HOST. — *Ctenosciaena gracilicirrhus* (LH = 1; P = 3.03; MI = 1.0; MA = 0.03).

TYPE MATERIAL. — Holotype: CHIOC 33790; Paratypes: CHIOC 33791 to 33794, 33795; USNPC 87422, 87423.

TYPE LOCALITY. — Rio Grande, Brazil.

ETYMOLOGY. — This species is named for Dr Anna Kohn, Instituto Oswaldo Cruz, in recognition of her contributions to the knowledge of helminthology in South America.

ADDITIONAL HOSTS. — *Menticirrhus americanus* (LH = 33.9-38.7; P = 4.08; MI = 1.0; MA = 0.04), *Cynoscion jamaicensis* (LH = 22.0-26.9; P = 3.33; MI = 1.0; MA = 0.03) and *Cynoscion guatucupa* (LH = 23.3-40.7; P = 3.81; MI = 1.25; MA = 0.05).

SITE OF INFECTION. — Coelomic cavity.

DESCRIPTION (based on seven specimens)

Scolex craspedote, 0.54 ± 0.06 (0.44-0.62) long; maximum width 0.29 ± 0.03 (0.24-0.35) at bothridia level. Four bothridia 0.20 ± 0.01 (0.19-0.22) long, almost totally overlapping bulbs. Margin of bothridia densely covered by short cuticular spines. Sheaths short, irregularly sinuous. Bulbs 0.18 ± 0.01 (0.12-0.40) long, 0.04 ± 0.01 (0.02-0.05) wide. Length/width ratio of bulbs 3.25 ± 0.67 (2.80-4.25). Total length/length ratio of bulbs, 3.66 ± 0.67 (2.75-4.60). Pars postbulbosa distinct, long, about 65% of total length. Velum 0.12 ± 0.02 (0.10-0.19) long, appendix 0.27 ± 0.05 (0.18-0.35) long. Hooks homeomorphous, uncinate, in continuous spirals; basal row with smaller hooks, 5-6 µm long; base 3-4 µm wide, other hooks 12 µm ± 2.44 (8-15) long, base 9 µm ± 1.32 (7-11) wide. Half spiral with six hooks.

REMARKS

Palm (1999) recognizes three species of *Heteronybelinia* with basal hooks smaller than

metabasal hooks (subgroup II of Palm *et al.* 1997). *Heteronybelinia annakohnae* n. sp. differs from these by lacking basal "serpe à bec" or recurvate hooks as are found in *H. nipponica* (Yamaguti, 1952), and *H. yamagutii* (Dollfus, 1960). *Heteronybelinia annakohnae* n. sp. and *H. robusta* (Linton, 1890) are the only species in this genus in which the bothridia almost completely overlap the bulbs. The new species differs from *H. robusta* by having a shorter scolex, by having a dilated appendix, and by the comparative onchotaxy.

Heteronybelinia estigmena (Dollfus, 1960)
(Fig. 2D-F)

HOST. — *Cynoscion jamaicensis* (NH) (IGD) (LH = 26.2-27.0; P = 3.33; MI = 1.0; MA = 3.03).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33796; MNHN-C-IX-144 (JJ1384-3-1).

DESCRIPTION (based on two specimens)
Scolex craspedote 1.01-1.10 long, bothridia 0.48-0.58 long, overlapping apices of bulbs. Maximum width 0.30-0.40, at level of the posterior portion of bothridia. Bulbs 0.26-0.30 long, 0.05-0.08 wide. Length/width ratio of bulbs 3.75-5.20. Total length/length ratio of bulbs 2.1-3.6. Sheaths regularly coiled at base. Velum 0.11-0.18 long; appendix 0.17-0.18 long. Hooks uncinate in continuous spirals; hooks of bothridial and antibothridial faces significantly different in size; hooks of antibothridial face (6-8 mm) long, base (6-8 µm) wide, hooks of bothridial face (3-3 µm) long, base (3-3 µm) wide.

REMARKS
Nybelinia estigmena Dollfus, 1960 was described based on larval forms from *Boops boops* (Linnaeus, 1758), *Alectis alexandrinus* (Geoffroy St Hilaire, 1858) and *Selene setapinnis* (Mitchill, 1815). Palm (1999) transferred the species to *Heteronybelinia* and Palm & Walter (2000) considered it as a senior synonym of *H. senegalensis*.

Genus *Nybelinia* Poche, 1926

Nybelinia bisulcata (Linton, 1889)
(Fig. 3A, B)

HOST. — *Umbrina canosai* (NH) (LH = 23.0-31.5; P = 3.45; MI = 1.25; MA = 0.04).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33788 a-b, 33789; MNHN-C-IX-144 (JJ1014-8-1).

DESCRIPTION
Measurements (based on three specimens): scolex 1.86 ± 0.74 (1.05-2.53) long. Bothridia 0.92 ± 0.34 (0.55-1.23) long. Bulbs 0.46 ± 0.19 (0.25-0.62) long, 0.13 ± 0.06 (0.05-0.17) wide. Velum 0.23 ± 0.10 (0.12-0.31) long, appendix 0.44 ± 0.44 (0.25-0.63) long. Hooks 13 µm ± 1.52 (12-15) long.

REMARKS
The adult of this species has a wide geographical distribution, having been previously recorded from the coast of Rio Grande do Sul in *Notorhynchus pectorosus* (Garman, 1884) by São Clemente *et al.* (1991) and São Clemente & Gomes (1992). This is the first record of its plerocercoid larval stages.
The larvae examined in the present study are about three times longer than the scolex of the adult specimens described by São Clemente & Gomes (1992). Great variations in the dimensions of the scolex are also mentioned by these authors and by Stunkard (1977). Palm & Walter (2000) report that vouchers of different species of *Nybelinia*, *Heteronybelinia* and *Mixonybelina* were deposited in the National Helminthological Collection, Beltsville, USA, by Linton under the name of *N. bisulcata* and for that reason they indicate that *N. bisulcata* is a *species inquerenda*. Dollfus (1942) revised these specimens and transferred the species to *Nybelinia*, since it was originally described as *Rhynchobothryum*. Linton (1890), however, refers to this species as *Tetrarhynchus bisulcatum* while stating that it was described in 1886 (see *Rhynchobothrium bisulcatum* in Linton, 1889: pl. IV). This document, according to Palm (1995) was only published in

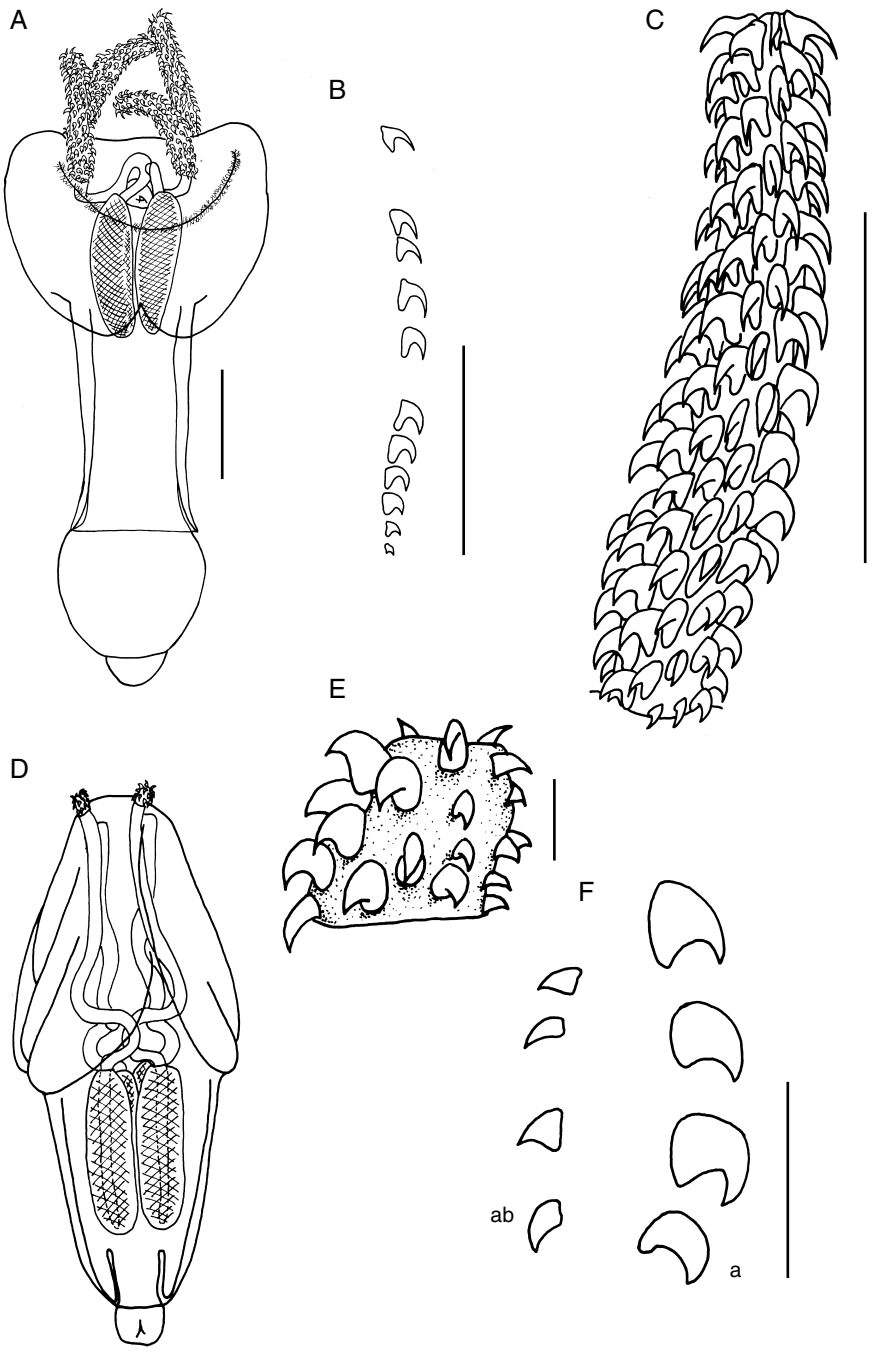

FIG. 2. — **A**-**C**, *Heteronybelinia annakohnae* n. sp.; **A**, larva *in toto*; **B**, hooks of the first rows of the tentacles; **C**, basal and metabasal armature; **D**-**F** *Heteronybelinia estigmena* (Dollfus, 1960); **D**, Larva *in toto*; **E**, basal armature; **F**, hooks of the first rows of the tentacles. Abbreviations: **ab**, antibothridial; **b**, bothridial. Scale bars: A, C, D, 0.1 mm; B, 60 mm; E, 0.01 mm; F, 20 µm.

1889, which apparently explains the date assigned to the species by most authors.

Family EUTETRARHYNCHIDAE Guiart, 1927
Genus *Dollfusiella* Campbell & Beveridge, 1994

Dollfusiella sp.
(Fig. 3C, D)

HOST. — *Micropogonias furnieri* (LH = 38.0; P = 0.56; MI = 1.0; MA = 0.005).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33797.

DESCRIPTION (based on one specimen)
Scolex 1.71 long. Maximum width at level of pars postbulbosa, 0.30. Bothridia patelliform, 0.2 long. Pars vaginalis 0.44 long, sheath irregularly coiled near bulbs. Pre-bulbar organ present. Bulbs 0.5 long, 0.05 wide; length/width ratio of bulb 10; scolex total length/length of bulb ratio, 3.42. Pars postbulbosa 0.56 long. Basal armature with uncinate hooks in a swollen portion of the tentacle followed by long spiniform hooks.

REMARKS
Campbell & Beveridge (1994) proposed *Dollfusiella* to accomodate species of Eutrarhynchidae with basal armature inflated and lacking macrohooks in the tentacles. The only specimen collected during this study presented tentacles not everted. The presence of a distinct group of hooks, the dilation in the base of the tentacle, and the absence of macrohooks justifies the inclusion of the species in *Dollfusiella*.

Superfamily OTOBOTHRIOIDEA Dollfus, 1942
Family GRILLOTIIDAE Dollfus, 1969

Genus *Progrillotia* Dollfus, 1946

AMENDED DIAGNOSIS. — Scolex acraspedote. Posterior margins of bothridia not notched. Tentacular armature with longitudinal bands of hooks in external face; basal armature present or not. Bulbs long, variable, with or without prebulbar organ. Testes in longitudinal bands, anterior to ovary; accessory seminal vesicle absent. Ovary at posterior extremity of proglottid. In Sciaenidae Cuvier, 1817 (intermediary hosts) and Elasmobranchii (definitive hosts).

Progrillotia dollfusi Carvajal & Rego, 1983
(Figs 4; 5)

TYPE HOST. — *Cynoscion guatucupa* (= *C. striatus* (Cuvier, 1829) according to Figueiredo (1992)) (LH = 9.8-46.0; P = 90.48; MI = 2683.46; MA = 2427.90).

OTHER HOSTS. — *Cynoscion jamaicensis* (LH = 9.4-34.6; P = 81.67; MI = 433.45; MA = 353.98); *Macrodon ancylodon* (LH = 6.8-36.3; P = 96.67; MI = 792.21; MA = 765.8); *Ctenosciaena gracilicirrhus* (LH = 13.3-25.4; P = 54.54; MI = 5.83; MA = 3.18); *Umbrina canosai* (LH = 11.0-36.5; P = 50.0; MI = 42.10; MA = 21.05); *Menticirrhus americanus* (LH = 24.2-26.6; P = 4.08; MI = 2.0; MA = 0.08); *Menticirrhus littoralis* (LH = 25.4-31.6; P = 3.39; MI = 1.5; MA = 0.05); *Paralonchurus brasiliensis* (LH = 4.7-17.4; P = 3.73; MI = 1.4; MA = 0.05); *Micropogonias furnieri* (LH = 28.0; P = 0.56; MI = 2.0; MA = 0.01) (all NH).

TYPE LOCALITY. — Rio de Janeiro, RJ (Brazil).

ADDITIONAL LOCALITY. — Rio Grande, RS (Brazil) (IGD).

SITE OF INFECTION. — Coelomic cavity.

MATERIAL EXAMINED. — Paratypes CHIOC 32018 b-d. Vouchers CHIOC 33725 to 33735; USNPC 86903 to 86923; HWML 39254 to 39284; MNHN-C-IX-144 (JJ1009-1-5-6; JJ1294-1-1; JJ1304-1-2; JJ1383-1-9; JJ1424-1-2; JJ1491-1-7; JJ1571-2-1).

REDESCRIPTION (based on 95 specimens)
Measurements of specimens from each host species presented in Tables 1-3. Plerocercus with spherical blastocyst. Scolex with two lateral patelliform bothridia, posterior margins free, not notched. Sheath long, irregularly coiled when tentacles invaginated; non sinuous when tentacles evaginated. Pre-bulbar organ conspicuous. Retractor muscle of tentacle attaches in anterior third of bulb. Gland cells present within bulb. Pars postbulbosa short. Scolex length/bulb length ratio 3.07 ± 1,02 (1.87-5.19). Armature heteroacanthous, heteromorphous; hooks hollow. First row in internal face of basal armature with two uncinate hooks (Ba and Bb, Fig. 4D), field of robust hooks; external face with three uncinate

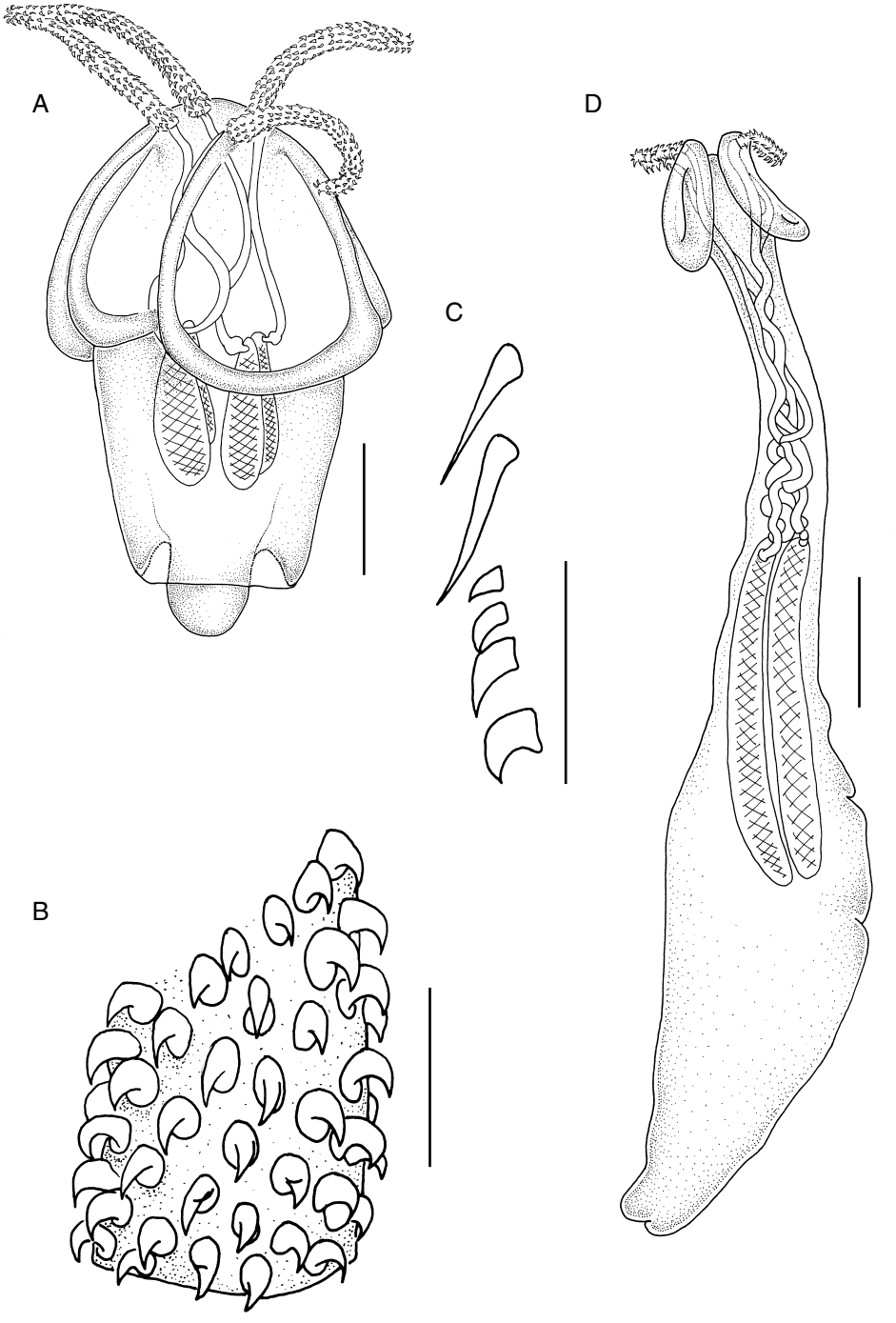

FIG. 3. — **A**, **B**, *Nybelinia bisulcata* (Linton, 1889); **A**, larva *in toto*; **B**, basal armature; **C**, **D**, *Dollfusiella* sp.; **C**, larva *in toto*; **D**, hooks of the first rows of the tentacles. Scale bars: A, B, 0.5 mm; C, 20 mm; D, 0.2 mm.

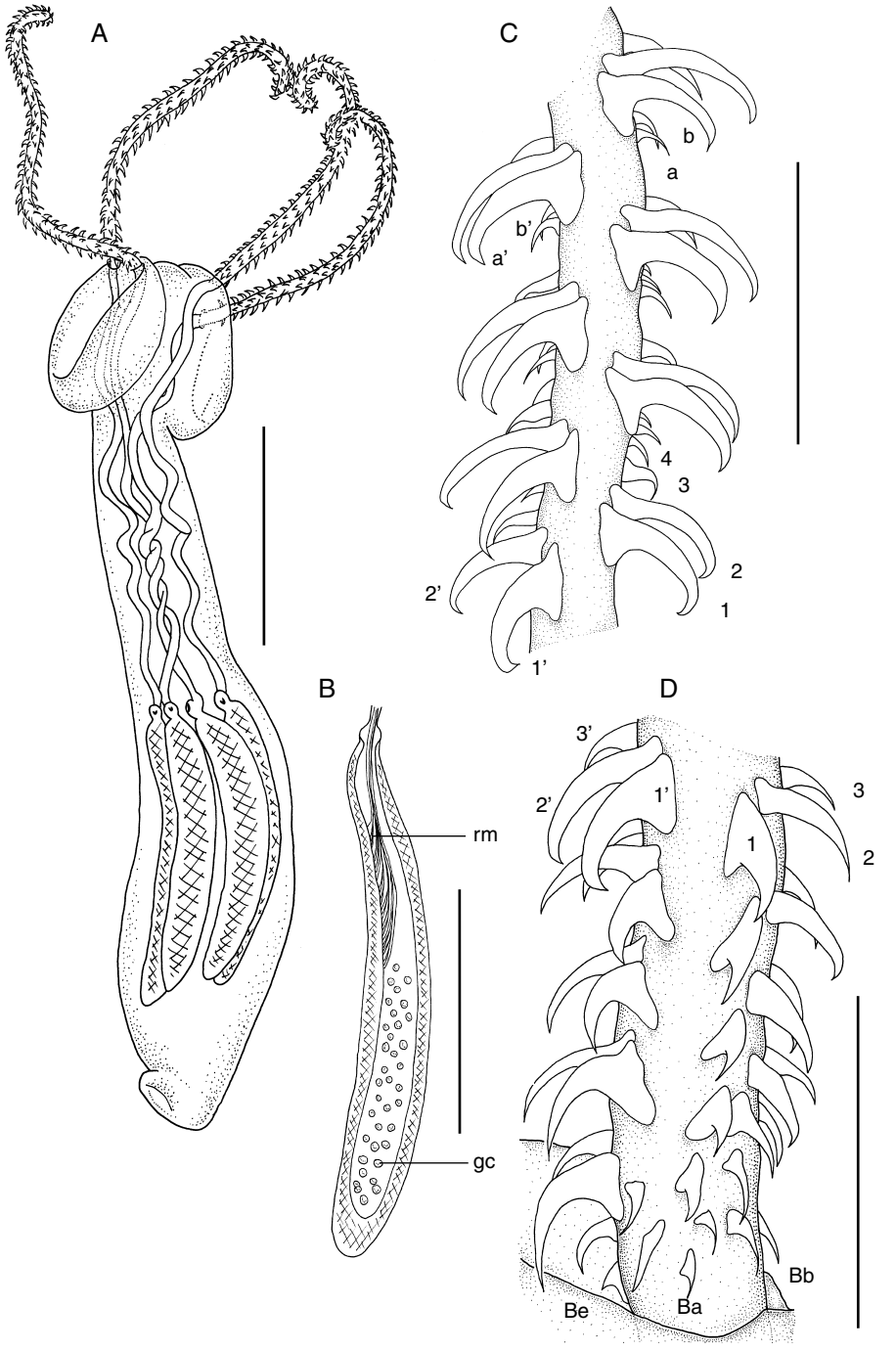

FIG. 4. — *Progrillotia dollfusi* Carvajal & Rego, 1983; **A**, larva *in toto*; **B**, longitudinal section of the bulb showing implantation of the retrator muscle (**rm**) in the tentacle and glandular cells (**gc**) (schematic); **C**, internal face, metabasal armature; **D**, internal face, basal armature. Abbreviations: **1**-**4**, falciform hooks of principal row half spiral of metabasal armature in the antibothridial face; **1'**-**3'**, in the bothridial face; **a**, **b**, intercalar hooks in the antibothridial face; **a'**, **b'**, in the bothridial face; **Ba**, **Bb**, **Be**, uncinate hooks of basal armature. Scale bars: A, 0.4 mm; B, 100 µm; C, D, 0.05 mm.

TABLE 1. — Measurements of the scolex (µm) of *Progrillotia dollfusi* Carvajal & Rego, 1983 from nine Sciaenidae fish host species of the coast of Rio Grande do Sul, Brazil. Abbreviations: **R**, range; **<**, lower limit; **>**, upper limit; $\bar{\chi}$, mean; **±**, standard deviation; **Tl**, total length; **Bl**, bulb length.

Host species and number	R	Tl	Pars bothridialis	Pars vaginalis	Bl	Bulb width	Tl x Bl ratio	Pars postbulbosa
Ctenosciaena	<	807	122	240	220	37	2	110
gracilicirrhus	>	2270	350	1180	670	160	4	240
(n = 6)	$\bar{\chi}$ ±	1420	233	619	390	65	3	177
		(672)	(99)	(424)	(172)	(55)	(0.5)	(49)
Cynoscion	<	620	100	250	200	30	1	120
guatucupa	>	2030	380	870	780	90	3	500
(n = 25)	$\bar{\chi}$ ±	1285	240	487	487	60	2.82	263
		(409)	(66)	(181)	(136)	(18)	(0.4)	(113)
Cynoscion	<	1220	240	530	300	50	2	120
jamaicensis	>	1980	350	790	700	90	4	300
(n = 10)	$\bar{\chi}$ ±	1722	290	673	534	71	3.3	225
		(239.48)	(36.81)	(91.04)	(120)	(13.01)	(0.39)	(68.51)
Macrodon	<	910	169	240	240	30	2	90
ancylodon	>	1850	320	640	530	160	3	400
(n = 10)	$\bar{\chi}$ ±	1218	216	384	387	67	3	231
		(356)	(58)	(141)	(104)	(35)	(0,4)	(106)
Menticirrhus	<	752	132	218	262	90	2	113
americanus	>	2215	275	800	675	–	3	365
(n = 3)	$\bar{\chi}$ ±	1285	190	444	408	–	3	209
		(807)	(75)	(311)	(231)		(0.4)	(135)
Menticirrhus	<	838	140	282	280	28	2	97
littoralis	>	1510	250	540	410	55	4	300
(n = 3)	$\bar{\chi}$ ±	1142	189	374	351	42	3	209
		(342)	(55)	(144)	(66)	(13)	(0.9)	(102)
Micropogonias	<	865	135	242	295	32	2	175
furnieri (n = 2)	>	1305	250	400	312	51	4	360
Paralonchurus	<	871	162	330	316	35	2	62
brasiliensis (n = 1)								
Umbrina canosai	<	908	180	315	275	45	2	165
(n = 10)	>	1045	305	700	460	60	5	360
	$\bar{\chi}$ ±	1213	216	441	351	50	3	225
		(211)	(37)	(129)	(61)	(5)	(0.9)	(51)
All hosts (n = 70)	<	620	100	218	200	28	1	62
Range	>	2270	380	1180	780	160	5	500
General average	$\bar{\chi}$ ±	1321	232	512	433	61	3	232
		(422)	(65)	(211)	(137)	(27)	(0.6)	(96)

hooks (Bc, Bd and Be, Fig. 5B, D), field of numerous spiniform microhooks (mh, Fig. 5B, D) surrounded by two longitudinal files of hastate hooks (hh, Fig. 5B, D). Principal rows of metabasal armature with groups of four falciform hooks in each half-spiral (hooks 1-4, 1'-4', Figs 4C; 5A, C, D); intercalary rows with three spiniform hooks near the base, and five or six spiniform hooks in distal portion; external face with discontinuous longitudinal band formed by groups of 5 (2+3) spiniform hooks located at end of each half-spiral of principal hooks.

REMARKS

The presence of a prebulbar organ in species of *Progrillotia* is not included in previous

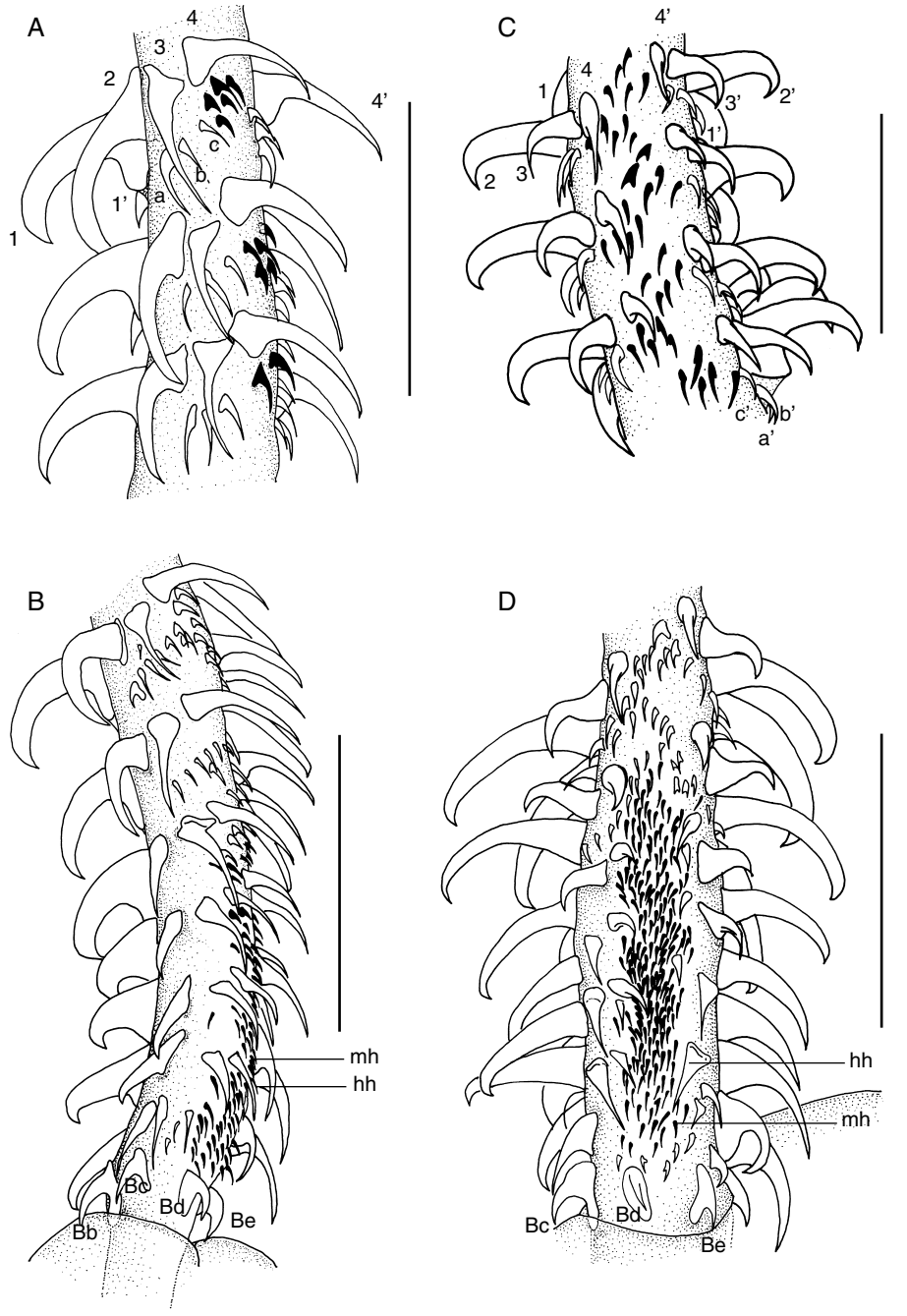

FIG. 5. — *Progrillotia dollfusi* Carvajal & Rego, 1983; **A**, metabasal armature, antibothridial face; **B**, basal armature, antibothridial face; **C**, metabasal armature, external face; **D**, basal armature, external face. Abbreviations: **mh**, microhooks; **hh**, hastiform hooks. Abbreviations: **1**-**4**, falciform hooks of principal row half spiral of metabasal armature in the antibothridial face; **1'-4'**, in the bothridial face; **a**-**c**, intercalar hooks in the antibothridial face; **a'-c'**, in the bothridial face; **Bb**, **Bc**, **Bd**, **Be**, uncinate hooks of basal armature. Scale bars: A, B, D, 0.05 mm; C, 0.03 mm.

TABLE 2. — Basal armature. Hooks measurements (µm) of *Progrillotia dollfusi* Carvajal & Rego, 1983 from nine Sciaenidae fish host species of the coast of Rio Grande do Sul, Brazil. Abbreviations: **R**, range; **<**, lower limit; **>**, upper limit; $\bar{\chi}$, mean; **±**, standard deviation. For hook identification see redescription and legends of the Figures 4C; 5A, D.

Host species and number		Hooks						
	R	a	B	C	d	e	mh	Hh
Ctenosciaena gracilicirrhus (n = 6)	<	7	7	9	7	9	2	7
	>	19	20	17	16	17	5	11
	$\bar{\chi}$ ±	13 (4)	15 (4.5)	12 (2.8)	11 (3)	13 (2.6)	4 (1.1)	10 (1.5)
Cynoscion guatucupa (n = 6)	<	7	7	6	8	7	2	4
	>	12	11	13	19	14	4	13
	$\bar{\chi}$ ±	9 (1.7)	9 (1.4)	9 (2.2)	12 (3.8)	10 (2.2)	2.3 (0.8)	9 (3.4)
Cynoscion jamaicensis (n = 5)	<	9	8	8	9	8	1	8
	>	16	15	13	16	15	3	15
	$\bar{\chi}$ ±	12 (2.5)	11 (3.2)	11 (2)	11 (2.9)	11 (2.5)	2.6 (0.8)	10 (2.8)
Macrodon ancylodon (n = 5)	<	9	8	7	7	7	2	7
	>	10	15	11	11	13	3	11
	$\bar{\chi}$ ±	9.8 (0.4)	11 (2.5)	9 (1.5)	9 (1.5)	10 (2.2)	2.8 (0.4)	8 (1.7)
Menticirrhus americanus (n = 2)	<	7	7	6	10	7	4	8
	>	15	14	9	12	16	4	9
Menticirrhus littoralis (n = 2)	<	12	–	9	–	–	2	8
	>	–	–	–	–	–	3	14
Micropogonias furnieri (n = 1)	<	–	–	7	–	–	2	6
Umbrina canosai (n = 2)	<	10	14	8	–	–	4	8
	>	–	–	10	–	–	6	11
All hosts (n = 29) Range	<	7	7	6	7	7	1	4
	>	19	20	17	19	17	6	15
General mean	$\bar{\chi}$ ±	11 (4.4)	11 (5.3)	10 (3.4)	11 (4.9)	11 (4.9)	3 (1.1)	9 (2.4)

diagnoses of the genus (Campbell & Beveridge 1993, 1994). In the only known description of *P. pastinacae*, Dollfus (1946) observed a refringent structure in the base of the sheath that could represent a prebulbar organ. Carvajal & Rego (1983) do not report this structure in their description of *P. dollfusi*. However, in all paratypes and vouchers studied herein a prebulbar organ was present. This characteristic is, therefore, included in the diagnosis of the genus. Gland cells in the bulb have not been reported previously.

Other amendments to earlier diagnoses of *Progrillotia* include the relative length of the bulb and the origin of the retractor muscle. The length/width ratio for the bulbs of species of the genus varies from 1.63 to 2.15 (based on measurements provided by Dollfus (1946, 1969) and those reported in this paper). Thus, it is considered highly variable. A retractor muscle originating at the posterior half of the bulb has been considered diagnostic for *Progrillotia* (Campbell & Beveridge 1993, 1994) but a rectrator muscle that originates at the anterior third of the bulb is present in *P. dollfusi*.

Of all three species known to occur in the genus, only *P. pastinacae* Dollfus, 1946, the type species, lacks a basal armature in the tentacle. Only

TABLE 3. — Metabasal armature. Hooks measurements (μm) of *Progrillotia dollfusi* Carvajal & Rego, 1983 from nine Sciaenidae fish host species of the coast of Rio Grande do Sul, Brazil. Abbreviations: **R**, range; **<**, lowest limit; **>**, highest limit; $\bar{\chi}$, mean; **Ir/bf**, intercalary rows/bothridial face; **Mh/ef**, microhooks/external face. For hook identification see redescription and legends of Figures 4; 5.

Host species and number		Hooks									
	R	1	1'	2	2'	3	3'	4	4'	Ir/bf	Mh/ef
Ctenosciaena gracilicirrhus (n = 5)	<	15	22	16	17	17	13	15	14	6	2
	>	42	39	47	48	35	38	47	36	18	8
	$\bar{\chi}$ ±	29 (15)	28 (6.7)	29 (15)	29 (12)	28 (11)	24 (9.5)	29 (14)	27 (8.4)	11 (4.4)	6 (2.4)
Cynoscion guatucupa (n = 5)	<	10	9	16	18	16	13	11	13	7	2
	>	15	12	26	36	36	23	19	21	8	5
	$\bar{\chi}$ ±	11 (4.5)	12 (1.3)	19 (8)	26 (7.3)	26 (11)	18 (4)	15 (5)	15 (3.2)	7 (0.4)	4 (1.2)
Cynoscion jamaicensis (n = 5)	<	14	19	18	21	19	15	14	16	6	5
	>	23	32	29	31	33	26	23	24	11	11
	$\bar{\chi}$ ±	18 (7.4)	24 (4.8)	24 (9.5)	27 (3.8)	25 (9.9)	20 (3.8)	19 (6.4)	21 (3.1)	8 (1.8)	7 (2.3)
Macrodon ancylodon (n = 5)	<	12	15	15	18	17	15	9	16	6	4
	>	30	25	23	30	30	30	23	24	9	7
	$\bar{\chi}$ ±	20 (9.6)	19 (4.3)	20 (7.6)	23 (4.6)	26 (10)	21 (5.5)	16 (6.4)	20 (2.9)	7 (1.2)	6 (1.2)
Menticirrhus americanus (n = 2)	<	19	21	23	20	16	19	18	15	4	5
	>	25	37	27	34	23	22	24	23	6	7
Menticirrhus littoralis (n = 1)	<	16	16	13	14	–	–	–	–	7	3
Micropogonias furnieri (n = 2)	<	–	–	–	–	24	22	18	10	7	–
	>	–	–	–	–	29	25	22	–	–	–
All hosts (n = 25)	<	10	9	13	14	16	13	9	10	4	2
	>	42	39	47	48	36	38	47	36	18	11
	$\bar{\chi}$ ±	20 (9.9)	22 (9.8)	23 (9.3)	26 (10)	25 (5.6)	21 (5.6)	19 (7.8)	20 (7.4)	8 (3.1)	6 (2.5)

two characters associated with the scolex are diagnostic for the genus, i.e., bothridia without indentation and a longitudinal band of hooklets of the external face of the tentacular armature interrupted. Thus, differentiation of species of *Progrillotia* and *Grillotia* Guiart, 1927, based on diagnostic characters proposed previously, is not clear.

Even the most recent diagnoses of *Grillotia* are dubious. Although proposed by Campbell & Beveridge (1994), the absence of a basal armature cannot be considered diagnostic for species of *Grillotia* since, in the same publication, these authors report a basal armature in *G. erinaceus* (Van Beneden, 1858). Further, Beveridge & Campbell (2001) describe *G. australis* and *G. pristiophori*, both with basal armature in the tentacles, and indicate that the genus requires extensive revision. The definition of *Progrillotia* (Beveridge *et al.* 1999) is equally problematic. In the phylogenetic analysis of Trypanorhyncha, these authors did not report blastocysts in the plerocerci in species of the genus (their character 2), which we have observed in our specimens of *P. dollfusi*. Further, their morphological matrix also considered the prebulbar organ (their character 7), the attachment of the retractor muscle of the tentacle in the base of the bulb (charater 8), the gland cells in the bulb (character 20), and the basal armature (character 27)

erroneously absent in species of *Progrillotia*. Both the type and voucher specimens of *P. dollfusi* studied herein depict these characters. Consequently, Beveridge *et al.* (1999) did not resolve the sister-group relationship of the genus nor did they sufficently differentiate *Progrillotia* from *Grillotia*. Thus, their consideration that the analysis is preliminary and their suggestion that *Grillotia*, presently with 20 nominal species, requires an extensive revision, are justified.

Measurements of *P. dollfusi* from the different host species examined (Tables 1-3) do not indicate significant differences among host species. *Pogonias cromis*, among the 10 species of Sciaenidae examined, is the only one in which *P. dollfusi* was not found. All host species, found in the present study with the exception of *C. guatucupa*, are new host records for this cestode.

Family PTEROBOTHRIIDAE Pintner, 1931
Genus *Pterobothrium* Diesing, 1850

Pterobothrium heteracanthum Diesing, 1850.

HOST. — *Pogonias cromis* (LH = 120.0; P = 3.03; MI = 5.0; MA = 0.15); *Umbrina canosai* (NH) (LH = 30.0; P = 0.86; MI = 1.0; MA = 0.01); *Cynoscion guatucupa* (NH) (LH = 27.0; P = 0.95; MI = 1.0; MA = 0.01); *Micropogonias furnieri* (LH = 22.0-59.5; P = 49.44; MI = 45.31; MA= 22.41).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33798 a-d, 33799, 33800 a-c; USNPC 87409, 87410, 87411; MNHN-C-IX-144 (JJ706-1-3).

REMARKS

In a recent revision of the Pterobothriidae, Campbell & Beveridge (1996) redescribed this species in detail. It has a wide geographic distribution and the larvae have been previously reported from several species of Sciaenidae. Previous records of *P. heteracanthum* in *M. furnieri* include those of São Clemente (1986a, b, 1987), for the coast of Rio de Janeiro, and of Pereira (1993), from Rio Grande do Sul, both from Brazil.

Pterobothrium crassicolle Diesing, 1850

HOST. — *Pogonias cromis* (NH) (LH = 120.0; P = 3.03; MI = 1.0; MA = 0.03); *Micropogonias furnieri* (LH = 28.0-59.0; P = 66.67; MI = 5.15; MA= 3.43).

SITES OF INFECTION. — Coelomic cavity, liver.

SPECIMENS DEPOSITED. — CHIOC 33902 a-b; USNPC 87412; MNHN-C-IX-144 (JJ142-12-10; JJ660-5-1).

REMARKS

This species, described from fishes of the northeast coast of Brazil, was redescribed by Rego (1987) based on specimens collected from *Brachyplatistoma flavicans* Castelnau, 1855, *B. vaillantii* (Valenciennes, 1840) and *Bagre marinus* (Mitchill, 1814). Campbell & Beveridge (1996) accepted, with reservations, the identification of Rego (1987). Rego's (1987) argument is consistent and the subsequent record by Rego *et al.* (1974) supports the identification. This species was also reported from *Cynoscion leiarchus* (Cuvier, 1830) by Rego *et al.* (1974), *Pomatomus saltatrix* (Linnaeus, 1766) by São Clemente *et al.* (1997), and *M. furnieri* from the coast of Rio de Janeiro by São Clemente (1986a, b, 1987) (see Rego 1987) and from the Rio Grande do Sul by Pereira (1993).

Family LACISTORHYNCHIDAE Guiart, 1927
Genus *Callitetrarhynchus* Pintner, 1931

Callitetrarhynchus gracilis (Rudolphi, 1819)

HOST. — *Cynoscion guatucupa* (NH) (LH = 27.0-46.0; P = 14.29; MI = 2.33; MA = 0.33); *Macrodon ancylodon* (NH) (LH = 24.8; P = 1.67; MI = 1.0; MA = 0.2); *Micropogonias furnieri* (LH = 26.0-59.5; P = 42.22; MI = 4.18; MA = 1.77).

SITES OF INFECTION. — Coelomic cavity, kidney.

SPECIMENS DEPOSITED. — CHIOC 33903, 33904 a-b; USNPC 87413, 87414, 87415; MNHN-C-IX-144 (JJ1029-3-3; JJ1408-2-1; JJ1507-1-1; JJ1716-1-1).

REMARKS

The first account of *Callitetrarhynchus gracilis* from the coast of Brazil is that of Dollfus (1942) in

Centropomus undecimalis (Bloch, 1792) from the Marajó Island. Palm (1997b) reports *C. gracilis* from *Caranx crysos* (Mitchill, 1815), *Chloroscrombrus chrysurus* (Linnaeus, 1758), *Oligoplistes palometa* (Cuvier, 1833), *Selene vomer* (Linnaeus, 1758), *Harengula clupeola* (Cuvier, 1829), *Opistonema oglinum* (Le Sueur, 1818), *Haemulon aurolineatum* Cuvier, 1829, *Larimus breviceps* (Cuvier, 1830), *Scomberomorus maculatus* (Mitchill, 1815), and *Sphyraena guachancho* Cuvier, 1829 from the coast of Pernambuco in the northeast of Brazil. This author indicates that *C. gracilis* is the most common host species and that it has the lowest host specificity in the area studied by him. Off the coast of the State of Rio de Janeiro, this species is found by Carvajal & Rego (1985) and by São Clemente *et al.* (1997) parasitizing *Pomatomus saltatrix*, and from *M. furnieri* by São Clemente (1986a, b) according to Carvajal & Rego (1985). In Rio Grande do Sul, *C. gracilis* is found parasitizing *M. furnieri* by Pereira (1993).

Callitetrarhynchus speciosus (Linton, 1897)

HOST. — *Cynoscion guatucupa* (NH) (LH = 33.0-44.0; P = 11.43; MI = 2.17; MA = 0.25); *Micropogonias furnieri* (LH = 27.0-59.0; P = 3.33; MI = 1; MA= 1.12).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33905, 33906, 33907; USNPC 87416; MNHN-C-IX-144 (JJ1055-3-1).

REMARKS

Previous records of *C. speciosus* for the coast of Brazil include those of Carvajal & Rego (1985) and São Clemente *et al.* (1997) for *P. saltatrix* from Rio de Janeiro, and São Clemente (1986a, b) from *M. furnieri*. In Rio Grande do Sul, the first record is that of Pereira (1993) from *M. furnieri*.

Family DASYRHYNCHIDAE Dollfus, 1935
Genus *Dasyrhynchus* Pintner, 1928

Dasyrhynchus pacificus Robinson, 1965
(Fig. 6)

HOSTS. — *Menticirrhus americanus* (NH) (LH = 39.7; P = 2.04; MI = 2.0; MA = 0.04); *Cynoscion jamaicensis* (NH) (LH = 22.0-32.3; P = 5.0; MI = 1.0; MA = 0.05); *Cynoscion guatucupa* (NH) (LH = 16.5-44.0; P = 6.67; MI = 3.14; MA = 0.21); *Macrodon ancylodon* (NH) (LH = 22.0-35.2; P = 5.0; MI = 1.0; MA = 0.05).

SITES OF INFECTION. — Coelomic cavity, pericardial cavity, and kidneys.

SPECIMENS DEPOSITED. — CHIOC 33908 a-c; USNPC 87417, 87418, 87419, 87420; MNHN-C-IX-144 (JJ1055-4-1; JJ1390-2-1).

DESCRIPTION

Based on 30 larvae examined; 26 measured. Scolex 13.29 ± 1.38 (9.90-15.42) long; two cordiform bothridia with margins free and an indentation on posterior margin; pars bothridialis 0.71 ± 0.08 (0.50-0.87) long. Tentacle sheath regularly coiled; pars vaginalis 8.37 ± 0.81 (6.50-10.32) long. Prebulbar organ absent, bulbs elongate, 2.43 ± 0.30 (1.97-3.00) long, 0.17 ± 0.06 (0.12-0.22) wide, posterior extremity overlapping pars postbulbosa. Length/width ratio of bulbs 14.43 ± 5.79 (11.25-20.40). Length of scolex/length of bulb ratio 5.48 ± 0.49 (4.44-6.51). Pars postbulbosa 1.68 ± 0.47 (1.07-2.35) long. Basal armature distinct on discrete swelling of the tentacle. Single chainette, continuous from basal armature to tip of tentacle. Chainette hooks with cordiform base. Principal rows in ascending alternate half spiral, with 10 principal hooks, and five or six intercalary hooks. Principal hooks diminishing in size along half spiral. Hooks 1 (1')-3 (3') larger, uncinate. Hooks 4 (4')-10 (10') falciform; intercalary hooks falciform, between hooks 4 (4')-7 (7').

REMARKS

Adults of *D. pacificus* were reported from the coast of South Brazil by São Clemente & Gomes (1989a) and São Clemente *et al.* (1991) in *Carcharhinus brachyurus* (Günter, 1860) (Carcharhinidae). This is the first record of the larva of this species in Brazil. The tentacular armature described here confirms the descriptions of São Clemente & Gomes (1989a) and Beveridge & Campbell (1993). However, the scolex of the larvae collected in the present study are larger.

In their key for species of *Dasyrhynchus*, Beveridge & Campbell (1993) suggest that the

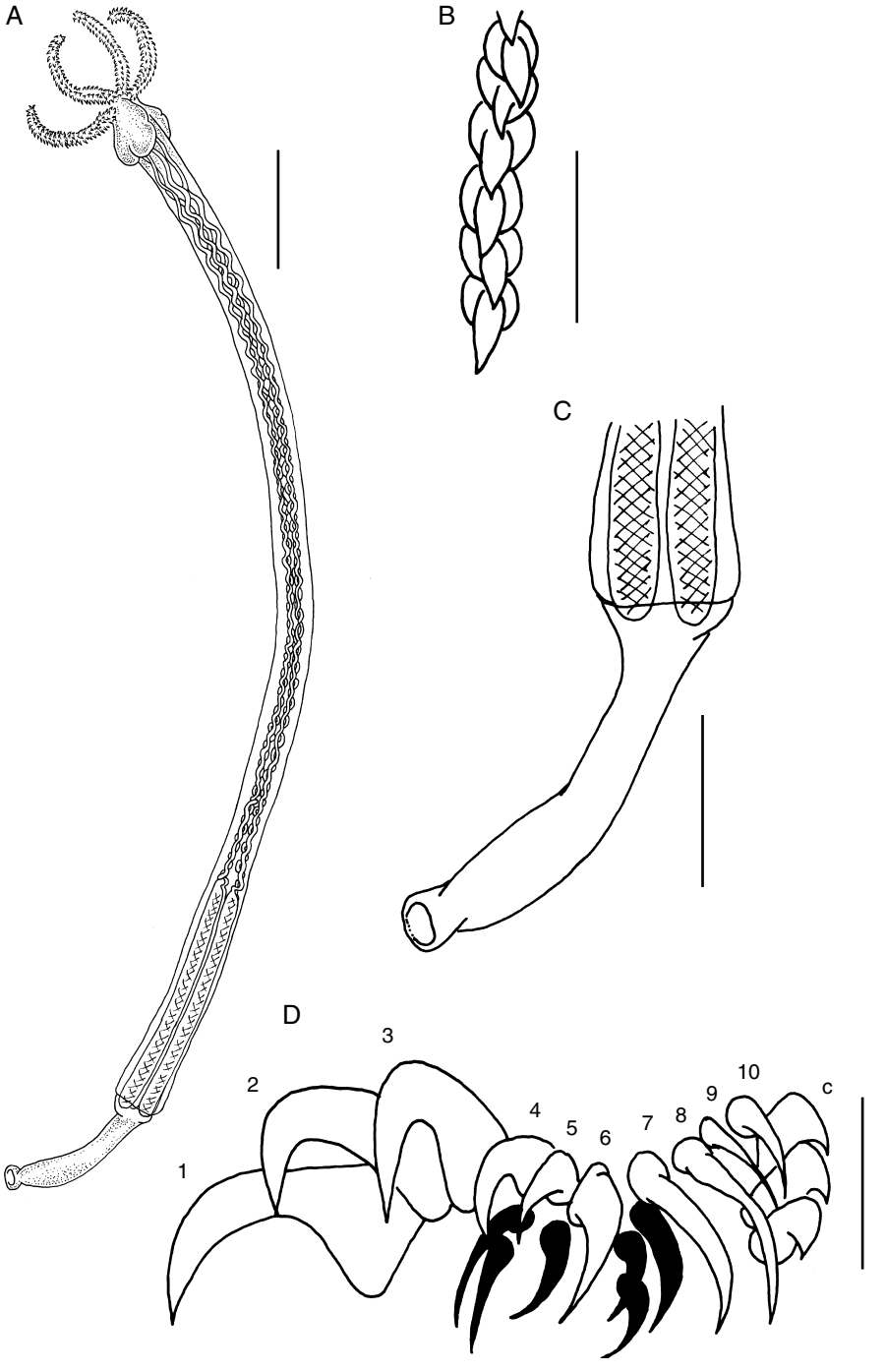

FIG. 6. — *Dasyrhynchus pacificus* Robinson, 1965; **A**, larva *in toto*; **B**, portion of the chainette; **C**, posterior portion of bulbs and appendix; **D**, half spiral of principal hooks, intercalary hooks (in black) and chainette (**c**). Scale bars: A, 0.1 mm; B, D, 0.05 mm; C, 1 mm.

posterior portion of the bulbs projecting into the pars proliferans is a diagnostic character of *D. magnus*. However, this characteristic is reported herein for *D. pacifica* and was noted in *D. thomasi* by Palm (2000). Since the Beveridge & Campbell (1993) studied plerocerci, it is possible that this feature represents a larval characteristic with no diagnostic value at the specific level. Larvae of *Dasyrhynchus* located near the pericardial cavity of the hosts were reported by Bussieras & Aldrin (1965), and Bussieras & Baudin-Laurencin (1973) from *Thunnus albacares* (Bonnaterre, 1788), *T. obesus* (Lowe, 1839) from Guinea and Senegal.

Family OTOBOTHRIIDAE Dollfus, 1942
Genus *Poecilancistrium* Dollfus, 1929

Poecilancistrium caryophyllum (Diesing, 1850)

HOSTS. — *Micropogonias furnieri* (LH = 25.8-59.0; P = 9.44; MI = 3.41; MA= 0.32).

SITE OF INFECTION. — Musculature.

SPECIMENS DEPOSITED. — CHIOC 33910, 33911 a-d.

REMARKS
Previous records of *P. caryophyllum* for the coast of Brazil include those of Carvajal & Rego (1985) and São Clemente *et al.* (1997) from *P. saltatrix* and from *M. furnieri* both from Rio de Janeiro. In Rio Grande do Sul, the first record for *M. furnieri* is that of Pereira (1993).

Unidentified procercoid larva
(Fig. 7A, B)

HOSTS. — *Micropogonias furnieri* (LH = 48.0; P = 0.56; MI = 2.0; MA = 0.01); *Cynoscion jamaicensis* (LH = 13.5 - 24.1; P = 6.67; MI = 25.0; MA = 1.67).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33909 a-c; USNPC 87424; MNHN-C-IX-144 (JJ1445-2-25).

DESCRIPTION (based on nine specimens)
Body 1.09 ± 0.25 (0.79-1.48) long, 0.27 ± 0.05 (0.20-0.37) maximum width. Anterior region with a well defined bothrium, 0.025 ± 0.007 (0.02-0.04) in diameter, 0.03 ± 0.01 (0.027-0.060) deep. Cercomer subspherical, total or partially invaginated, 0.20 ± 0.03 (0.13-0.25) long. Length of the cercomer/total length of the larva ratio 5.43 ± 0.76 (4.4-6.7). Hooks not observed within cercomer.

REMARKS
There are few published records of procercoids in marine fishes. Among those few show forms similar to those larvae found in the present study. The larval development of *Lacistorhynchus dollfusi* Beveridge & Campbell, 1987 (= *L. tenuis* Beneden, 1850) has been described by Riser (1956), Mudry & Dailey (1971), and Sakanari & Moser (1989). The latter authors also completed the cycle of *L. dollfusi* Beveridge & Sakanari, 1987 in the laboratory. Riser (1956) and Mudry & Dailey (1971) presented descriptions and drawings of the procercoid larvae.
Except for the fact that embryonic hooks have not been observed, the material described in the present study is similar to that reported by the authors mentioned above. The procercoids recorded by Riser (1956), Mudry & Dailey (1971), and Sakanari & Moser (1989) were from crustaceans and may represent early stages in the life cycle. The absence of hooks in the present specimens may be because they are in transition to the plerocercoid stage.

Unidentified plerocercoid larva
(Fig. 7C, D)

HOSTS. — *Macrodon ancylodon* (NH) (LH = 28.4; P = 1.67; MI = 1.0; MA = 0.02).

SITE OF INFECTION. — Coelomic cavity.

SPECIMENS DEPOSITED. — CHIOC 33912, 33913, 33914, 33915 a-b; USNPC 87420; MNHN-C-IX-144 (JJ1253-4-1; JJ1384-4-3).

REMARKS
Plerocercoid larvae similar to those found in the present study from *Macrodon ancylodon* were reported from *Micropogonias undulatus* (Lin-

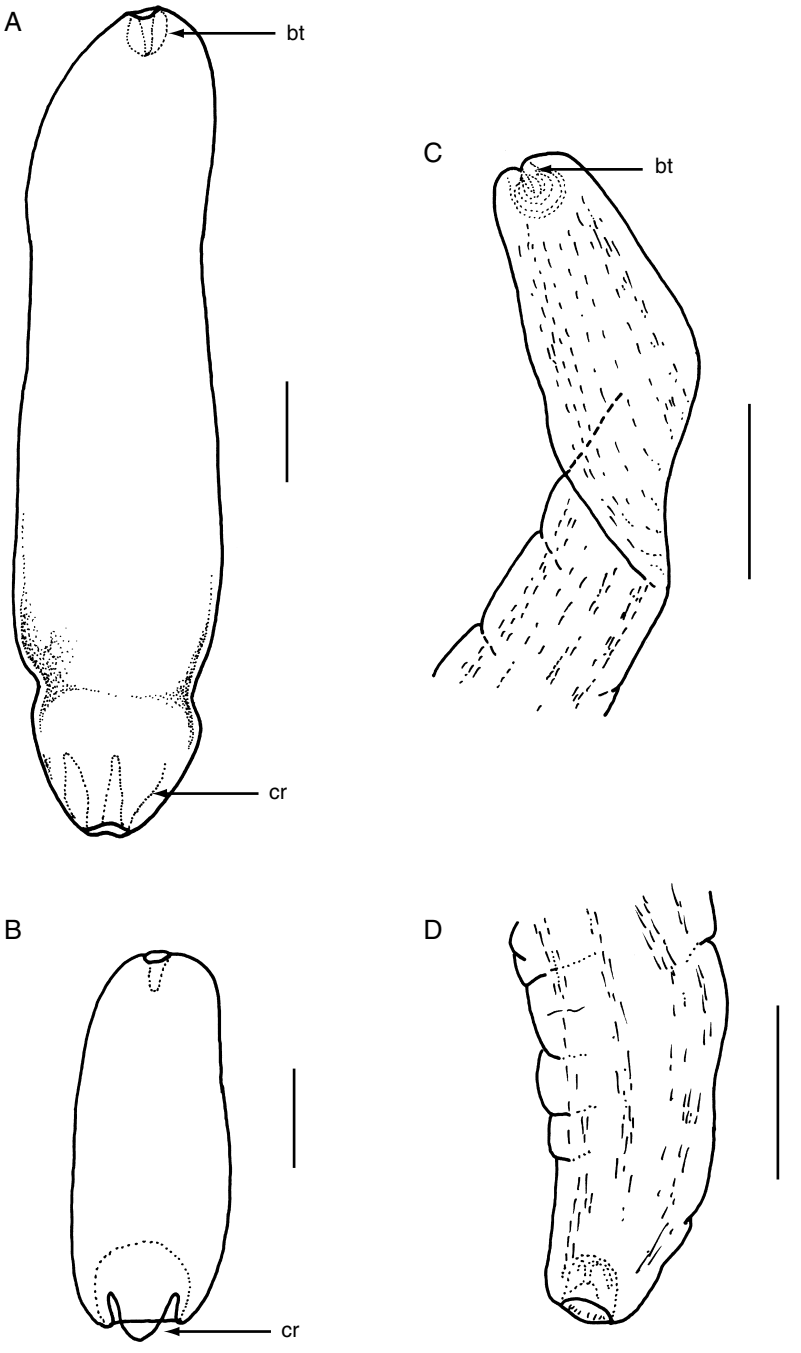

FIG. 7. — **A**, **B**, unidentified procercoid larva; **A**, larva *in toto*; **B**, same with retracted cercomer; **C**, **D**, unidentified plerocercoid larva; **C**, anterior region; **D**, posterior region. Abbreviations: **bt**, bothria; **cr**, cercomer. Scale bars: A, 0.25 mm; B, 0.15 mm; C, D, 0.1 mm.

naeus, 1766) in the Gulf of Mexico by Overstreet (1977) and in *Micropogonias furnieri* off the coast of Rio de Janeiro by São Clemente (1986b) and coast of Rio Grande do Sul by Pereira (1993).

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