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Digenetic Trematodes of Marine Teleost Fishes from Biscayne Bay, Florida

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DIGENETIC TREMATODES OF MARINE TELEOST FISHES FROM BISCAYNE BAY, FLORIDA[1]

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Abstract

This study includes 111 species of Digenea from 69 of 113 species of teleost fishes examined from Biscayne Bay, Florida. Biscayne Bay represents the reported northern limit along the Atlantic coast for all but 22 of the 111 species. It represents the southern limit for only one, *Didymocystis scomberomori.* From the known collections reported in the literature, the Digenea from Biscayne Bay appear to consist primarily of a tropical fauna. Species previously known from the Pacific Ocean only are *Botulisaccus pisceus* and *Pseudocreadium scaphosomum.* There are 81 new host records.

Two new genera are created: *Claribulla* (Fellodistomatidae) and *Apertile* (Opecoelidae). Thirteen new species are described: *Apocreadium cryptum, Cadenatella floridae, Claribulla longula, Diphtherostomum albulae, Hamacreadium confusum, Hurleytrema pyriforme, Hymenocotta manteri, Lasiotocus albulae, Lasiotocus haemuli, Lasiotocus mugilis, Neolepidapedon macrum, Nicolla halichoeri,* and *Opegaster pritchardae.*

Eleven new combinations are made: *Apertile holocentri,* formerly *Neopecoelus holocentri* Manter, 1947; *Apocreadium foliatum,* formerly *Homalometron foliatum* Siddiqi and Cable, 1960; *Bianium longipygum,* formerly *Diploproctodaeum longipygum* Oshmarin, Mamaev, and Parukhin, 1961; *Bianium macracetabulum,* formerly *Diploproctodaeum macracetabulum* Oshmarin, Mamaev, and Parukhin, 1961; *Diplomonorchis magnacetabulum,* formerly *Diplomonorcheides magnacetabulum* Thomas, 1959; *Helicometrina exacta,* formerly *Helicometra exacta* Linton, 1910; *Hurleytrema malabonensis,* formerly *Pseudohurleytrema malabonensis* (Velasquez, 1961); *Hurleytrema shorti,* formerly *Pseudohurleytrema shorti* Nahhas and Powell, 1965; *Megasolena hysterospina,* formerly *Lepidauchen hysterospina* Manter, 1931; *Myosaccium opisthonemae,* formerly *Neogenolinea opisthonemae* Siddiqi and Cable, 1960; and *Pseudopecoelus scorpaenae,* formerly *Neopecoelus scorpaenae* Manter, 1947.

Five genera have been synonymized: *Bilecithaster* Siddiqi and Cable, 1960, synonym of *Diplangus* Linton, 1910; *Diplomonorcheides* Thomas, 1959, synonym of *Diplomonorchis* Hopkins, 1941; *Neogenolinea* Siddiqi and Cable, 1960, synonym of *Myosaccium* Montgomery, 1957; *Neopecoelus* Manter, 1947, synonym of *Pseudopecoelus* Von Wicklen, 1946; and *Parahurleytrema* Nahhas and Powell, 1965, synonym of *Hurleytrema* Srivastava, 1938.

Twelve species have been synonymized: *Antorchis holacanthi* Siddiqi and Cable, 1960, synonym of *Antorchis urna* (Linton, 1910) Linton, 1911; *Bilecithaster ovalis* Siddiqi and Cable, 1960, synonym of *Diplangus parvus* Manter, 1947; *Diplomonorchis micropogoni* Nahhas and Cable, 1964, synonym of *Diplomonorchis leiostomi* Hopkins, 1941; *Helicometra pretiosa* Bravo-Hollis and Manter, 1957, a synonym of *Helicometra torta* Linton, 1910; *Helicometrina parva* Manter, 1933, and *Helicometrina trachinoti* Siddiqi and Cable, 1960, synonyms of *Helicometrina exacta* (Linton, 1910); *Hexangitrema breviceca* Siddiqi and Cable, 1960, synonym of *Hexangitrema pomacanthi* Price, 1937; *Manteria costalimai* Freitas and Kohn, 1964, synonym of *Manteria brachydera* (Manter, 1940); *Megasolena archosargi* Sogandares-Bernal and Hutton, 1959, synonym of *Megasolena hysterospina* (Manter, 1931); *Opisthadena cortesi* Bravo-Hollis, 1966, synonym of *Opisthadena dimidia* Linton, 1910; *Paracryptogonimus neoamericanus* Siddiqi and Cable, 1960, synonym of *Paracryptogonimus americanus* Manter, 1940; and *Pseudohurleytrema ottoi* Travassos, Freitas, and Bührnheim, 1965, synonym of *Hurleytrema shorti* (Nahhas and Powell, 1965).

Acknowledgments

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Introduction

The present study was undertaken to make the digenetic trematode fauna of fishes from the east coast of Florida better known. Emphasis has been placed on several of the numerous fishes that spend either all or a portion of their lives in Biscayne Bay.

This report concerns 111 species of adult Digenea collected from 69 of 113 species

of teleosts represented by 333 individuals. A few of these trematodes have been reported from the Atlantic coast of Florida by Ward (1954), Schroeder (in press), Anderson (1965), Daigger and Lewis (1967), and Overstreet (1968). Descriptions of most of the previously named species are available in the literature based on collections from Beaufort, North Carolina (Linton, 1905; Manter, 1931; Pearse, 1949); Dry Tortugas, Florida (Linton, 1910; Manter, 1933a, 1933b, 1934, 1947); Woods Hole Region, Massachusetts (Linton, 1900, 1901, 1940); Bermuda (Linton, 1907; Hanson, 1950); Bahama Islands (Sparks, 1957; Sogandares-Bernal, 1959); Curaçao and Jamaica (Nahhas and Cable, 1964); Puerto Rico (Price, 1934; Siddiqi and Cable, 1960); Cuba (Pérez Vigueras, 1955a, 1955b, 1955c, 1957, 1958); and different areas of the Gulf of Mexico, including the west coast of Florida (Sparks, 1958; Sogandares-Bernal and Hutton, 1959a, 1959b, 1959c; Nahhas and Short, 1965; Nahhas and Powell, 1965). Other known species encountered in this study have been reported from other localities and are discussed in the text when relevant.

Methods

Fishes for study were collected between January 1966 and May 1968 by hook and line, seine, trap, trawl, or spear and kept alive until they could be examined. Almost all the fishes were examined within two days after capture. Examination included the entire alimentary system and coelomic cavity of all fishes, and the gills, heart, swim bladder, urinary bladder, and other tissues of many. Most trematodes were washed in 0.8 per cent saline; fixed in hot alcohol-formalin-acetic acid (AFA), using light coverslip pressure when necessary to prevent curling; stained with Van Cleave's hematoxylin; and mounted in Permount. Lithium carbonate and butyl amine were added during dehydration in 80 per cent alcohol to prevent future fading. Sectioned material was stained with Mallory's trichrome stain or Harris's hematoxylin with eosin as a counterstain. Measurements and computed ratios were taken using microns as the unit, but the values were rounded off for the text. All measurements are in millimeters unless otherwise indicated. Measurements were taken on fully-formed eggs unless the text indicates otherwise. The diameter of the oral sucker was compared with that of the acetabulum, with the oral sucker representing one, in order to compute the sucker ratio. Asterisks indicate new host records. The common names, authors, and families of the fishes examined are included in the Host-Parasite List following the discussion. A camera lucida was used for all illustrations. Holotypes have been deposited in the Helminthological Collection of the United States National Museum, and the hosts in the Ichthyological Collection of the Institute of Marine Sciences, University of Miami, Miami, Florida.

Description and Discussion of Species

Except for new species, the discussion is limited to aspects that supplement the available literature. A partial synonymy is presented.

FAMILY SANGUINICOLIDAE Graff, 1907

Deontacylix ovalis Linton, 1910

Host: *Kyphosus sectatrix* (6 of 6).
Site: Body cavity.

Discussion: Land (1967) considered the family Aporocotylidae Odhner, 1912, in which *Deontacylix ovalis* had previously been placed, as a synonym of Sanguinicolidae. My specimens agree with the original description by Linton (1910:83-84) and extended by Manter (1947:367-368). The testis is usually not as distinct as described by Manter, but is more reticulate with short lateral bulges extending from the longitudinal extracaecal extensions. Adjacent lateral bulges often overlap or touch each other. The lobed ovary occasionally has numerous perforations. The excretory system includes a very short, terminal, sac-like vesicle with branched collecting ducts that extend anteriorly, accompanying the lateral nerves. The excretory pore is terminal.

FAMILY BUCEPHALIDAE Poche, 1907

Bucephalus scorpaenae Manter, 1940
Figure 1

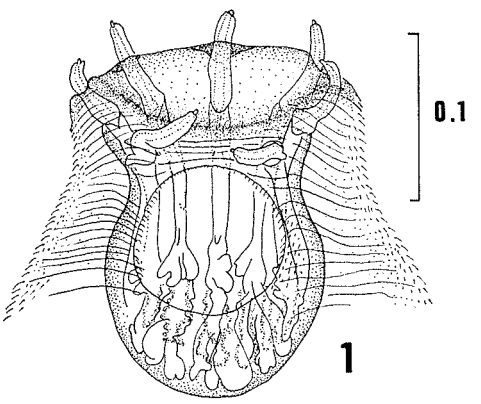


Figure 1. *Bucephalus scorpaenae,* ventral view.

Hosts: *Scorpaena grandicornis* (2 of 2)*; *Scorpaena plumieri* (2 of 4).
Site: Pyloric caeca and intestine.
Discussion: Figure 1 shows at the base of rhynchus previously undescribed gland cells with large ducts which join the bases of the tentacles. Manter (1940c:5) and Winter (1960:183) described the dorsal wall of the anterior sucker as being vesicular and probably glandular. Other species of bucephalids, some without papillae or tentacles, have been reported to possess anterior gland cells. Hopkins (1954:356, figs. 1-2; 358, 6-7) described and illustrated such cells in *Rhipidocotyle transversale* Chandler, 1935, and *Bucephaloides strongylurae* Hopkins, 1954, as extending over and around the rhynchus, and subsequently opening anteriorly.

Bucephalus varicus Manter, 1940

Bucephalus polymorphus Baer, 1827, of Nagaty, 1937, and others.

Bucephalus pseudovaricus Velasquez, 1959.

Hosts: *Caranx crysos* (1 of 2); *Caranx hippos* (3 of 3).
Site: Pyloric caeca, few in stomach.
Discussion: Manter (1963c:228) discussed the synonymy and identification of this variable species. The present specimens show further variability in that the testes are usually separated by the proximal portion of the uterus.

Prosorhynchus pacificus Manter, 1940
Gasterostomum sp. Linton, 1910 (from *Mycteroperca bonaci* and *M. venenosa*).
Prosorhynchus atlanticus Manter, 1940.

Hosts: *Mycteroperca bonaci* (3 of 3); *Mycteroperca microlepis* (2 of 2).
Site: Intestine and pyloric caeca.
Discussion: Hanson (1950:75) considered *Prosorhynchus atlanticus,* apparently from a misidentified host, as a synonym of *P. pacificus* on the basis of the variability in the specimens she examined from Bermuda. She noted a wide range in the size of eggs. Nahhas and Cable (1964:174) reported nonintergrading egg lengths in specimens from Curaçao, Jamaica, and Puerto Rico, as I find in my specimens, and they did not accept the synonymy. Winter (1960:187-189), however, reported specimens from Mazatlán, Sinaloa, Mexico, with eggs 29 to 33 by 19 to 20 microns, about the same measurements as found in most Atlantic specimens. I am therefore accepting the synonymy.

Rhipidocotyle adbaculum Manter, 1940

Hosts: *Scomberomorus maculatus* (1 of 2); *Scomberomorus regalis* (2 of 2).
Site: Pyloric caeca and intestine.
Discussion: My specimens differ slightly from the original description. The eggs measure 17 to 23 by 12 to 15 microns rather than 15 to 17 by 9 to 10, and the ovary does not always overlap the anterior testis.

Bucephaloides bennetti Hopkins and Sparks, 1958

Bucephalopsis bennetti Melugin, 1940 (*nomen nudum*).

Host: *Paralichthys albigutta* (1 of 1).
Site: Pyloric caeca.
Discussion: Sogandares-Bernal and Hutton (1959a:260) gave a review of *B. bennetti.*

Bucephaloides arcuatus (Linton, 1900) Velasquez, 1959

Gasterostomum arcuatum Linton, 1900.
Bucephalopis arcuatus (Linton, 1900) Eckmann, 1932.

Host: *Scomberomorus regalis* (2 of 2).
Site: Pyloric caeca.

Discussion: My specimens agree fairly well with the original description by Linton. They have an excretory vesicle extending to or near the rhynchus, and thus differ from specimens previously reported as *Bucephaloides arcuatus* from barracuda, as discussed by Manter (1963c: 229-230) and confirmed by Nahhas and Cable (1964: 173).

FAMILY FELLODISTOMATIDAE Nicoll, 1913

Tergestia pectinata (Linton, 1905) Manter, 1940

Distomum pectinatum Linton, 1905.
Theledra pectinata (Linton, 1905) Linton, 1910.

Host: *Caranx crysos* (1 of 2).
Site: Rectum.

Discussion: Considerable confusion exists about the identification of some species of *Tergestia.* Manter (1947:323) believed that what Linton reported as *T. pectinata* from *Auxis thazard* and *A. rochei* is actually *T. laticollis,* and that *T. laticollis* of Yamaguti, 1951, is probably *T. pectinata* (see: Manter, 1963b:447). Two specimens 1.8 long from *Caranx crysos* have sucker ratios of 1:1.5 and 1:1.6, which would place them as *T. laticollis* in Manter's key (1954:527). The specimens have a straight seminal vesicle, a character which Manter (1947:323) also used to differentiate *T. laticollis* from *T. pectinata.* However, Sogandares-Bernal and Hutton (1959b:64) noted a straight seminal vesicle in *T. pectinata,* and my specimens have a folded cirrus and eggs 19 to 23 by 12 to 14 microns, characters which Manter (1947:323) regarded as defining *T. pectinata.* I make the identification with reservation because of this confusion and because the specimens appear more like those from *Selene vomer* discussed below, except that the blunt-ended seminal vesicle in specimens from *C. crysos* extends posteriorly, rather than tapering off and curling back to approximately the middle of the posterior border of the acetabulum.

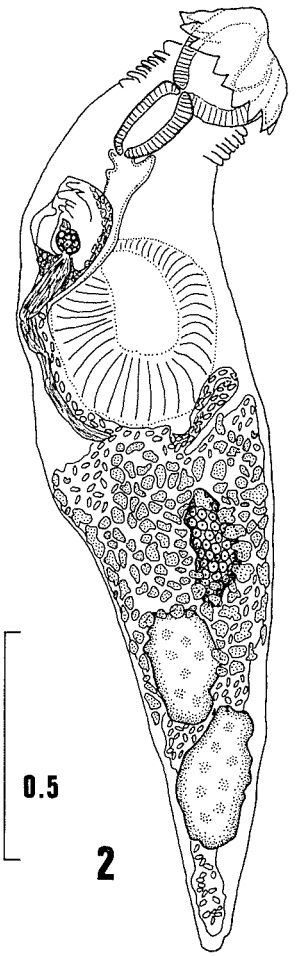


Figure 2. *Tergestia* sp., dorsal view.

Tergestia sp. Figure 2

Host: *Selene vomer* (1 of 2).
Site: Intestine.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71296.

Discussion: This could be a new species as suggested by Siddiqi and Cable (1960: 284) who found the flame cell pattern in a small specimen from *Selene vomer* to differ from that recorded for *Tergestia laticollis.* It is similar to *T. acuta,* although the

vitellaria are not confluent in all my specimens. *Tergestia pauca* Freitas and Kohn, 1965, another similar species, also has numerous vitelline follicles which are dispersed both inter- and extracaecally, although it differs from my specimens in having a sucker ratio of 1:1.97 to 2.34 and differently-shaped terminal genitalia.

Nine mature individuals 1.2 to 2.4 long have 13 oral lobes, sucker ratios 1:1.5 to 1.7, eggs 16 to 23 by 11 to 16 microns, and width of pharynx 45 to 56% of the length. A prostatic vesicle is present in the cirrus sac. The uterus extends to a level posterior to the rear testis in the three larger specimens.

Infundibulostomum spinatum
Siddiqi and Cable, 1960

Host: *Haemulon sciurus* (1 of 6)*.
Site: Intestine.

Discussion: A single specimen differs somewhat from the original description. It measures 1.4 long and has a sucker ratio of 1:0.30. The seminal vesicle is indistinctly bipartite, without an observable external seminal vesicle.

Proctoeces lintoni
Siddiqi and Cable, 1960

Host: *Lagodon rhomboides* (2 of 5)*.
Site: Rectum.

Proctoeces maculatus (Looss, 1901) Odhner, 1911
Distomum maculatum Looss, 1901.
Distomum subtenue Linton, 1907.
Proctoeces erythraeus Odhner, 1911.
Proctoeces subtenuis (Linton, 1907) Hanson, 1950.

Host: *Calamus bajonado* (1 of 1).
Site: Rectum.

Discussion: In view of the variation in specimens from various parts of the world, it seems pertinent to give a few characteristics of my four specimens. They are 1.7 to 2.2 long with sucker ratios of 1:1.5 to 1.8 and eggs 45 to 62 by 19 to 24 microns. They have a long genital sinus and vitellaria extending to a level posterior to the testes. Manter and Pritchard (1962:115-116) gave a review of the species.

Antorchis urna (Linton, 1910) Linton, 1911

Mesorchis urna Linton, 1910.
Antorchis holacanthi Siddiqi and Cable, 1960 (new synonym).

Hosts: *Holacanthus isabelita* (1 of 1); *Pomacanthus arcuatus* (1 of 4); *Pomacanthus paru* (1 of 1).
Site: Intestine and pyloric caeca.

Discussion: The overlap in characteristics between *Antorchis urna* and *A. holacanthi* is such that the two appear to be synonymous. Dr. R. M. Cable lent three slides with 25 specimens of *A. urna* and four slides with 23 specimens of *A. holacanthi* from Puerto Rico, Curaçao, and Jamaica. Siddiqi and Cable (1960:285) used the general size and shape of the body and pharynx, form of vitellaria, position of testes, extent of uterus, and shape of oral sucker to distinguish between the two species. I can separate Dr. Cable's specimens into two groups by size of body, number and size of vitellaria, and shape of pharynx, although I do not consider them separate species. Of my specimens, eleven from or near the pyloric caeca of *Holacanthus isabelita,* the site and host for *A. holacanthi,* agree in all respects with others from the intestine of *Pomacanthus* spp., the site and hosts for *A. urna.* The lengths are 1.1 to 1.5 and 1.1 to 1.7, the pharynx is spherical to elongate, the vitellaria are relatively large, the posterior border of the testes does not extend to a level anterior to the acetabulum, the uterus extends to or to a level slightly anterior to the testes, and the oral sucker is usually funnel-shaped. Two differences between Dr. Cable's specimens of *A. holacanthi* and mine of *A. urna* are (1) the length of body (up to 1.1 as compared to 1.1 to 1.7), and (2) number but not size of vitellaria (less than 10 as compared to about 20 to 30). The shorter length might be due to host-influence. Also, Linton (1910:47-48) recorded a length of 0.84 for a specimen of *A. urna.* My smaller specimens have fewer vitellaria than the larger specimens, although never less than 10. In view of the variations, I consider *A. holacanthi* a synonym of *A. urna.*

Both wholemounts and sagittal sections

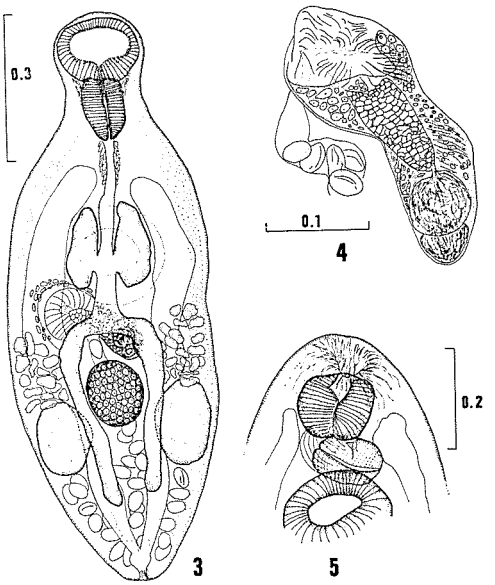


Figure 3. *Botulisaccus pisceus,* individual with few eggs, dorsal view. Figure 4. *Botulisaccus pisceus,* terminal reproductive organs of different individual, dorsal view.
Figure 5. *Botulisaccus pisceus,* anterior end, ventral view.

show an almost spherical, spined cirrus projecting into a spinous atrium. Siddiqi and Cable (1960:286) incorrectly stated, in contrast to Manter (1947:320), that "the muscular lining of the genital atrium is reflected over the end of the cirrus sac, giving it an annulated appearance . . . ."

Steringotrema corpulentum (Linton, 1905) Manter, 1931

Distomum corpulentum Linton, 1905.

Hosts: *Archosargus rhomboidalis* (4 of 5)*; *Lagodon rhomboides* (1 of 5).
Site: Pyloric caeca.

Botulisaccus pisceus Caballero, Bravo-Hollis, and Grocott, 1955
Figures 3, 4, and 5

Host: *Albula vulpes* (7 of 7).
Site: Intestine, few in pyloric caeca.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71297.

Description (based on 18 wholemounts and 3 sectioned specimens): Body pyriform, 1.0 to 1.8 long by 0.36 to 0.68 in maximum width, usually at or just posterior to level of acetabulum. Cuticle completely spinose. Oral sucker spherical, funnel-shaped, or cup-shaped; 0.07 to 0.18 long by 0.13 to 0.21 wide; sometimes retracted deeply into body (Figure 5). Acetabulum 0.21 to 0.34 long by 0.21 to 0.35 wide. Sucker ratio 1:1.2 to 1.9. Forebody 24 to 36% of body length; usually with a fold in the cuticle at a level just anterior to acetabulum. Prepharynx short. Pharynx large, muscular, oval to barrel-shaped, 0.13 to 0.19 long by 0.07 to 0.12 wide, anterior portion with diagonal rather than radial musculature; muscles extending from a point at middle or posterior of pharynx to oral sucker. Esophagus 0.10 to 0.22 long; anterior region surrounded by glandular cells; with large epitheliated lateral outpouchings located midacetabular to a level immediately anterior to acetabulum. Primary intestinal bifurcation near level of posterior border of acetabulum. Caeca extending to approximately middle of posttesticular region; prominently epitheliated except for some of internal portions.

Testes symmetrical, elongate; right testis 0.16 to 0.29 long by 0.09 to 0.18 wide; left testis 0.16 to 0.28 by 0.07 to 0.18. Posttesticular region 15 to 28% of body length. Cirrus sac muscular, straight to arcuate, 0.20 to 0.38 long, extending from a level immediately posterior to acetabulum to near ovarian level; constricted at level of prostatic vesicle. Cirrus sac containing bipartite seminal vesicle, portions oval, spherical, or irregular; prostatic vesicle wide, longer than seminal vesicle, surrounded by prostatic cells; cirrus short, wide, muscular, unarmed. Genital pore postacetabular, sinistral. Genital atrium wide but constricted at genital pore.

Ovary spherical to ovoid, 0.10 to 0.18 long by 0.07 to 0.16 wide; between testes with ¼ to ¾ of its length above anterior margins of testes. Seminal receptacle lacking; sperm in proximal portion of uterus. Laurer's canal opening dorsally posterior to ovary. Mehlis's gland compact to diffuse. Uterus extensive, extending from cirrus sac to posterior end of body, leaving most of testes

visible. Metraterm short. Vitelline follicles numerous, extending from anterior portion of testes to or near acetabular level. Eggs operculated, thick-walled, 34 to 47 by 23 to 30 microns.

Excretory vesicle V-shaped with arms terminating between midacetabular and pharyngeal levels. Excretory pore dorsal or terminal.

Discussion: My specimens agree with the original description of *Botulisaccus pisceus* with two exceptions: first, I could not see the small spines on the cirrus mentioned by Caballero *et al.* in their generic diagnosis, and, second, they misinterpreted the epitheliated esophageal outpouching as the intestinal bifurcation, which is located dorsal to the cirrus sac.

Caballero *et al.* placed *Botulisaccus* in the Monorchiidae, and Yamaguti (1958:56) transferred it to the Zoogonidae, but Manter and Pritchard (1961:483) thought it belonged in the Monorchiidae. The presence of a V-shaped excretory vesicle, or Y-shaped with an extremely short stem, described here for the first time, and the absence of a spinose cirrus indicate that *Botulisaccus* should be assigned to the Fellodistomatidae. The only unusual fellodistomatid characters of this genus are the postacetabular cirrus sac and genital pore and the esophageal outpouchings.

This species was previously known only from *Albula vulpes* from the Pacific Ocean.

Claribulla gen. n.

Generic diagnosis: Body elongate, spinose. Oral sucker cup-shaped or funnel-shaped. Acetabulum preovarian, enclosed in genital atrium. Pharynx elongate. Caeca long or short. Testes diagonal to tandem. Seminal vesicle preacetabular. Pars prostatica present. Atrial papilla present. Ovary compact, pretesticular. Seminal receptacle absent. Vitellaria in acetabular-ovarian zone. Eggs without filaments. Parasites in marine fishes. Type and only species:

Claribulla **longula** sp. n.
Figures 6 and 7

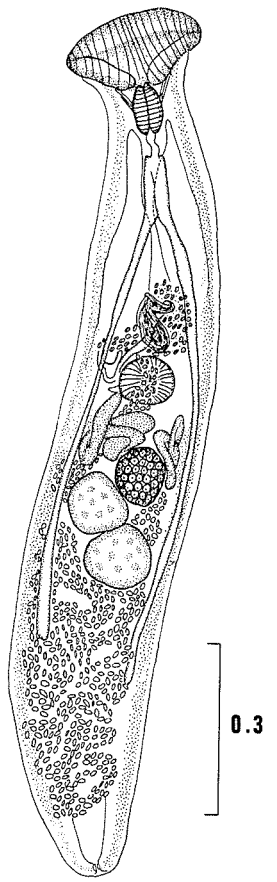
Hosts: *Albula vulpes* (5 of 7), type hosts; *Sphyraena barracuda* (1 of 1).

Site: Pyloric caeca, few in upper intestine. *Holotype*: U. S. N. M. Helm. Coll. No. 71316, paratype: No. 71376.

Description (based on 15 wholemounts and 1 sectioned specimen): Body bluntly rounded posteriorly, 0.9 to 2.7 long by 0.21 to 0.37 wide, the widest portion generally in hindbody; usually a slight constriction at acetabular level. Entire cuticle with minute spines. Oral sucker 0.10 to 0.24 long by 0.14 to 0.27 wide. Acetabulum enclosed in genital atrium, protrusible, 0.07 to 0.14 long by 0.09 to 0.13 wide. Sucker ratio 1:0.4 to 0.7. Forebody 29 to 44% of body length. Pharynx 0.07 to 0.19 long by 0.04 to 0.08 wide, in contact with oral sucker and connected to it by muscle fibers attached at or near equator of pharynx. Esophagus usually shorter than pharynx. Intestinal bifurcation much nearer oral sucker than acetabulum. Caeca sometimes swollen, extending to between acetabulum and near posterior end of body.

Testes diagonal to almost tandem, usually contiguous, spherical to slightly irregular; anterior testis 0.06 to 0.15 long by 0.08 to 0.18 wide, either sinistral or dextral to posterior testis; posterior testis 0.06 to 0.17 long by 0.10 to 0.16 wide. Posttesticular space 26 to 41% of body length. Cirrus sac absent. Seminal vesicle saccate, straight or bent, extending to a level anterior to or occasionally overlapping acetabulum. Pars prostatica sinuous or nearly straight, extending posteriorly from anterior portion of seminal vesicle; surrounded by numerous free prostatic cells. Ejaculatory duct inconspicuous, short and muscular. Atrial papilla large, muscular, located sinistrally, at a level anterior or lateral to acetabulum, protruding into muscular canal which extends posteriorly to approximately midacetabular level, then joining large muscular genital atrium.

Ovary rounded to slightly irregular, median or submedian, anterior to and almost always in contact with anterior testis, 0.06 to 0.12 long by 0.08 to 0.12 wide. Laurer's canal present. Proximal folds of uterus filled with sperm. Vitelline follicles clustered laterally, extending from ovarian level to or near acetabular level. Uterus extensive, filling most of postovarian spaces and extending to anterior border of acetabu-



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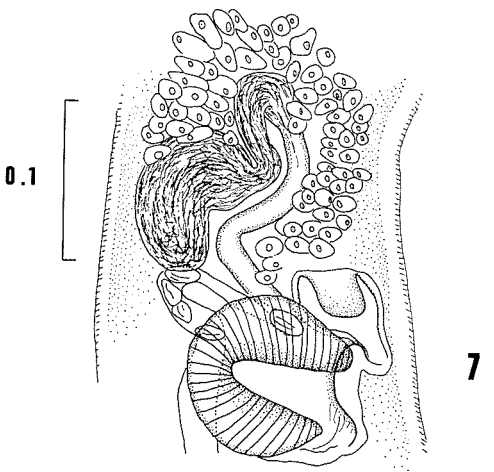

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Figure 6. *Claribulla longula,* holotype, dorsal view. Figure 7. *Claribulla longula,* terminal reproductive organs, side view.

lum before joining genital atrium. Eggs usually collapsed, noncollapsed specimens 16 to 30 by 10 to 13 microns; 25 to 29 by 11 to 13 in living specimens.

Excretory vesicle Y-shaped; stem dividing at ovarian level with arms extending to pharyngeal level. Excretory pore terminal.

Discussion: I believe the genus *Claribulla* belongs in the family Fellodistomatidae. If I were to accept the validity of Monodhelminthidae Dollfus, 1937, then *C. longula,* with its atrial papilla, or accessory organ as referred to by Yamaguti, could be placed in that family. However, I am treating this family as a subfamily in the Fellodistomatidae. Yamaguti (1958:256-259) included the genera *Monodhelmis* Dollfus, 1937, *Mehratrema* Srivastava, 1939, *Tandanicola* Johnston, 1927, and *Prosogonarium* Yamaguti, 1952, in the Monodhelminthidae. Of these, *C. longula* resembles the species of *Monodhelmis* and *Tandanicola* by lacking a cirrus sac, although it differs from members of all four genera by having a preovarian acetabulum, an acetabulum enclosed in the genital atrium, and several other individual differences. The relationship of *Tandanicola* with the Fellodistomatidae was previously reported by Cable (1953:417), when he amended Tandanicolinae Johnston, 1927, to include *Megalomyzon* Manter, 1947, and *Pseudosteringophorus* Yamaguti, 1940, both recognized fellodistomatids, and transferred the subfamily from the Brachycoeliidae to the Fellodistomatidae.

Claribulla longula further links the monodhelminthids with the fellodistomatids by being similar to a group of the latter which includes *Pseudobacciger* Nahhas and Cable, 1964, *Bacciger* Nicoll, 1914, *Pentagramma* Chulkova, 1939, and *Faustula* Poche, 1926. *Bacciger* and *Pentagramma* were reviewed by Margolis and Ching (1965) without being assigned to a subfamily because of the unstable classification of the fellodistomatids. *Claribulla longula* differs from species of the above four genera in the arrangement of the gonads, the absence of a seminal receptacle, and the presence of an atrial papilla. A cirrus sac is absent in members of *Pseudobacciger* and indistinct in those of *Pentagramma.* The absence of a cirrus sac in *Pseudobacciger harengulae* (Yamaguti, 1938) (= *Bacciger h.*) and in

the illustration of *B. bacciger* (Rudolphi, 1819) by Stossich (1889) caused Yamaguti (1938 and 1958) to place *Bacciger* in the Heterophyidae and later in the Cryptogonimidae.

The absence of a cirrus sac in conjunction with the atrial papilla in *C. longula* is suggestive of a cryptogonimid. In the superfamily Opisthorchioidea, of which Cryptogonimidae is a member, however, a consistent and conspicuous feature is a seminal receptacle. Also, all known cercariae in that superfamily which leave the snail have eyespots which can be found, at least as scattered granular pigmented remnants, in the forebody of the adult (Cable, 1968: personal communication). If the cercaria of *C. longula* is found to have eyespots, this species should be transferred to the family Cryptogonimidae.

In Digenea lacking the usual protrusible cirrus, numerous modifications of terminal genitalia and adjacent portions are found in non-related groups, including the fellodistomatids. Convergent evolution of these modifications led parasitologists to place the presently recognized Microphallidae and Gymnophallinae as subfamilies of the Heterophyidae. More recent studies on the life histories of these three groups indicate that they represent three distinct orders, with two (Microphallidae and Heterophyidae) in the superorder Epitheliocystidia and one (Gymnophallinae) in the superorder Anepitheliocystidia.

The single specimen from *Sphyraena barracuda* may represent an accidental infection.

The name *Claribulla* is from *clara* (distinct) and *bulla* (knot), and refers to the muscular atrial papilla.

FAMILY PARAMPHISTOMATIDAE Fischoeder, 1901

Cleptodiscus reticulatus Linton, 1910

Host: *Pomacanthus arcuatus* (2 of 4).
Site: Rectum.

FAMILY PRONOCEPHALIDAE Looss, 1902

Barisomum erubescens Linton, 1910

Pleurogonius erubescens (Linton, 1910) Prudhoe, 1944.

Monostomum pomacanthi MacCallum, 1916.

Pleurogonius pomacanthi (MacCallum, 1916) Price, 1931.

Host: *Pomacanthus arcuatus* (1 of 4).
Site: Rectum.

Discussion: Linton (1910:70) implied, as I determine, that the dorsoventral musculature of this worm was very unusual. The internal bundles are roughly situated in rows, separated from adjacent bundles by approximately two bundle widths. They are most prominent in the intercaecal region. A few long crystals in the parenchyma apparently are sponge spicules that entered the worm mechanically.

FAMILY MICROSCAPHIDIIDAE Travassos, 1922

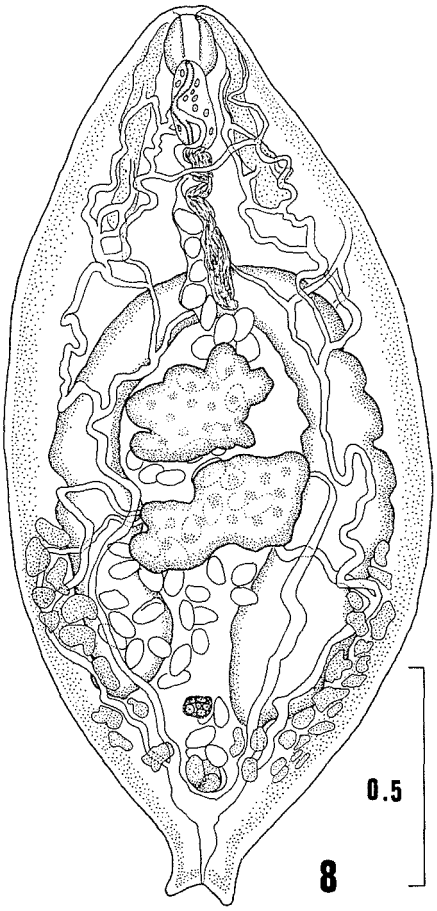
Hexangitrema pomacanthi Price, 1937
Figures 8 and 9

Hexangitrema breviceca Siddiqi and Cable, 1960 (new synonym).

Host: *Pomacanthus arcuatus* (1 of 4).
Site: Intestine and rectum.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71298.

Description (based on 14 wholemounts and 3 sectioned specimens): Body monostomate, broadly fusiform, notched posteriorly, 1.5 to 2.4 long by 0.71 to 1.00 wide. Cuticle smooth. Eyespot pigment present, more conspicuous in smaller specimens. Oral sucker terminal, 0.09 to 0.16 long by 0.11 to 0.15 wide; retrodorsal pockets prominent or retracted and inconspicuous. Esophagus, including bulb at posterior end, 0.24 to 0.49 long, muscular; bulb spherical to elongated. Caeca wide, terminating blindly from 8 to 33% of length of body from posterior end.

Testes tandem, lobed, intercaecal or slightly overlapping caeca, approximately 0.2 to 0.6 long by 0.3 to 0.5 wide. Genital pore near posterior border of oral sucker. Hermaphroditic sac thin-walled elongate; comprised of loosely woven fibrous strands; containing terminal portion of metraterm, prostatic cells, small or no internal seminal



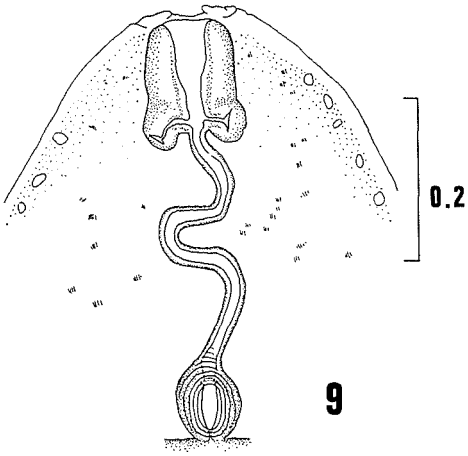


Figure 8. *Hexangitrema pomacanthi,* ventral view. Figure 9. *Hexangitrema pomacanthi,* anterior end.

vesicle, pars prostatica, and long (0.08 to 0.10), narrow, muscular hermaphroditic duct. External seminal vesicle long, sinuous, extending to or posterior to intestinal bifurcation.

Ovary smooth to irregular, 0.09 to 0.16 long by 0.06 to 0.13 wide, posttesticular by a variable distance. Mehlis's gland posterior to ovary. Laurer's canal present, inconspicuous. Vitellaria extracaecal and overlapping caeca ventrally, from between midlevel of either testis to postovarian region, sometimes confluent posterior to ovary. Uterus intercaecal or slightly overlapping caeca; proximal coils filled with sperm. Metraterm long. Eggs thin-shelled, operculate, 79 to 92 by 49 to 59 microns.

Excretory vesicle short, with two main collecting ducts, each dividing into prominent secondary ducts at a level between posterior testis and vesicle. Additional branching present, forming a network of ducts anteriorly. Excretory pore between caudal processes.

Discussion: *Hexangitrema breviceca* Siddiqi and Cable, 1960, is distinguished from *H. pomacanthi* by the presence of lobed, somewhat separated testes and short caeca that do not reach the posttesticular region. My specimens show gradations in the separation of testes from touching to being well separated, in the extent of the caeca which terminate between the midlevel of the posterior testis and beyond the ovary, and in the degree of lobation of the testes. The testes, however, are never completely spherical as illustrated by Price (1937, Figure 5). Many of my specimens were over 4 in length before fixation. Because of these intergradations and variations, I am placing *H. breviceca* as a synonym of *H. pomacanthi.*

The hermaphroditic sac is difficult to interpret in many wholemounts and has not previously been described for *H. pomacanthi.* Sectioned material reveal its structure is similar to that which Looss (1902:676-682, figs. 121, 139) described and illustrated in species of *Microscaphidium* and *Angiodictyum.* These genera are related to *Hexangitrema* and include species in marine turtles. Yamaguti (1958) placed these genera in Angiodictyidae Looss, 1902. I agree with

Stunkard (1943:143) in suppressing Angiodictyidae and accepting Microscaphidiidae Travassos, 1922, as the only available name.

FAMILY HAPLOPORIDAE Nicoll, 1914

Vitellibaculum spinosum (Siddiqi and Cable, 1960) Durio and Manter, 1968

Allomegasolena spinosa Siddiqi and Cable, 1960.

Host: *Chaetodipterus faber* (1 of 2).
Site: Posterior intestine.

Discussion: Four specimens 1.8 to 2.4 long have cuticular spines extending to or almost to posterior end in addition to spines at terminal portion of body, pharynx 0.18 to 0.19 long by 0.12 to 0.14 wide and pyriform in shape, and eggs 62 to 75 by 39 to 43 microns. Sucker ratios are 1:1.3 to 1.9 and appear to be dependent on the state of contraction of the oral sucker at the time of fixation. The forebody is attenuated in three of the specimens. In a 1.6 long curled specimen with two eggs, lent by Dr. R. M. Cable, the pharynx is barrel-shaped and 0.12 long by 0.095 wide. The variations in shape of body, sucker ratio, and size of pharynx, in addition to the report of *Vitellibaculum spinosum* from both *Chaetodipterus faber* and *Lutjanus apodus* (see: Nahhas and Cable, 1964:179), all suggest that additional specimens of *V. attenuatum* (Siddiqi and Cable, 1960) from *L. apodus,* the type host, may well show *V. attenuatum* to be a synonym of *V. spinosum.*

Dr. Manter has unreported specimens of *V. spinosum* from *C. faber* that he has identified from his collection from Beaufort, North Carolina.

Megasolena hysterospina (Manter, 1931) comb. n.
Figure 10

Lepidauchen hysterospina Manter, 1931.
Megasolena archosargi Sogandares-Bernal and Hutton, 1959 (new synonym).

Host: *Archosargus rhomboidalis* (4 of 5).
Site: Intestine.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71299.

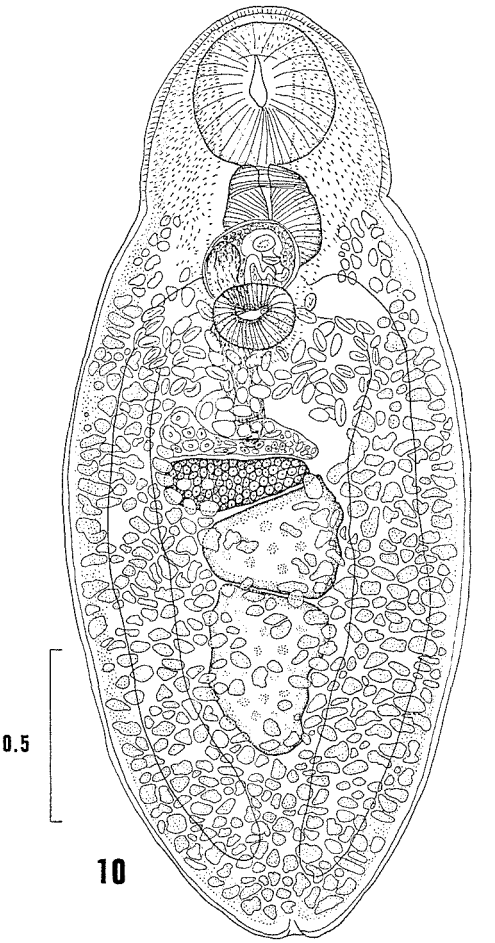


Figure 10. *Megasolena hysterospina,* ventral view.

Discussion: Examination of a paratype of *Lepidauchen hysterospina,* lent by Dr. H. W. Manter, revealed that species to have a hermaphroditic sac instead of a cirrus sac. This species is therefore in the genus *Megasolena* Linton, 1910, with *M. hysterospina* as a new combination. Prévot (1968) recently studied adult and larval *L. stenostoma* Nicoll, 1913, and found that a seminal receptacle was present and a hermaphroditic sac absent. He concluded that *Lepidauchen* Nicoll, 1913, belonged in the subfamily Lepocreadiinae Odhner, 1905.

I consider *M. archosargi* Sogandares-Bernal and Hutton, 1959, a synonym of *M.*

hysterospina. Megasolena hysterospina is described as not having an esophagus or external seminal vesicle. My specimens have both, but they are difficult or impossible to see in some individuals. A Laurer's canal is present; it was not observed in *M. archosargi.* The hermaphroditic sac varies in shape from elongate to almost spherical, with its posterior extension lying between the anterior and posterior borders of the acetabulum. A tubular prostatic vesicle is present. The vitelline follicles containing yolk granules agree with the descriptions; some gland cells not containing granules, however, extend anteriorly to these. A ventral cuticular area, usually present as a groove and bordered by spines, extends between the suckers and includes their apertures. The bordering spines were observed on specimens lent by Dr. R. M. Cable from his Jamaican collection and were seen to extend only to the midacetabular level on Dr. H. W. Manter's specimen.

Additional measurements on 12 of my mature specimens are: Body 1.9 to 3.9 long by 0.99 to 1.56 wide. Oral sucker 0.33 to 0.68 long by 0.34 to 0.54 wide. Acetabulum 0.16 to 0.35 by 0.20 to 0.38. Sucker ratio 1:0.6 to 0.8. Forebody 26 to 34% of body length. Prepharynx contracted or up to 0.13 long. Pharynx 0.22 to 0.46 long by 0.19 to 0.34 wide. Anterior testis 0.20 to 0.55 long by 0.36 to 0.85 wide; posterior testis 0.38 to 0.73 by 0.37 to 0.74. Ovary 0.13 to 0.21 long by 0.32 to 0.65 wide; Dr. Cable's specimens also have ovaries wider than long. Eggs 56 to 83 by 35 to 47 microns.

FAMILY HAPLOSPLANCHNIDAE Poche 1925

Schikhobalotrema sparisoma (Manter, 1937) Skrjabin and Guschanskaja, 1955

Haplosplanchnus sparisoma Manter, 1937.

Host: *Nicholsina usta* (2 of 3)*.
Site: Intestine.

Schikhobalotrema kyphosi (Manter, 1947) Skrjabin and Guschanskaja, 1955

Haplosplanchnus kyphosi Manter, 1947.

Host: *Kyphosus sectatrix* (3 of 6).

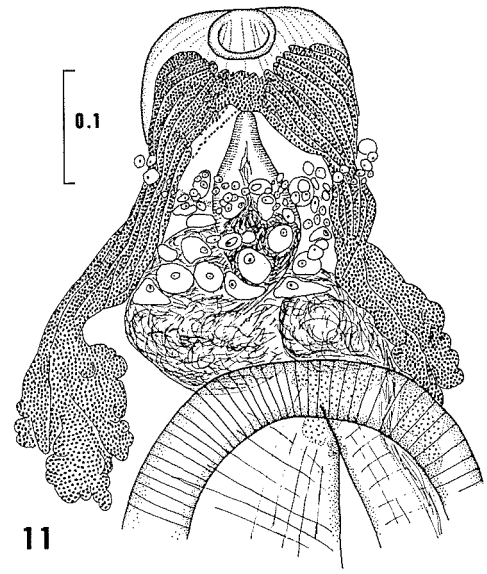


Figure 11. *Schikhobalotrema acutum,* genital bulb and associated structures, ventral view.

Site: Pyloric caeca, occasionally in upper intestine.

Additional measurements and discussion: Six specimens 1.9 to 2.8 long by 0.52 to 0.79 wide have sucker ratios of 1:0.6 to 1.1, depending on the expansion of the oral sucker. The oral sucker is 0.29 to 0.46 wide, and the acetabulum is 0.23 to 0.35 wide. Forebody is 26 to 36% of the body length. Pharynx is 0.11 to 0.17 long by 0.12 to 0.17 wide. Eggs are 80 to 92 by 51 to 64 microns. The anterior limit of the excretory vesicle may reach the level of the pharynx, and the extremely sinuous seminal vesicle may extend posterior to the testis. Sensory papillae are prominent on the oral sucker and anterior end, as Manter (1937b:385) predicted for all species of "*Haplosplanchnus.*"

Schikhobalotrema acutum (Linton, 1910) Skrjabin and Guschanskaja, 1955
Figure 11

Deradena acuta Linton, 1910.
Haplosplanchnus acutus (Linton, 1910) Manter, 1937.

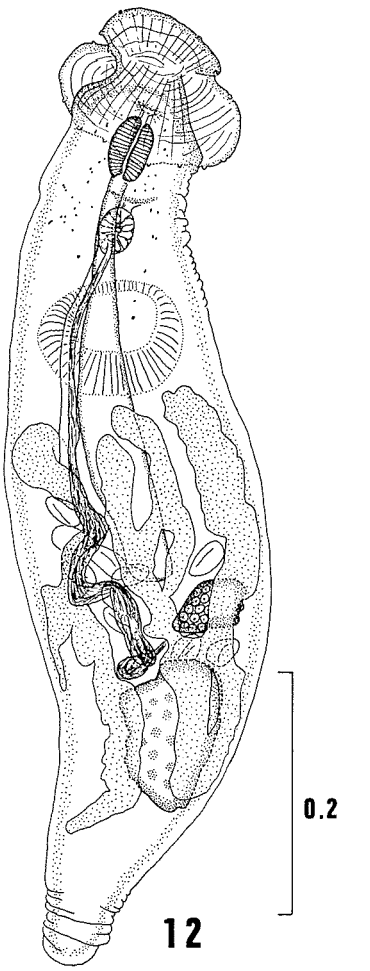
Host: *Strongylura timucu* (1 of 3).
Site: Rectum.

Discussion: Sogandares-Bernal and Sogandares (1961:145-147) reviewed this species and considered *Schikhobalotrema* as a subgenus of *Haplosplanchnus*. There is considerable range in length, an important character used to distinguish this species from *S. adacutus*. The previous authors reported a specimen of 0.6, without eggs, from *Abudefduf saxatilis* (= *A. marginatus* as used by Manter, 1937), a host of the smaller *S. adacutus*. Siddiqi and Cable (1960:Figure 16) illustrated a specimen of 0.7 from a beloniform, the typical host for *S. acutum*. Manter (1937b:385) discussed specimens of 1.3 to 2.0 long and Caballero *et al.* (1953: 128) others 1.6 to 2.1 from the Pacific Ocean, all from beloniform fishes. My specimens are 2.1 to 2.5 with sucker ratios of 1:1.2 to 1.4 and have eggs 85 to 88 by 53 to 57 microns. Sensory papillae are present around the oral sucker. Manter (1937b: 386) described longitudinal striae dividing the muscular genital bulb. The dorsal portion of this bulb in my specimens appears corrugated and the ventral portion is covered by a series of tubules which are filled with granules (Figure 11). The tubules extend posteriorly, dividing into two groups at the midlevel of the bulb. Both groups lead to large reservoirs of granules, which appear like yolk granules, located on each side of the acetabulum.

Hymenocotta **manteri** sp. n.
Figures 12 and 13

Host: *Mugil cephalus* (3 of 3), type host.
Site: Intestine and pyloric caeca.
Holotype: U. S. N. M. Helm. Coll. No. 71300, paratype: No. 71366.

Description: (based on 16 wholemounts and 3 sectioned specimens): Body elongate, 0.9 to 1.6 long by 0.27 to 0.45 at maximum width, usually near acetabular level. Cuticle thick, with prominent rings, especially in tapering hindbody. Pigment granules scattered in forebody and occasionally throughout entire worm. Oral sucker replaced by



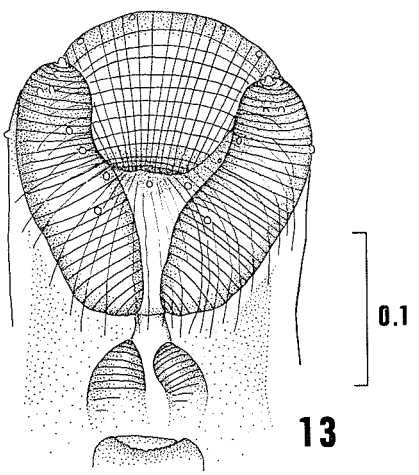


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Figure 12. *Hymenocotta manteri*, holotype, dorsal view. Figure 13. *Hymenocotta manteri*, contracted oral disc, ventral view.

oral disc which may be flared out, or contracted (Figure 13) and superficially resembling spherical or cup-shaped oral sucker; 0.15 to 0.33 wide at greatest diameter, depending on individual variation and contraction. Numerous sensory papillae on disc. Acetabulum protrusible, without lobes, 0.16 to 0.25 long by 0.17 to 0.27 wide; aperture a circular to longitudinal slit-like opening. Sucker ratio 1:0.6 to 1.3. Forebody 26 to 36% of body length. Prepharynx about ½ length of pharynx. Pharynx 0.07 to 0.10 long by 0.06 to 0.09 wide. Single caecum usually approaching or extending well into testicular level; highly cellular, often containing particulate matter.

Testis elongate, spherical, or slightly irregular, not touching acetabulum; 0.13 to 0.19 long by 0.09 to 0.20 wide. Posttesticular space 11 to 39% of body length, depending on contraction. Cirrus sac absent. Seminal vesicle tubular, long, extending near or well into testicular level; straight to highly sinuous; often with several loops directly anterior or posterior to acetabulum; connected to spherical prostatic vesicle by pars prostatica of greater length than vesicle. Genital atrium muscular. Genital pore median or submedian, at a level near posterior of pharynx.

Ovary subglobular, 0.06 to 0.12 long by 0.05 to 0.12 wide, variable in position from anterior acetabular level to posterior border of testis, usually anterolateral to testis. Seminal receptacle dorsal, near ovarian level. Vitelline follicles usually in elongate groups, extending from level of acetabulum or slightly posteriorly to a level midway between testis and posterior end of body. Uterus may extend to midtesticular level before turning anteriorly. Metraterm present. Eggs usually partially collapsed, 66 to 89 by 35 to 48 microns; not containing fully-developed miracidia.

Excretory pore terminal; vesicle bifurcating at midtesticular level with arms extending to near posterior border of pharynx.

Discussion: Manter (1961:67-69) erected the genus *Hymenocotta* to accommodate a single species, *H. mulli* Manter, 1961, which differs from all other haplosplanchnids in having a cirrus sac and a six-lobed disc, which replaces the oral sucker. The present species is the second with a disc, but it is not six-lobed, and a cirrus sac is absent. What appears to be the cirrus sac is weakly developed and not evident in all of Dr. Manter's specimens of *H. mulli* from New Caledonia (Manter, 1968:personal communication). Pending further information, the present species is placed in *Hymenocotta* because of the oral disc which, with the absence of a well-developed bulb of prostatic ducts, distinguishes *H. manteri* from *Schikhobalotrema elongatum* Nahhas and Cable, 1964, an otherwise similar species from the same host.

This species is named in honor of Dr. Harold Winfred Manter, in recognition of his contributions to the field of trematodology.

FAMILY LEPOCREADIIDAE Nicoll, 1934

Thysanopharynx elongatus Manter, 1933

Host: *Lactophrys quadricornis* (1 of 3).
Site: Intestine.

Discussion: Manter (1963a:107) reduced the family Megaperidae Manter, 1934, which would include this and the following species, to a subfamily in the Lepocreadiidae. Nahhas and Cable (1964:179) tentatively accepted Megaperidae and placed it in the superfamily Haploporoidea Mehra, 1961, along with the haploporids and haplosplanchnids. They also noted that *Enenterum* and *Cadenatella,* generally placed in the Lepocreadiidae, have features in common with members of the Haploporoidea and that they might later be transferred to that group. Pending life history studies, however, they retained the two genera in the Lepocreadiidae. I also prefer to retain them, as well as *Thysanopharynx* and *Megapera,* with the lepocreadiids.

Megapera sp.

Host: *Lactophrys quadricornis* (1 of 3).
Site: Intestine.

Discussion: A single immature individual is included in this study because *Lactophrys quadricornis* is the final host for several species of *Megapera.* It is 0.51 long and has a constricted hindbody as in *M. gyrina,* although the vitellaria extend from the posterior end to the testes as in *M. pseudogyrina* and *M. ovalis.* The sucker ratio is 1:0.29.

Enenterum aureum Linton, 1910

Host: *Kyphosus sectatrix* (5 of 6).
Site: Rectum and posterior intestine.

Cadenatella americana Manter, 1949

Host: *Kyphosus sectatrix* (4 of 6).
Site: Intestine.

Discussion: The forebody, especially the the ventral region, contains individual gland cells opening to the exterior. The elongate or spherical prostatic vesicle generally extends posteriorly, and dorsal to the acetabulum, rather than along its anterior border, as in the holotype. A sectioned specimen does not have a cirrus sac, confirming what Nahhas and Cable (1964:192) believed. A thin membrane, however, appears to surround the vesicle in some wholemounts.

Cadenatella **floridae** sp. n.
Figures 14, 15, and 16

Host: *Kyphosus sectatrix* (5 of 6), type host.
Site: Pyloric caeca and occasionally anterior intestine.
Holotype: U. S. N. M. Helm. No. 71301, paratype: No. 71367.

Description (based on 10 mature wholemounts and 2 sectioned specimens): Body elongate, 3.0 to 4.7 long by 0.31 to 0.44 wide; largest immature specimen 3.01. Cuticle spinose from anterior end to testicular level. Eyespot remnants present; brownish-yellow pigment scattered through parenchyma. Oral sucker 0.10 to 0.16 in diameter with 8 muscular preoral lobes, 4 dorsal and 4 ventral. Acetabulum 0.15 to 0.19 long, 0.14 to 0.19 wide, and 0.12 to 0.17 deep; the surrounding cuticle with an inner ring of papillae adjacent to cuticular spines. Sucker ratio 1:1.1 to 1.5. Forebody 21 to 43% the length of body, with 8 to 11 midventral accessory suckers; occasionally 1 or 2 suckers ventral to posterior portion of pharynx, never anterior to pharynx; the second sucker anterior to acetabulum usually largest, 0.08 to 0.12 wide; smallest sucker 0.04 to 0.06 wide. Prepharynx 0.06 to 0.42, depending on contraction. Pharynx massive, pyriform, 0.22 to 0.32 long by 0.09 to 0.14 wide. Esophagus from 0.09 to 0.24 long; large muscular sphincter at anterior end. Caeca extending to posterior end of body, joining excretory vesicle to form uroproct with terminal pore.

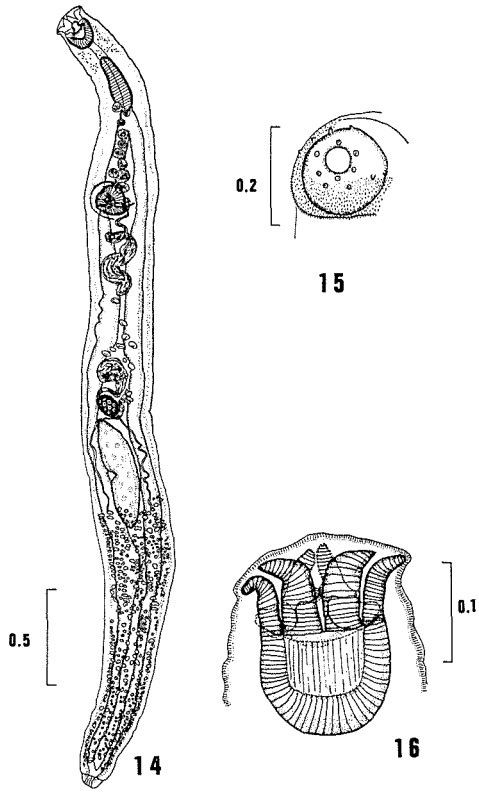

Figure 14. *Cadenatella floridae*, holotype, ventral view. Figure 15. *Cadenatella floridae*, acetabular region, ventral view. Figure 16. *Cadenatella floridae*, anterior end, dorsal view.

Testis single, elongate, occasionally with indentation, 0.32 to 0.73 long by 0.10 to 0.21 wide. Posttesticular region 21 to 40% of body length. Cirrus sac absent. Seminal vesicle long, sinuous, extending to about midway between acetabulum and ovary. Prostatic vesicle spherical to ovoid, near anterior border of acetabulum. Ejaculatory duct short. Genital atrium muscular, inconspicuous in wholemounts. Genital pore in invagination leading to posterior accessory sucker.

Ovary globular to almost triangular; 0.08 to 0.14 long by 0.11 to 0.19 wide; slightly anterior to or overlapping forward portion of testis. Seminal receptacle of uterine type, at a level anterior to ovary. Mehlis's gland near seminal receptacle. Laurer's canal opening dorsal to ovary. Uterus preovarian, intercaecal or occasionally overlapping caeca.

Metraterm present. Vitelline follicles dorsal, ventral, and lateral to caeca and testis; extending from posterior ⅓ of testicular level to end of body; filling most of posttesticular space. Gland cells not containing granules extending from near anterior level of testis almost to pharyngeal level. Eggs thin-shelled, 41 to 72 by 30 to 40 microns for partially-collapsed eggs; 48 to 58 by 31 to 34 microns for noncollapsed eggs.

Excretory vesicle Y-shaped, bifurcating at ovarian level; arms extending about midway between acetabulum and ovary; excretory canals extending from tips of arms to oral sucker then posteriorly through hindbody.

Discussion: Five other species of *Cadenatella* have been described, all from fishes of the genus *Kyphosus*. Only two, *C. brumpti* (Dollfus, 1946) and *C. kyphosi* Nahhas and Cable, 1964, have more than two accessory suckers. The present species differs from both by having 8 to 11 rather than 14 to 17 accessory suckers, by the extension of spines on the ventral side of the body, and probably by possessing a muscular esophageal sphincter. It resembles *C. kyphosi* in size and oral lobes but differs in the location of the accessory suckers. Papillae near the acetabulum (Figure 15) probably are sensory in function; they have not been described for any other species of *Cadenatella*.

Nahhas and Cable (1964:191-192) discussed the known species and considered *Jeancadenatia* a synonym of *Cadenatella*. Sogandares-Bernal (1959:80) clarified some of the provisional description of *C. brumpti* by Dollfus (1946:124-126).

Lepocreadium trulla (Linton, 1907) Linton, 1910

Distomum trulla Linton, 1907.

Host: *Ocyurus chrysurus* (3 of 5).
Site: Intestine.

Discussion: Six specimens 0.9 to 1.2 long have sucker ratios of 1:0.7 to 0.9 and eggs 49 to 56 by 29 to 35 microns. The pharynx is lobed anteriorly. The anterior extent of the excretory vesicle was observed in a living specimen to vary from the pharyngeal level to one a short distance posterior to the intestinal bifurcation. Sogandares-Bernal and Hutton (1960:282) discussed that feature in fixed specimens and Hanson (1950:78) gave measurements of small individuals, also from *Ocyurus chrysurus*.

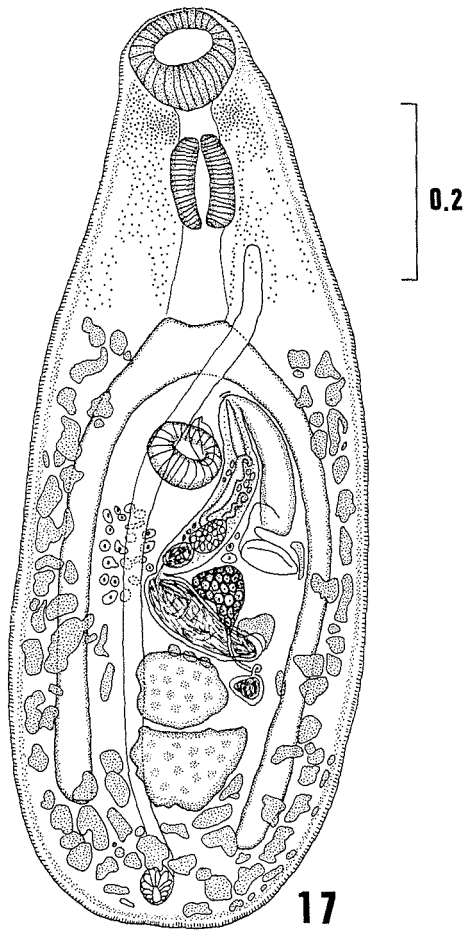

Figure 17. *Lepocreadium pyriforme*, ventral view.

Lepocreadium pyriforme (Linton, 1900) Linton, 1940
Figure 17

Distomum pyriforme Linton, 1900.

Host: *Sardinella anchovia* (1 of 3)*.
Site: Pyloric caeca.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71302.

Discussion: Variations within *Lepocreadium pyriforme* make the status of that species uncertain, as discussed by Sogandares-Bernal and Hutton (1960:280-282) in regard to specimens from different hosts

which Linton identified as *L. pyriforme*. Nahhas and Cable (1964:188) and Nahhas and Short (1965:43) accepted as *L. pyriforme* only individuals resembling Figure 47 (Linton, 1940) or Figure 9 (Sogandares-Bernal and Hutton, 1960), both drawn from specimens from *Palinurichthys perciformis* (Mitchill), the type host. Mine differ from those figures illustrated in the extent of vitellaria, length of the prepharynx, shape and extent of the external seminal vesicle, and sucker ratio. In some of those respects, they are more like those illustrated by the above authors from other hosts. I am provisionally placing my specimens in *L. pyriforme* and describing them, so when adequate material is examined, they can be placed in the proper species.

Description (based on 4 specimens): Body 0.96 to 1.06 long by 0.32 to 0.40 in maximum width. Oral sucker 0.10 to 0.12 long by 0.10 to 0.12 wide. Acetabulum 0.07 to 0.08 by 0.07 to 0.09. Sucker ratio 1:0.7 to 0.08. Forebody 42 to 45% of body length. Prepharynx approximately ½ as long as pharynx width. Pharynx 0.09 to 0.10 long by 0.07 wide. Esophagus as long as, or longer than, pharynx. Caeca ending at level of posterior border of rear testis to midlevel of posttesticular space.

Testes tandem, slightly irregular; anterior testis 0.07 to 0.09 long by 0.10 to 0.12 wide; posterior testis 0.09 to 0.10 by 0.10 to 0.13. Posttesticular space 12 to 18% of body length. Genital pore anterior and sinistral to acetabulum. Cirrus sac 0.11 to 0.21 long by 0.05 wide, posterior extent from midway between acetabulum and ovary to ovarian level. External seminal vesicle elongate, large, approaching size of cirrus sac; terminating in zone of anterior testis.

Ovary smooth, 0.05 to 0.08 long by 0.06 to 0.07 wide. Seminal receptacle sinistral to and usually touching anterior testis. Metraterm muscular, over ¾ as long as cirrus sac. Vitelline follicles from level of intestinal bifurcation to posterior end of body. Eggs partially collapsed, 57 to 71 by 26 to 37 microns.

Excretory pore terminal or subdorsal; vesicle extending intercaecally from pore, on dextral side, then crossing the left caecum near intestinal bifurcation and ending in the left side of forebody at anterior esophageal level.

Lepocreadium floridanum Sogandares-Bernal and Hutton, 1959

Host: *Lagodon rhomboides* (2 of 5).
Site: Pyloric caeca.

Discussion: Twenty-two specimens are 0.4 to 1.2 long and have sucker ratios of 1:0.9 to 1.2. The eggs are within the range given by Nahhas and Short (1965:43); those from living specimens were 62 to 66 by 32 to 40 microns. Extent of the excretory vesicle in a living individual was observed to vary between the bifurcal and anterior esophageal level.

Pseudocreadium scaphosomum Manter, 1940

Hypocreadium scaphosomum (Manter, 1940) Yamaguti, 1942.

Host: *Monacanthus hispidus* (3 of 6)*.
Site: Intestine.

Discussion: Opinion differs as to synonymy between *Hypocreadium* Ozaki, 1936, and *Pseudocreadium* Layman, 1930, and also among the various species assigned to those genera. Sogandares-Bernal (1959:75) and Nahhas and Cable (1964:193) considered *Hypocreadium* a synonym of *Pseudocreadium,* and Manter (1946:414) questioned whether the same may be true of *P. scaphosomum* Manter, 1940, and *P. lamelliforme* (Linton, 1907). Also Bravo-Hollis and Manter (1957:38) were hesitant as to whether *P. scaphosomum* was a synonym of *P. patellare* (Yamaguti, 1938). *Pseudocreadium lamelliforme* (Linton, 1907) and *P. myohelicatum* (Bravo-Hollis and Manter, 1957) are usually separated from *P. patellare* and *P. scaphosomum* by possessing some vitelline follicles which overlap the caeca ventrally. However, Sogandares-Bernal (1959: 76) found at least a few such follicles in a series of paratypes of *P. scaphosomum* and considered *P. myohelicatum* its synonym.

My specimens can be placed in three groups: one of 5 individuals 1.0 to 1.3 long with eggs 51 to 80 by 35 to 47 microns are from 2 specimens of *M. hispidus* 9 cm long; another of 7 individuals 1.5 to 1.7 long with eggs 56 to 71 by 39 to 43 microns are from 1 specimen of *M. hispidus* 26 cm long; and a third of 17 individuals 0.9 to 1.6 long with eggs 56 to 75 by 32 to 43 microns are from 3 specimens of *Balistes*

capriscus. The three groups are alike in most respects: they have smooth to lobed gonads; long, sinuous, divided prostatic vesicle; sinuous cirrus when inverted; variable extent of caecal undulations; genital pore ventral or slightly anterior to caeca; and extremely muscular distal portion of the metraterm. I place these specimens in two species, primarily on the basis of their vitelline arrangement; that is: *P. scaphosomum* from *M. hispidus* and *P. lamelliforme* from *B. capriscus*. Although vitellaria in a few specimens of *P. scaphosomum* are partially ventral to the caeca, the worms from *M. hispidus* are distinct from *P. lamelliforme* and five paratypes of *P. myohelicatum* on a slide lent by Dr. H. W. Manter. The vitellaria in *P. myohelicatum* are not intensive or in clusters and neither *P. lamelliforme* nor *P. myohelicatum* have vitellaria restricted from the caecal zone as in *P. scaphosomum*. For this reason, I consider *P. myohelicatum* a valid species, rather similar to *P. balistis* Nagaty, 1942 (originally *P. balistes*), which also has a short, reasonably straight prostatic vesicle, but a distinctly-partitioned external seminal vesicle. The internal seminal vesicle is extremely muscular, especially in *P. scaphosomum,* and may be spherical, bipartite, or teardrop in shape, depending on contraction. Width of muscular constriction of the prostatic vesicle varies, and the external seminal vesicle may be sinuous, tubular, or saccate.

Additional observations may reveal that *P. patellare* is conspecific with *P. scaphosomum,* and *P. lamelliforme* with *P. myohelicatum,* or possibly that all four are the same species. Illustrations of *P. scaphosomum* from *B. polylepis* by Lamothe (1963:102-108) and Caballero *et al.* (1953:117–121) indicate variability of that trematode.

Pseudocreadium lamelliforme (Linton, 1907) Manter, 1946

Distomum lamelliforme Linton, 1907 (in part).

Host: *Balistes capriscus* (2 of 4).
Site: Intestine.

Discussion: The excretory sphincter in my species of *Pseudocreadium,* especially *P. lamelliforme,* gives a false impression of 5 to 10 large, radial spines.

Nahhas and Cable (1964:193-194) described *P. lactophrysi* and pointed out that Linton (1907:108-109) probably considered that species, *Dermadena lactophrysi,* and *P. lamelliforme* as a single species.

Dermadena lactophrysi Manter, 1946

Distomum lamelliforme Linton, 1907 (in part).

Host: *Lactophrys quadricornis* (2 of 3).
Site: Intestine.

Neoapocreadium coili (Sogandares-Bernal, 1959) Siddiqi and Cable, 1960

Apocreadium coili Sogandares-Bernal, 1959.

Host: *Balistes capriscus* (1 of 4).
Site: Intestine.

Discussion: My single specimen is 3.3 long by 1.0 wide, with a forebody 37% the length of the body. The sucker ratio is 1:0.90, and the eggs measure 80 to 82 by 52 to 54 microns. The sucker ratio and amount of posttesticular space, characters used to separate *N. coili* from *N. bravoi* (Sogandares-Bernal, 1959), are intermediate between values for the two species. The confluent preacetabular vitellaria, however, are numerous, rather than sparse as illustrated for *N. bravoi.* There appears to be a misprint in the description (Sogandares-Bernal, 1959:83): the body width of *N. coili,* as illustrated, should be about 0.69 rather than 0.225, as given in the text.

When additional life history studies of trematodes belonging in the Lepocreadiidae and related families are collected, I believe the genera *Apocreadium* Manter, 1937, *Neoapocreadium* Siddiqi and Cable, 1960, *Postporus* Manter, 1949, and others will be transferred to a separate family. But until the limits of such a group are better defined, I prefer to leave the above three genera in the Lepocreadiidae.

Apocreadium mexicanum Manter, 1937

Host: *Balistes capriscus* (1 of 4)*.
Site: Intestine.

Discussion: Three immature worms are 1.8 to 3.3 long, and even though Manter (1937a:11) reported a mature specimen of *A. mexicanum* 2.2 long, I believe only one species is involved. The lymphatic vessels are branched, and the vitellaria extend anteriorly to the posterior edge of the acetabulum. The largest specimen has a fore-

body 23% the length of the body and a posttesticular space 43% that length; the sucker ratio is 1:1.6. The smaller specimens have longer forebodies, shorter posttesticular areas, and smaller sucker ratios. Siddiqi and Cable (1960:306) and Nahhas and Cable (1964:190) discussed some of the variability of this species.

Apocreadium foliatum (Siddiqi and Cable, 1960) comb. n.
Figure 18

Homalometron foliatum Siddiqi and Cable, 1960.

Hosts: *Haemulon aurolineatum* (1 of 7)*; *Haemulon carbonarium* (1 of 1)*; *Haemulon parrai* (3 of 7)*.
Site: Intestine.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71303.

Discussion: I place this species in the genus *Apocreadium* because it possesses a prominent lymphatic system. There are two pairs of longitudinal vessels which extend almost the entire length of the body and give off numerous branches, primarily in the hindbody.

My 13 wholemounts and 2 sectioned specimens are 1.5 to 5.5 long by 0.44 to 0.85 wide, with an immature specimen 1.74 long. The cuticular spines cover the entire body of immature specimens but only near the testicular level in adults. The prepharynx may be as short as 1/3 that of the pharynx and the seminal vesicle overlaps or is slightly anterior to the ovary, predominantly on the left side. Eggs are 85 to 98 by 48 to 62 microns. With the exception of being larger worms with correspondingly larger organs, my specimens agree with those from *Haemulon sciurus,* lent by Dr. R. M. Cable from his Jamaican collection. Nahhas and Cable (1964:184) discussed specimens which had vitellaria extending to the ovarian level and had a larger body, wider range in sucker ratio, and larger eggs than in those of the original description. The excretory vesicle in my specimens and the borrowed ones extends only to or slightly beyond the posterior border of the rear testis, rather than to the anterior testis.

Apocreadium foliatum differs from *A. balistis* Manter, 1947, *A. caballeroi* Bravo-Hollis, 1953, *A. longisinosum* Manter, 1937, *A. mexicanum* Manter, 1937, and *A. syna-*

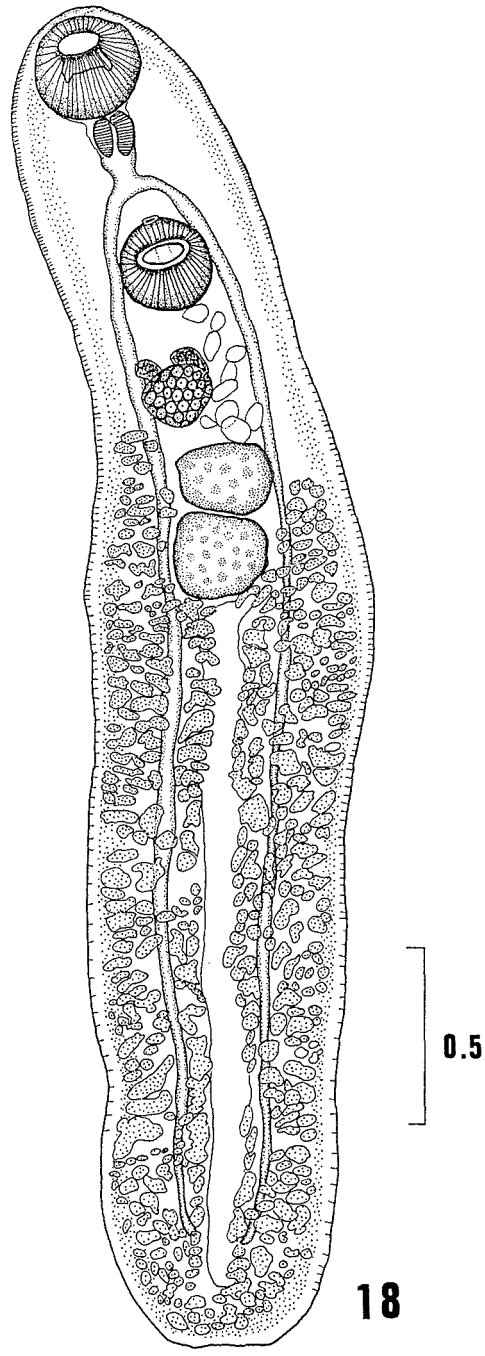

Figure 18. *Apocreadium foliatum,* ventral view.

gris Yamaguti, 1953, in usually having an acetabulum smaller than the oral sucker. In this respect, *A. folliatum* is more like the species of *Apocreadium* described below.

Apocreadium **cryptum** sp. n.
Figure 19

Hosts: *Anisotremus virginicus* (1 of 6); *Haemulon parrai* (1 of 7), type host; additional hosts from Florida Keys cited in discussion.

Site: Pyloric caeca and intestine.

Holotype: U. S. N. M. Helm. Coll. No. 71304, paratype: No. 71368.

Description (based on 6 mature specimens from Biscayne Bay and Florida keys): Body elongate, 4.5 to 9.3 long by 0.98 to 1.53 in maximum width, hindbody extremely foliate usually with median indentation at posterior extremity. An immature individual 4.0 long. Cuticle thick, unspined. Little, if any, eyespot pigment in mature specimens; more conspicuous in immature individuals. Oral sucker funnel-shaped, 0.71 to 1.01 long by 0.68 to 1.37 wide. Acetabulum 0.34 to 0.54 long by 0.30 to 0.59 wide. Sucker ratio 1:0.4 to 0.5. Forebody 30 to 36% of body length. Prepharynx longer or shorter than pharynx. Pharynx 0.19 to 0.32 long by 0.20 to 0.36 wide, without prominent anterior circular muscle band. Length of esophagus variable, up to 80% as long as pharynx. Intestinal bifurcation midway between suckers or closer to oral sucker. Caeca narrow, terminating blindly near posterior end of body.

Testes lobate, tandem, intercaecal, in contact or separated; separated to a greater extent in larger specimens; anterior testis 0.15 to 0.31 long by 0.28 to 0.38 wide; posterior testis 0.19 to 0.41 by 0.26 to 0.35. Post-testicular region 31 to 40% of body length. Cirrus sac absent. Seminal vesicle saccate, extending to roughly midway between acetabulum and ovary. Entire length of pars prostatica surrounded by prostatic cells, more conspicuous and numerous anteriorly. Genital atrium tubular. Genital pore median or slightly submedian, anterior to or ventral to acetabulum.

Ovary smooth or slightly irregular, 0.11 to 0.30 long by 0.20 to 0.28 wide; anterior and slightly dextral to anterior testis, separated by either more or less than length of testis. Seminal receptacle between seminal vesicle and ovary. Mehlis's gland between ovary and anterior testis. Vitelline follicles numerous, those containing yolk extending from level between seminal vesicle and acetabulum to posterior end of body; smaller

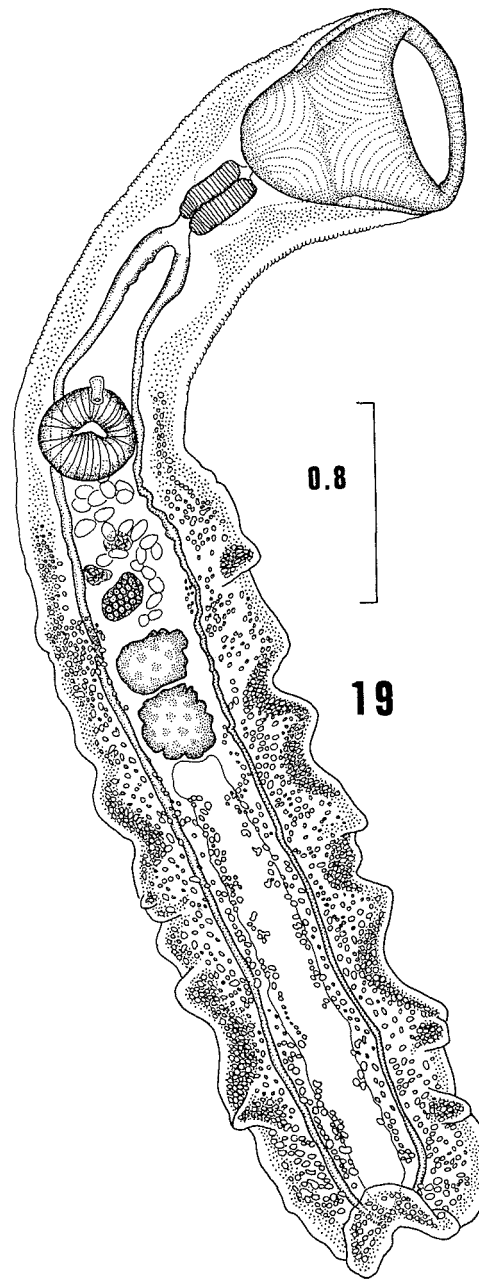

Figure 19. *Apocreadium cryptum*, holotype, ventral view.

gland cells, without yolk granules, extending forward to oral sucker. Uterus joining male duct near anterodorsal portion of acetabulum. Eggs 92 to 111 by 58 to 67 microns.

Excretory vesicle terminating anteriorly at posterior edge of rear testis. Excretory pore subdorsal. Lymphatic system conspicuous with longitudinal vessels, 3 pairs in 1 specimen, 2 in another, running the length of the body; numerous branches in hindbody.

Discussion: This species differs from all others in *Apocreadium* and *Homalometron* in having a funnel-shaped oral sucker and a more foliate hindbody. The only other unspined *Apocreadium* is *A. longisinosum* Manter, 1937.

Three larger specimens of *A. cryptum* were donated by Dr. Robert Schroeder, who collected them from the pyloric caeca of *Haemulon sciurus* and *H. plumieri* caught near Lower Matecumbe Key, Florida. They differ from smaller individuals by having a more contracted pharynx and a greater number of eggs with a larger mean size, but the largest individual from *H. parrai* also has large eggs. A large specimen has one anomalous caecum which is completely interrupted to form a short branch joining the normal caecum and another portion with two blind ends extending the length of the vitellaria and lacking well-developed epithelium of normal caeca. No evidence of injury or degeneration as the cause of this abnormality was observed.

The name *cryptum* refers to the sometimes secret habitat of this species in a pyloric caecum.

Postporus epinepheli (Manter, 1947) Manter, 1949

Opisthoporus epinepheli Manter, 1947.
Postporus mycteropercae (Manter, 1947) Manter, 1949.

Host: *Mycteroperca bonaci* (1 of 3)*.
Site: Intestine.

Discussion: Siddiqi and Cable (1960: 305) reduced *Postporus mycteropercae* (Manter, 1947) to a synonym of *P. epi-*

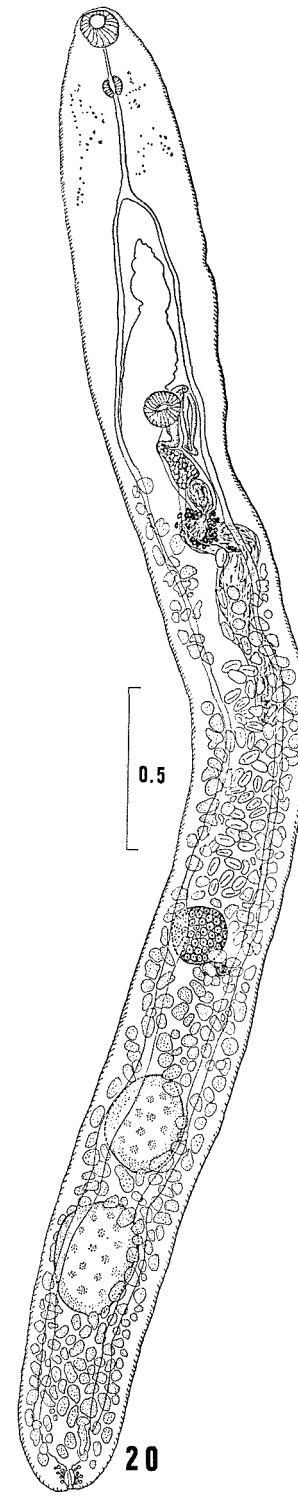

Figure 20. *Neolepidapedon macrum*, holotype, ventral view.

nepheli. My three specimens are 2.8 to 3.1 long, have sucker ratios of 1:0.95 to 1.2 and have the prepharynx longer than the pharynx. They are like *P. mycteropercae,* except that the excretory vesicle reaches the pharyngeal level, thereby supporting the synonymy suggested by Drs. Siddiqi and Cable.

Neolepidapedon **macrum** sp. n.
Figure 20

Host: *Mycteroperca microlepis* (1 of 2), type host.
Site: Intestine.
Holotype: U. S. N. M. Helm. Coll. No. 71305.

Description (based on 1 specimen): Body elongate, 4.7 long by 0.42 wide. Entire cuticle spinose. Eyespot pigment present. Oral sucker slightly subterminal, 0.11 long by 0.12 wide. Acetabulum 0.11 long by 0.12 wide. Sucker ratio 1:1.1. Prepharynx 0.10 long. Pharynx 0.06 long by 0.06 wide. Esophagus 0.30 long. Intestinal bifurcation nearer oral sucker than acetabulum; caeca extending almost to posterior end of body.

Testes tandem, separated, smooth; anterior testis 0.30 long by 0.20 wide; posterior testis 0.35 by 0.25. Posttesticular space 0.54 long. Cirrus sac extending well posterior to acetabulum; containing small, oval, internal seminal vesicle, large conspicuous prostatic vesicle, and cirrus. External seminal vesicle tubular, sinuous, about twice length of cirrus sac. Prostatic cells few, free in parenchyma, mostly surrounding anterior portion of external seminal vesicle. Genital atrium small. Genital pore sinistral near anterolateral border of acetabulum.

Ovary entire, smooth, submedian, 0.19 long by 0.17 wide, anterior to and separated from anterior testis by about length of testis. Seminal receptacle postovarian. Uterus descending slightly posterior to ovary before extending anteriorly. Metraterm not as long as cirrus sac. Vitellaria extending from near posterior portion of cirrus sac to posterior end of body; confluent posterior to testes and between gonads, partially overlapping the gonads and excretory vesicle dorsally. Eggs 63 to 66 by 35 to 41 microns.

Excretory vesicle tubular, ending nearer intestinal bifurcation than acetabulum; sphincter well developed; pore terminal.

Discussion: Five other species of *Neolepidapedon* with an excretory vesicle extending almost to the intestinal bifurcation have been described. This species resembles *N. hypoplectri* Nahhas and Cable, 1964, and *N. mycteropercae* Siddiqi and Cable, 1960. It differs from *N. hypoplectri* in body shape, sucker ratio, number of prostatic cells, position of genital pore, and, probably, length of prepharynx. Nahhas and Cable (1964: 186) examined 55 additional specimens of *N. mycteropercae,* some from *Mycteroperca bonaci,* and discussed variability in the species. This specimen differs from *N. mycteropercae* in position of genital pore, anterior extent of vitellaria, and smaller sucker ratio.

Caballero *et al.* (1955:131-134) described and illustrated what they believed was *Lepidapedon elongatum* (Lebour, 1908) Nicoll, 1915, from a serranid host. If their species actually belongs in *Neolepidapedon* Manter, 1954, a genus erected for species without a membrane enclosing the prostatic cells, then we are probably dealing with the same species. My specimen differs from their description slightly in measurements and by possessing cuticular spines over the entire body, rather than just the anterior portion. Caballero *et al.* discussed the possibility of loss of some spines from their specimens during preparation of the material.

Bianium plicitum (Linton, 1928) Stunkard, 1931

Distomum sp. Linton, 1898 (from *Lagocephalus laevigatus*)—Linton 1905 (from *Syngnathus fuscus, Cynoscion regalis,* and *Sphaeroides maculatus*).
Psilostomum plicitum Linton, 1928.
Bianium concavum Stunkard, 1930.
Bianium adplicitum Manter, 1940.
Diploproctodaeum plicitum (Linton, 1928) Sogandares-Bernal and Hutton, 1959.

Hosts: *Sphaeroides spengleri* (1 of 2); *Sphaeroides testudineus* (4 of 5).
Site: Intestine.

Discussion: Manter (1947:279-281) discussed the variability in small specimens from Tortugas, Florida, medium-sized ones from Beaufort, North Carolina, and large individuals from Woods Hole and the Pa-

cific. My 10 mature specimens substantiate his data, as they also are intermediate as are those from Beaufort. They are 1.0 to 1.8 long with an immature individual reaching 1.2. The vitellaria never extend anterior to the acetabular level, and the acetabulum is larger than the oral sucker, except on the smallest and two immature specimens. This finding conflicts with Manter's suggestion that an increase in the size of the oral sucker may be correlated with an increase in body length.

Sogandares-Bernal and Hutton (1958) reviewed the status of *Bianium* Stunkard, 1930, and considered it a synonym of *Diploproctodaeum* LaRue, 1926. Travassos, Freitas, and Bührnheim (1965) erected *Amarocotyle* as a new genus for the species *A. simonei,* which possesses a small unlobed ovary and lacks an external seminal vesicle and is similar to *B. plicitum,* also from *Sphaeroides testudineus.* The authors separated three previously established species into *Diploproctodaeum* and *Bianium* and five others into *Diploporetta* Strand, 1942, and *Diplocreadium* Park, 1939. They did not include *B. vitellosum* (Sogandares-Bernal and Hutton, 1959) Gupta, 1968, and they accepted *B. lecanocephalum* Pérez Vigueras, 1955, which Sogandares-Bernal and Hutton (1958:566-567) considered a synonym of *D. haustrum* (MacCallum, 1918). Lamothe (1966:150-151) discussed the problem and recognized *B. plicitum, B. holocentri* (Yamaguti, 1942), *D. haustrum, D. cryptosoma* (Ozaki, 1928), *D. hemistroma* Ozaki, 1920, *D. tetraodontis* (Nagaty, 1956), and *D. vitellosum* Sogandares-Bernal and Hutton, 1959. He separated *Bianium* from *Diploproctodaeum* on the basis of including species with a more or less longer esophagus and ventrolateral folds which do not unite beyond the acetabulum. Gupta (1968), unaware of the works by Travassos *et al.* or Lamothe, considered *Diploproctodaeum* monospecific and separated *D. haustrum* from all the species of *Bianium* by the shape of the body, length of esophagus, position of genital pore, shape of ovary, and extent of vitellaria. He placed all the species discussed by Lamothe (except *D. haustrum*), *Diplocreadium koreanum* Park, 1939, and three new species all in the genus *Bianium.* Oshmarin, Mamaev, and Parukhin (1961) described three new related species from *Abalistes stellaris* in the Gulf of Tonkin, erecting a new genus for *Sphincteristomum acollum.* After considering their descriptions of the two new species of *Diploproctodaeum,* I still accept that genus as monospecific; therefore, *B. longipygum* and *B. macracetabulum* become new combinations.

All authors except Yamaguti (1958:134) and Gupta (1968:145) have apparently accepted *Diplocreadium* Park, 1939, until the presence of ani in *D. koreanum* is established.

I think that in order to better understand the validity of the above genera, additional specimens of *Diploproctodaeum haustrum, Diplocreadium koreanum, Amarocotyle simonei,* and *Sphincteristomum acollum* should be examined.

Bianium vitellosum (Sogandares-Bernal and Hutton, 1959) Gupta, 1968

Diploproctodaeum vitellosum Sogandares-Bernal and Hutton, 1959.

Host: *Chilomycterus schoepfi* (3 of 6)*.
Site: Intestine.

Discussion: Four specimens show considerable variation among themselves and with the description. The ovary is not necessarily sinistral or in contact with the anterior testis. In fact, the testes are diagonal to almost symmetrical, or overlapping medianly. As fixative was applied to one specimen, the testes changed from a tandem to almost symmetrical position. The right testis is consistently more ventral than the left. Contrary to the description by Sogandares-Bernal and Hutton, the cirrus sac in my specimens of *Bianium vitellosum* is not almost in contact with the ovary (as it is in my specimens of *B. plicitum*), and the external seminal vesicle does not overlap the ovary as it consistently does in my individuals of *B. plicitum.* The genital pore is located between the level of the posterior and middle of the pharynx, rather than at the anterior border of the acetabulum. Vitellaria always converge anterior to the acetabulum and usually reach the oral sucker, but extend only to the midpharyngeal level in one specimen.

The body length is 1.9 to 2.2, with sucker ratio of 1:1.0 to 1.2. There are a few delicate cuticular spines, primarily on the anterior portion of the body, and the excretory vesicle apparently extends almost to

the ovary. The ejaculatory duct is not sinuous. In life, *B. vitellosum* is orangeish, with what is normally the posterior portion of the body usually located behind and between the oral sucker and acetabulum, which, along with the anterior body folds, act as the holdfast organ. The free end may take numerous shapes, including elongate and caudate. In one living specimen the ani opened through two terminal protuberances.

Multitestis inconstans (Linton, 1905) Manter, 1931

Distomum inconstans Linton, 1905.

Host: *Chaetodipterus faber* (2 of 2).
Site: Intestine and pyloric caeca.

Crassicutis marina Manter, 1947

Host: *Eucinostomus gula* (1 of 3)*.
Site: Midintestine.

FAMILY OPISTHOLEBETIDAE Fukui, 1929

Pachycreadium crassigulum (Linton, 1910) Manter, 1954

Lebouria crassigula Linton, 1910.
Plagioporus crassigulus (Linton, 1910) Price, 1934.

Host: *Calamus bajonado* (1 of 1).
Site: Midintestine.

FAMILY OPECOELIDAE Ozaki, 1925

Apopodocotyle oscitans (Linton, 1910) Pritchard, 1966

Hamacreadium oscitans Linton, 1910.
Podocotyle breviformis Manter, 1940.
Pseudoplagioporus brevivitellus Siddiqi and Cable, 1960.

Hosts: *Anisotremus virginicus* (2 of 6); *Archosargus rhomboidalis* (2 of 5).
Site: Intestine and pyloric caeca.

Discussion: Pritchard (1966:166-167) erected *Apopodocotyle,* with *A. oscitans* as the type species, to include *Podocotyle*-like species having a postbifurcal, median, or submedian genital pore. The specimens from the intestine of *Anisotremus virginicus* are 0.9 and 1.3 long, whereas three specimens from the pyloric caeca of *Archosargus rhomboidalis* are 2.1 to 2.8 long. One of the large specimens is unusually gravid, with the uterus extending to the posterior end of the body. Partially-collapsed eggs are 49 to 56 by 35 to 40 microns.

Figure 21. *Hamacreadium confusum,* holotype, ventral view.

Hamacreadium mutabile Linton, 1910

Hosts: *Lutjanus griseus* (1 of 3); *Lutjanus synagris* (1 of 7).
Site: Pyloric caeca and stomach.

Hamacreadium **confusum** sp. n.
Figure 21

Hamacreadium mutabile Linton, 1910, of Siddiqi and Cable, 1960 (in part).

Host: *Ocyurus chrysurus* (1 of 5), type host.

Site: Intestine.

Holotype: U. S. N. M. Helm. Coll. No. 71306.

Description (based on 2 mature and 2 immature specimens from Biscayne Bay and Puerto Rico): Body elongate, rounded at both ends, usually with a slight constriction at acetabular level, 1.2 to 2.2 long by 0.45 to 0.71 wide at level of anterior portion of acetabulum; hindbody slightly wider. Oral sucker subterminal, 0.14 to 0.17 long by 0.14 to 0.18 wide. Acetabulum 0.23 to 0.26 long by 0.22 to 0.29 wide, at or near equatorial level. Sucker ratio 1:1.4 to 1.7. Forebody 36 to 44% of body length. Prepharynx 0.02 to 0.05 long. Pharynx 0.06 to 0.12 long by 0.08 to 0.11 wide. Esophagus 0.06 to 0.16 long. Intestinal bifurcation usually nearer oral sucker than acetabulum. Caeca epithelial, terminating near posterior end.

Testes slightly irregular, diagonal, contiguous or separated; left testis anterior, 0.20 to 0.28 long by 0.17 to 0.19 wide; right testis 0.19 to 0.33 by 0.17 to 0.28. Posttesticular space 9 to 13% of body length. Genital pore sinistral, close to or ventral to caecum, about midway between intestinal bifurcation and acetabulum. Cirrus sac arcuate, terminating posteriorly at anterior border of acetabulum; containing large, folded seminal vesicle, short tubular prostatic vesicle, prostatic cells, and short muscular cirrus.

Ovary dextral to median, lobed; usually 6 secondary lobes. Seminal receptacle in contact with ovary. Vitelline follicles extending from midesophageal or postpharyngeal level to posterior end, slightly confluent anteriorly. Uterus preovarian. Eggs thin-shelled, 72 to 85 by 43 to 49 microns.

Excretory vesicle extending to ovarian zone; pore terminal, sphincter present.

Discussion: One specimen with two eggs and one with none, both from *Ocyurus chrysurus* and slightly contracted, were lent by Dr. R. M. Cable and used in the above description. Of the four specimens, the smallest contains two eggs and all have well-developed organs, so the immature specimens are included in the description. All are similar to *Hamacreadium mutabile* and *Cainocreadium gulella* from related hosts. In fact, Siddiqi and Cable (1960:297) identified their specimens as *H. mutabile,* but they differ from that species in that the excretory vesicle extends to the ovarian level only, rather than beyond the acetabulum. Yamaguti (1934:310-311) mentioned the taxonomic importance of the extent of the vesicle in *H. mutabile.* Because *C. gulella* has a median genital pore, Durio and Manter (1968:751) transferred that species from *Hamacreadium* to *Cainocreadium.* The present species is the only one in *Hamacreadium* reported to possess a short excretory vesicle. Of the several species for which the extent of the vesicle is unknown, *H. confusum* is distinguished from *H. diacopae* Nagaty and Abdel Aal, 1962, and *H. leiperi* Gupta, 1956, by the lobated ovary; from *H. balistis* Nagaty and Abdel Aal, 1962 (originally *H. balistesi*), by the uninterrupted vitellaria; and from *H. morgani* Baz, 1946, primarily by the size. The latter is 5.7 to 7.3 long and probably a synonym of *H. mutabile.*

Helicometra torta Linton, 1910

Helicometra pretiosa Bravo-Hollis and Manter, 1957 (new synonym).

Hosts: *Epinephelus adscensionis* (1 of 1)*; *Epinephelus striatus* (1 of 2).

Site: Intestine and pyloric caeca.

Discussion: Three specimens from the pyloric caeca of *Epinephelus striatus* have cirrus sacs that extend near or past the posterior border of the acetabulum, gonads close together, and lobed testes. Specimens from the midintestine of *E. adscensionis* have shorter extending cirrus sacs and rounded, separated testes. The excretory vesicle projects slightly past the ovary, depending on the contraction of the body. Because of the variation among my specimens, in addition to that found by Siddiqi and Cable (1960:300), I consider *Helicometra pretiosa* Bravo-Hollis and Manter, 1957, a synonym of *H. torta.*

Helicometrina execta (Linton, 1910) comb. n.

Helicometra execta Linton, 1910.

Helicometrina parva Manter, 1933 (new synonym).

Helicometrina trachinoti Siddiqi and Cable, 1960 (new synonym).

Hosts: *Anisotremus virginicus* (2 of 6)*; *Bathygobius soporator* (2 of 9); *Blennius cristatus* (1 of 6)*; *Halichoeres bivittatus*

(10 of 11); *Halichoeres pictus* (2 of 2); *Halichoeres radiatus* (7 of 8); *Labrisomus kalisherae* (2 of 2)*; *Trachinotus falcatus* (3 of 6)*.

Site: Rectum and intestine.

Discussion: I believe *Helicometrina parva* Manter, 1933, to be synonymous with *Helicometra execta* Linton, 1910, although *H. execta* is to be transferred to the genus *Helicometrina* as *H. execta* (Linton, 1910). When two testes are present, they are not tandem as they almost always are in species of *Helicometra.* There is intergradation of characters previously used to differentiate the two forms. Collections of 26, 15, and 14 mature specimens from *Halichoeres radiatus, H. bivittatus* and *H. pictus* respectively contain individuals with from none to five testes. Sucker ratios range from 1:1.6 to 2.1, and the acetabulum is situated anywhere from the midlevel to just within the anterior 1/3 of the body. The body ranges from 0.86 to 2.07 in length, and the cirrus sac from pre- to midacetabular in posterior extent. The ovary has three to many lobes, with secondary lobing predominant. The characters originally defined as characterizing *H. parva* are not constant, and Manter (1933a:179) apparently was correct in implying that *H. parva* may be a variation of *H. execta.*

Eleven additional specimens from two *H. bivittatus* and one from *H. pictus* have nine testes, sucker ratios of 1:1.8 to 2.8, and further agree with my individuals of *H. execta* in having few ovarian lobes and the cirrus sac extending to midacetabulum. They also resemble *H. trachinoti* Siddiqi and Cable, 1960. Only worms with 9 testes were in the two *H. bivittatus,* whereas the specimen from *H. pictus* was accompanied by several others with fewer testes.

Five specimens from *Trachinotus falcatus,* four from *Anisotremus virginicus,* and five from *Labrisomus kalisherae* were much like *H. trachinoti* with sucker ratios of 1:1.8 to 2.5. In specimens from all hosts, the location of the genital pore varies among positions anterior, posterior, or directly ventral to the intestinal bifurcation. The cirrus sac may be on either the right or left of the acetabulum and varies in extent from the anterior margin to the midlevel of the acetabulum. There is at least one testis short of the predominant nine in some specimens from *T. falcatus* and *A. virginicus,* and *L. kalisherae* contained individuals with four, seven, eight, and nine testes. Two worms from *Bathygobius soporator* and one from *Blennius cristatus* have nine testes and compare well with others having that number. Thus, from the morphological variation and the low host specificity recorded for *H. execta* (Manter, 1933a:170), I also consider *H. trachinoti* synonymous with *H. execta.*

A few specimens from *Halichoeres radiatus* have poorly-formed eggs.

Helicometrina mirzai Siddiqi and Cable, 1960

Hosts: *Labrisomus nuchipinnis* (1 of 1)*; *Ogcocephalus cubifrons* (1 of 2)*; *Opsanus beta* (3 of 6)*.

Site: Intestine and rectum.

Discussion: Twenty specimens from *Labrisomus nuchipinnis* 1.0 to 1.7 long have nine testes and sucker ratios of 1:1.9 to 2.2. The locations of the genital pore and the acetabulum vary as in *Helicometrina execta,* but most specimens differ from *H. execta* in having a long interruption of vitellaria at the level of the acetabulum. In a few specimens, the interruption is short or unilateral. Four individuals from *Ogcocephalus cubifrons* compare well with those from *L. nuchipinnis.*

I consider some specimens from *Opsanus beta* to be *H. mirzai* and designate others from that host as *H. nimia* because there is extensive secondary lobing of the ovary. Some confusion exists because both *H. mirzai* and *H. nimia* are present in one individual of *O. beta,* and specimens with narrow interruptions of the vitellaria and weak secondary lobing of the ovary are present in another. Additional collections may show the two to be the same species.

Helicometrina nimia Linton, 1910

Helicometrina orientalis Srivastava, 1936.
Helicometrina elongata Noble and Park, 1937.

Hosts: *Lutjanus apodus* (1 of 3); *Lutjanus mahogoni* (1 of 2)*; *Ocyurus chrysurus* (1 of 5); *Opsanus beta* (2 of 6)*; *Scorpaena grandicornis* (1 of 2)*.

Site: Pyloric caeca, intestine, and rectum.

Discussion: Manter (1933a:176) reported

egg measurements for *Helicometrina nimia* from the Tortugas of 40 to 50 by 22 to 30 microns. In the present study, measurements of eggs from individuals from all hosts are 53 to 68 by 25 to 34 microns. An atypical specimen from *Scorpaena grandicornis* is 4.1 long and has only three testes.

Deelman (1960:13) examined several hundred specimens from a single species of host from one locality, and reduced *H. orientalis* and *H. elongata* to synonymy with *H. nimia.*

Manteriella crassa (Manter, 1947) Yamaguti, 1958

Horatrema crassum Manter, 1947.

Host: *Equetus acuminatus* (3 of 3).
Site: Intestine and bile duct.

Discussion: I am following Mehra (1966: 23) and accepting the genus *Manteriella.* One host 9 cm long had six specimens in its bile duct in addition to 14 in its intestine.

The host for *M. crassa* and *Pseudopecoeloides equesi* is the bold-striped island-species of *Equetus* common in the Florida keys. It is commonly referred to as *E. pulcher* and is the species examined by Nahhas and Cable (1964).

Pseudopecoeloides equesi Manter, 1947

Host: *Equetus acuminatus* (3 of 3).
Site: Intestine.

Discussion: The acetabulum may be larger than the oral sucker rather than smaller as described by Manter (1947:291). The cuticle, especially on and near the acetabular stalk and the terminal portion of the body, is ringed with minute striae bearing numerous pointed projections.

Pseudopecoelus scorpaenae (Manter, 1947) comb. n.

Neopecoelus scorpaenae Manter, 1947.

Host: *Scorpaena plumieri* (2 of 4).
Site: Posterior intestine and rectum.

Discussion: Seven wholemounts agree fairly well with the description of *Neopecoelus scorpaenae.* They are 1.3 to 2.0 long by 0.33 to 0.51 wide, sometimes widest at the acetabular level. The forebody is 17 to 21% of body length. The oral sucker is 0.09 to 0.12 long by 0.09 to 0.10 wide and the acetabulum is 0.16 to 0.20 by 0.22 to 0.28, with sucker ratios of 1:2.5 to 2.8. Eggs are partially collapsed and measure 49 to 54 by 30 to 34 microns. The genital pore is usually near the anterior level of the pharynx. The seminal vesicle passes to the left, right, or dorsal to the acetabulum before becoming strongly sinuous posterior to that sucker. Vitellaria extend from the middle of the acetabulum in one specimen, the posterior edge of the acetabulum in others. Temporary folds on the acetabulum of one specimen appear as but are not true papillae. The excretory vesicle extends a short distance anterior to the ovary.

Serial sagittal sections of a specimen did not reveal ani. Manter (1947:294) stated that they "are inconspicuous in preserved specimens but were clearly observed in living specimens." Nahhas and Cable (1964: 195) could not observe ani in either living or preserved material. Their absence places this species in the genus *Pseudopecoelus* where it differs from most species in lacking a lobed ovary. It is very similar, if not identical, to *P. barkeri* Hanson, 1950, from squirrel fishes. The posttesticular space in *P. scorpaenae* is slightly longer. There is apparently much variation in *P. barkeri.* Siddiqi and Cable (1960, Figure 93) illustrated a specimen with a sucker ratio of 1:1.6 and widely-interrupted vitellaria. Nahhas and Cable (1964:196) have specimens that differ from *P. tortugae* seemingly in size of eggs only. *Pseudopecoelus scorpaenae* differs from *P. elongatus* (Yamaguti, 1938) Von Wicklen, 1946, in anterior extent of vitellaria, shape and site of ovary, and size of pharynx; and from *P. manteri* Sogandares-Bernal and Hutton, 1959, in sucker ratio, anterior extent of vitellaria, and, probably, position of testes.

Because *N. scorpaenae* is the type species of *Neopecoelus* Manter, 1947, and I consider it a synonym of *P. scorpaenae, Neopecoelus* becomes a synonym of *Pseudopecoelus* Von Wicklen, 1946, and hence unavailable, requiring the erection of a new genus for *N. holocentri* Manter, 1947.

Apertile gen. n.

Generic diagnosis: Body elongate, aspinose. Acetabulum without papillae. Pharynx large. Each caecum with anus. Testes lobed or not, tandem. Genital pore sinistral, at pharyngeal level. Cirrus sac absent, seminal

vesicle tubular, extending posterior to acetabulum. Ovary lobed or not. Seminal receptacle absent. Uterus preovarian. Metraterm present. Vitellaria from acetabular level to posterior end of body. Excretory vesicle short. Parasitic in intestines of marine fishes. Type species: *Apertile holocentri* (Manter, 1947) comb. n.

Discussion: *Apertile* differs from *Pseudopecoelus* by having separate ani. *Neohelicometra* Siddiqi and Cable, 1960, also has separate ani but differs from *Apertile* primarily in having a funnel-shaped oral sucker, a seminal receptacle, and filamented eggs. The significance of ani in some opecoelids is questionable. Sogandares-Bernal and Hutton (1959c:341) showed that in *Opecoelides fimbriatus* the ability to see ani or a uroproct depends on the contraction of the body.

The name *Apertile* is from *apertum* (opened) and *ile* (intestine), and refers to the ani.

Opegaster **pritchardae** sp. n.
Figure 22

Host: *Bathygobius soporator* (1 of 9), type host.

Site: Rectum.

Holotype: U. S. N. M. Helm. Coll. No. 71307, paratype: No. 71369.

Description (based on 11 wholemounts and 1 sectioned specimen from Biscayne Bay and Florida keys): Body elongate, 1.0 to 1.4 long by 0.32 to 0.47 wide, tapering slightly toward ends, decidedly pointed posteriorly in living specimens; a slight constriction at acetabular level. Oral sucker 0.09 to 0.13 long by 0.09 to 0.15 wide. Acetabulum 0.18 to 0.25 by 0.19 to 0.26, with thickened anterior and posterior lips; papillae lacking. Sucker ratio 1:1.6 to 2.0. Forebody 30 to 38% of body length. Prepharynx short, pharynx 0.06 to 0.08 long by 0.05 to 0.08 wide. Esophagus shorter than, to over twice as long as, pharynx. Intestinal bifurcation usually closer to acetabulum than pharynx. Caeca uniting posteriorly and opening ventrally at an inconspicuous common anus.

Gonads postequatorial. Testes tandem, contiguous, slightly irregular; anterior testis 0.10 to 0.18 long by 0.20 to 0.26 wide; posterior testis 0.13 to 0.23 by 0.16 to 0.23. Posttesticular space 9 to 14% of body length. Genital pore inconspicuous, sinistral, slightly posterior to pharyngeal level. Cirrus sac short, slender; containing reduced prostatic vesicle and cirrus. Seminal vesicle external, saccate, extending to or overlapping acetabulum anteriorly; surrounded by few prostatic cells.

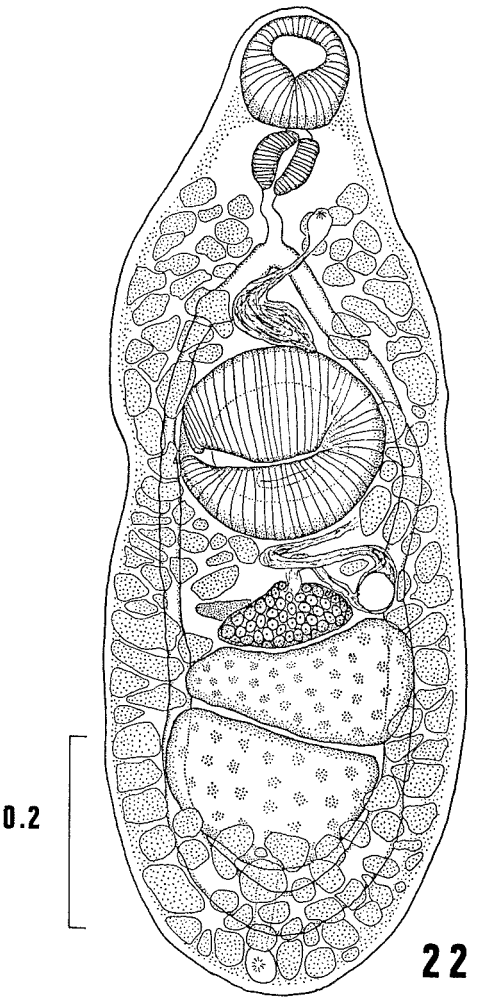

Figure 22. *Opegaster pritchardae*, holotype, ventral view.

Ovary slightly irregular, 0.07 to 0.11 long by 0.11 to 0.20 wide, median or dextral, touching anterior testis. One ovary sinistral rather than dextral, with genital pore in that atypical specimen at midpharyngeal level. Seminal receptacle lacking. Laurer's canal present. Vitellaria from anterior esophageal level to posterior end of body, con-

fluent in forebody and posttesticular space. Metraterm weakly developed, extending to level of acetabulum. Eggs 54 to 64 by 31 to 39 microns.

Excretory vesicle I-shaped, extending to ovarian level. Excretory pore terminal or subterminal.

Discussion: Mr. Richard Heard provided eight mature specimens of *Opegaster pritchardae* which were collected from the intestine of *Bathygobius soporator* at Molasses Key, Florida. They agree in most respects with individuals from Biscayne Bay and are used in the description.

The species differs from all others in the genus *Opegaster* Ozaki, 1928, except *O. caulopsettae* Manter, 1954, by lacking acetabular papillae. The anterior and posterior lips are too large and muscular to be papillae as in many opecoelids and not as muscular as the lips in *Labrifer* Yamaguti, 1936. The caeca in *O. caulopsettae* are described as "seemingly uniting near posterior end of body and opening dorsally through an anus just anterior to the excretory pore near posterior end of body" (Manter, 1954:503). In my specimens the anus is ventral, the gonads are not lobed, the seminal vesicle does not extend past the acetabulum, and the posttesticular space is much shorter. They are most like *O. gobii* Manter, 1954, which has small acetabular papillae which sometimes are not evident (Manter, 1954: 503). *Opegaster pritchardae* is most easily distinguished from that species by the shorter posttesticular space.

This species is named in honor of Mrs. Mary Hanson Pritchard, in recognition of her contributions to the field of trematodology.

Genitocotyle cablei Nahhas and Short, 1965

Host: *Hippocampus erectus* (3 of 4)*.
Site: Intestine.

Discussion: Three specimens from *Hippocampus erectus* are identified as *Genitocotyle cablei* and provide the following measurements which extend the ranges of those in the original description: length, 1.4 to 3.4; width, 0.36 to 0.66; diameter of oral sucker, 0.13 to 0.21; diameter of acetabulum, 0.20 to 0.29; sucker ratio, 1:1.4 to 1.5; forebody, 20 to 29% of body length; pharynx, 0.11 to 0.18 long by 0.10 to 0.16 wide; esophagus longer or shorter than

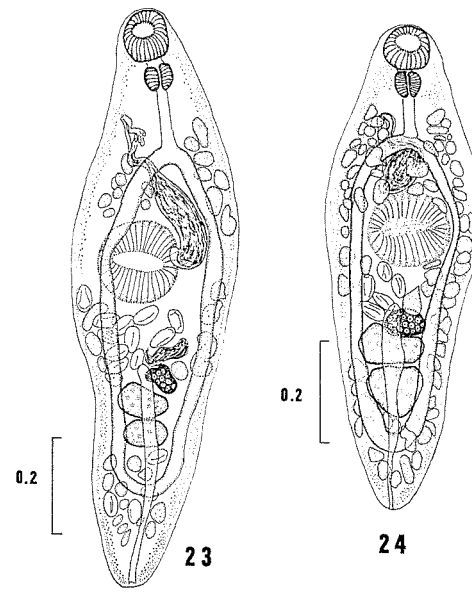

Figure 23. *Nicolla halichoeri*, holotype, dorsal view. Figure 24. *Nicolla halichoeri*, dorsal view.

pharynx. Diameters of anterior testis 0.21 to 0.37, posterior testis 0.19 to 0.45, ovary 0.17 to 0.25. Eggs, 46 to 48 by 19 to 37 microns. The anterior extent of the excretory vesicle is not visible.

Genitocotyle cablei was previously known from *Ancylopsetta quadrocellata* in Apalachee Bay, Gulf of Mexico (Nahhas and Short, 1965:42).

Nicolla **halichoeri** sp. n.
Figures 23 and 24

Hosts: *Halichoeres bivittatus* (3 of 11); *Halichoeres radiatus* (3 of 8), type host.
Site: Intestine.
Holotype: U. S. N. M. Helm. Coll. 71308, paratype: No. 71370.

Description (based on 14 wholemounts and 1 sectioned specimen): Body spindle-shaped, smooth, 0.7 to 1.2 long by 0.25 to 0.32 wide; widest at acetabular level. Oral sucker 0.07 to 0.10 long by 0.07 to 0.10 wide. Acetabulum slightly preequatorial, 0.11 to 0.17 by 0.12 to 0.19. Sucker ratio 1:1.8 to 2.1. Forebody 32 to 38% of body length. Prepharynx usually about ½ as long as pharynx. Pharynx 0.05 to 0.06 long by 0.04 to 0.06 wide. Esophagus 1 to 2 times as long as pharynx. Intestinal bifurcation ap-

proximately midway between acetabulum and pharynx. Caeca united slightly posterior to testes.

Testes smooth to somewhat irregular, tandem, contiguous in all but one atypical specimen with ovary between them; anterior testis 0.05 to 0.10 long by 0.08 to 0.18 wide; posterior testis 0.07 to 0.12 by 0.09 to 0.15. Posttesticular space 18 to 23% of body length. Cirrus sac thin-walled, claviform; touching anterior border of acetabulum dextrally, sinistrally, or medially; containing large saccate seminal vesicle, short cirrus. Prostatic cells few, free in parenchyma. Genital pore sinistral at esophageal level.

Ovary subglobular, 0.03 to 0.07 long by 0.05 to 0.09 wide, either median or dextral, in contact with anterior testis. Seminal receptacle usually indistinct, proximal coils of uterus full of sperm. Laurer's canal present. Vitelline follicles well developed, from esophageal level to near posterior end of body, confluent anteriorly and posteriorly, one or more follicles usually between posterior testis and caecal loop. Uterus may extend posteriorly beyond caecal loop. Eggs partially collapsed, 49 to 62 by 26 to 34 microns.

Excretory vesicle I-shaped, extending to ovarian level; pore terminal.

Discussion: This species is similar to *Nicolla gallica* (Dollfus, 1941) Dollfus, 1959, in length of the body and in extent of the excretory vesicle. It differs from that species in having a uterus which may extend posterior to the ovary. The uterus also extends posteriorly in *N. wisniewskii* (Ślusarski, 1958), although the excretory vesicle in that species extends to near the posterior margin of the rear testis *Nicolla halichoeri* is probably the same as that Nahhas and Cable (1964:198) described and illustrated as *Coitocaecum* sp., in which the uterus extended slightly posterior to the ovary and a seminal receptacle was lacking.

Nicolla sp.
Figure 25

Host: *Halichoeres pictus* (2 of 2).
Site: Intestine.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71309.

Discussion: Five specimens of *Nicolla* sp. 0.7 to 1.2 long by 0.25 to 0.32 wide with a sucker ratio 1:1.8 to 2.1, an esophagus shorter than the pharynx, the rear margin of the posterior testis overlapping the united caeca, and a small prostatic vesicle appear to represent a new species. These specimens, however, may be *N. halichoeri* in an unsatisfactory host-parasite relationship since the vitellaria in three of the specimens are poorly formed and all the specimens are from a different species of wrasse than is *N. halichoeri*. *Nicolla* sp. appears similar to *N. extrema* Travassos, Freitas, and Bührnheim, 1965, in the appearance of the testes. It differs from *N. extrema* in length of the body and in the sucker ratio.

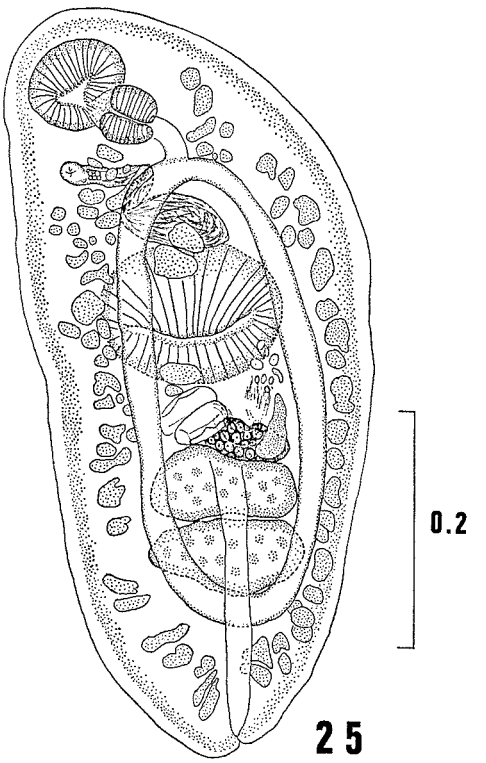

Figure 25. *Nicolla* sp., dorsal view.

FAMILY GORGODERIDAE Looss, 1901

Xystretrum solidum Linton, 1910

"Trematode allied with *Phyllodistomum*" of Linton, 1907.
Xystretrum papillosum Linton, 1910.
Catoptroides aluterae MacCallum, 1917.
Catoptroides magnum MacCallum, 1917.
Macia pulchra Travassos, 1921.

Xystretrum pulchrum (Travassos, 1921) Manter, 1947.

Hosts: *Balistes capriscus* (1 of 4); *Monacanthus hispidus* (1 of 6)*; *Sphaeroides testudineus* (5 of 6).

Site: Urinary bladder.

Discussion: Before Siddiqi and Cable (1960:282-283) reduced *Xystretrum pulchrum* to synonymy with *X. solidum,* the two were separated mainly by a sucker ratio of 1:1.5 or less in *X. pulchrum,* and a ratio of 1:1.5 or more with an abrupt widening of the hindbody in *X. solidum* (Manter, 1947:329-331).

Ten specimens from *Sphaeroides testudineus,* with varying degrees of widening of the hindbody, have sucker ratios of 1:1.1 to 1.8; the lower ratios are from small worms and two of the three with larger ratios are poor preparations. The sucker ratio of seven specimens from *Monacanthus hispidus* is 1:1.3 to 1.6 and 1:1.3 in one worm from *Balistes capriscus.* Manter (1947) reported *X. solidum* from *B. capriscus* and *X. pulchrum* from *Sphaeroides splengeri.*

FAMILY ZOOGONIDAE Odhner, 1911

Diplangus paxillus Linton, 1910

Hosts: *Anisotremus virginicus* (2 of 6); *Haemulon carbonarium* (1 of 1)*; *Haemulon parrai* (5 of 7); *Haemulon sciurus* (3 of 6).

Site: Rectum and posterior intestine.

Discussion: There is much overlap of characteristics of *Diplangus paxillus* and *D. parvus* Manter, 1947. The length of *D. parvus,* 0.46 to 1.05, overlaps that of *D. paxillus,* 0.63 to 1.67. Also, testes may be tandem to diagonal in both species, and the size, shape, and number of coils in the seminal vesicle are not constant in either species. The posterior end of *D. parvus* is usually broadly rounded but may be pointed, whereas the generally pointed posterior end of *D. paxillus* may appear rounded. In both species, vitelline follicles vary in number and are situated between the anterior border of the acetabulum and that of the posterior testis, although they are usually restricted to the acetabular zone in *D. parvus.* The acetabulum in both species is protrusible and usually preequatorial. Extent of the caeca varies between the posterior edge of the acetabulum and the middle of the post-testicular space, with the caeca of *D. parvus* usually shorter. In that species, the excretory vesicle reaches levels ranging from the middle of the posterior testis to the acetabulum. In *D. paxillus,* the vesicle ends near the ovarian level, although Manter (1947, Figure 71) illustrated it as being entirely posttesticular. The eggs of *D. parvus* are 26 to 36 by 13 to 19 microns and those in *D. paxillus* 27 to 39 by 14 to 17 microns.

Diplangus paxillus can be separated from *D. parvus* by having a sucker ratio of 1:1.2 to 1.7, as compared with 1:2.1 to 2.6. Also, *D. paxillus* occurs in the rectum or posterior intestine of the host, and *D. parvus* in or near the pyloric caeca.

Diplangus parvus Manter, 1947

Bilecithaster ovalis Siddiqi and Cable, 1960 (new synonym).

Hosts: *Anisotremus virginicus* (3 of 6)*; *Haemulon carbonarium* (1 of 1); *Haemulon parrai* (2 of 7)*; *Haemulon plumieri* (1 of 5); *Haemulon sciurus* (5 of 6).

Site: Pyloric caeca and anterior intestine.

Discussion: I believe *Bilecithaster ovalis* Siddiqi and Cable, 1960, is a synonym of *Diplangus parvus,* and therefore *Bilecithaster* Siddiqi and Cable, 1960, a synonym of *Diplangus* Linton, 1910. *Bilecithaster ovalis* was apparently placed in the family Hemiuridae because the excretory arms seemed to unite at a level dorsal to the oral sucker. With the exception of that feature, *B. ovalis* fits the description of *D. parvus,* which is found in the same site, within the same host, from Tortugas, Florida, and Jamaica.

Diphtherostomum anisotremi Nahhas and Cable, 1964

Hosts: *Anisotremus virginicus* (4 of 6); *Haemulon plumieri* (3 of 5)*; *Haemulon sciurus* (5 of 6).

Site: Rectum.

Discussion: Nine specimens from the type host, *Anisotremus virginicus*, measure 0.53 to 1.08, have sucker ratios of 1:1.5 to 2.1, with the length of the esophagus three to eight times that of the pharynx, and the cirrus sac three to four times as long as wide. Specimens from *Haemulon sciurus* and *H. plumieri* have the same features except that some have an even larger esophagus-to-pharynx length ratio.

In the original description, *Diphtherostomum anisotremi* was differentiated from *D. americanum* by having an esophagus at least three times as long as the pharynx rather than being about the same length, and a cirrus sac about four times as long as wide instead of the width being ½ to ¾ the length.

Diphtherostomum americanum
Manter, 1947

Hosts: *Archosargus rhomboidalis* (2 of 5)*; *Eupomacentrus leucostictus* (1 of 6)*; *Lagodon rhomboides* (1 of 5).
Site: Rectum and posterior intestine.
Discussion: Sogandares-Bernal and Hutton (1959c:342-343) identified trematodes from *Gobiosoma robustum, Lagodon rhomboides,* and *Opsanus beta* as *D. americanum.* Their illustration shows a short esophagus and a long, thin cirrus sac as do my specimens. In fixed ones, the length of the esophagus is 1.0 to 2.1 times the length of the pharynx; in a living specimen from *Archosargus rhomboidalis* it varied from slightly longer to 3.5 times longer than the pharynx. An egg released from that worm was 54 by 26 microns compared to 30 to 45 by 13 to 17 microns after the specimen was mounted. All my specimens identified as *D. anisotremi* or *D. americanum* have a completely spinose cuticle, an observable seminal receptacle, and variations in the positions of the gonads as reported by Sogandares-Bernal and Hutton (1959c:343). Apparently the only difference between the two species is the length of the variable esophagus. Another closely related, if not identical, species is *D. macrosaccum* Montgomery, 1957, which is completely covered with spines, has a short esophagus, and has a cirrus sac about nine times longer than it is wide. This trematode is found in *Neoclinus uninotatus,* a blenny from California.

Diphtherostomum **albulae** sp. n.
Figure 26

Host: *Albula vulpes* (4 of 7), type host.
Site: Intestine and pyloric caeca.
Holotype: U. S. N. M. Helm. Coll. No. 71310, paratype: No. 71371.
Description (based on 13 specimens, 4 with newly-formed eggs): Body small, plump, tapered at ends, 0.43 to 0.73 long by 0.19 to 0.34 wide. Cuticle completely spinose. Oral sucker terminal or slightly subterminal, 0.08 to 0.10 long by 0.10 to 0.13 wide. Acetabulum weakly developed, without lip-like thickening, 0.08 to 0.11 by 0.08 to 0.11. Sucker ratio 1:0.75 to 0.92. Forebody 38 to 57% of body length. Prepharynx very short. Pharynx 0.03 to 0.04 long by 0.03 to 0.04 wide. Esophagus 2 to 3 times longer than pharynx. Intestinal bifurcation approximately midway between suckers. Caeca short, ending just anterior to or within acetabular zone.

Testes roughly symmetrical, at or slightly anterior to level of acetabulum; left testis 0.08 to 0.12 long by 0.05 to 0.09 wide; right testis 0.09 to 0.13 by 0.05 to 0.10.

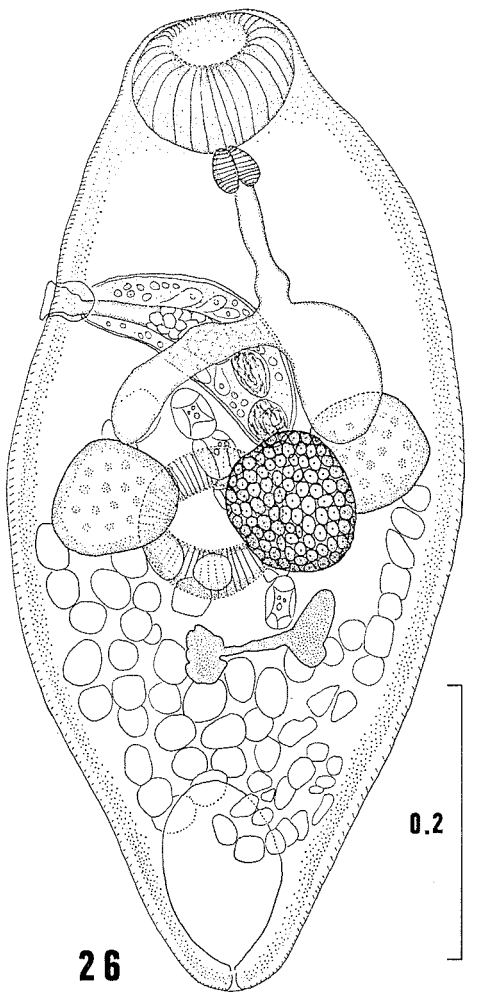

Figure 26. *Diphtherostomum albulae,* holotype, dorsal view.

Genital pore at or near sinistral margin of body, at level of or slightly anterior to intestinal bifurcation. Cirrus sac thick-walled, arcuate to straight, 0.14 to 0.21 long by 0.06 to 0.09 wide, usually ending at anterior border of acetabulum; containing bipartite seminal vesicle, wide prostatic vesicle, prostatic cells, and short, unarmed cirrus.

Ovary smooth, 0.07 to 0.11 long by 0.07 to 0.11 wide, dorsal to acetabulum, at or slightly posterior to level of testes, usually close to right testis. Seminal receptacle not observed. Uterus filling most of body posterior to testes except extreme posterior region. Metraterm weak. Vitellaria 2 small masses near posterior portion of ovary. Eggs extremely thin-shelled, 25 to 42 by 16 to 31 microns, when not compressed.

Excretory vesicle short, saccate. Excretory pore at or near posterior end.

Discussion: This species differs from others in the genus *Diphtherostomum* by lacking thickened acetabular margins and lip-like folds of the body overlapping the acetabulum, and by having an oral sucker larger than the acetabulum. In *D. microacetabulum* Schulman-Albowa, 1952, the suckers are about equal in size, the esophagus is shorter, the cirrus sac has a thinner wall than in *D. albulae,* and an obvious seminal receptacle is present.

Steganoderma nitens
(Linton, 1898) Manter, 1947

Distomum nitens Linton, 1898.
Lecithostaphylus nitens (Linton, 1898) Linton, 1940.
Steganoderma elongatum Manter, 1947.

Host: *Tylosurus crocodilus* (1 of 7)*.
Site: Intestine.

Discussion: Because of overlapping characters, Nahhas and Cable (1964:199) reduced *S. elongatum* to synonymy with *S. nitens*. I find that the position of the ovary varies from midway between the testes and acetabulum to near that sucker, and the genital pore is sometimes almost marginal. In contrast to Nahhas and Cable's specimens, only three of my 48 have vitellaria that do not lie posterior to the testes. In those, the follicles, on one side only, end beyond the midlevel of the testes. The eggs measure 28 to 36 by 16 to 20 microns.

The host, *Tylosurus crocodilus* (Peron and Lesueur), was identified by Mr. F. H. Berry. This fish is separate from, but sometimes identified as, *T. acus*.

FAMILY MONORCHIIDAE Odhner, 1911

Genolopa ampullacea Linton, 1910

Genolopa longicaudata Siddiqi and Cable, 1960.

Hosts: *Anisotremus virginicus* (4 of 6)*; *Haemulon aurolineatum* (5 of 7)*; *Haemulon flavolineatum* (2 of 2); *Haemulon parrai* (7 of 7); *Haemulon plumieri* (3 of 5); *Haemulon sciurus* (6 of 6).
Site: Pyloric caeca and anterior intestine.

Discussion: The considerable range in characteristics of this species has been noted by Manter (1942:351), Nahhas and Cable (1964:201), and others. The eggs are 13 to 20 by 9 to 13 microns and usually smaller than those described by Linton (1910:78) and Manter (1942:351). The atrial spines are up to 49 microns long, the ovary is subglobular to distinctly trilobed, and the oral sucker may be pyriform in shape.

Lasiotocus longovatus
(Hopkins, 1941) Thomas, 1959

Genolopa longovatum Hopkins, 1941.
Proctotrema longovatum (Hopkins, 1941) Manter, 1942.

Hosts: *Anisotremus virginicus* (2 of 6)*; *Haemulon aurolineatum* (1 of 7); *Haemulon parrai* (1 of 7)*; *Haemulon sciurus* (2 of 6); *Orthopristis chrysopterus* (3 of 4).
Site: Pyloric caeca and intestine.

Discussion: There is considerable variation in this species. The caeca may end at the testicular level rather than somewhat past it, the testis may be well removed from the acetabulum, and the cirrus sac often extends beyond the acetabulum. The body is characteristically urn-shaped as originally described but exceptions occur (Nahhas and Cable, 1964:201).

Whether various species of monorchiids should be in the genus *Proctotrema* or *Lasiotocus* has been discussed by Manter and Pritchard (1961:483-484) and Nahhas and Cable (1964:200). I am following Bartoli and Prévot (1966:406) who transferred to the genus *Lasiotocus* all species previously referred to as *Proctotrema* except *P. bacilliovatum.*

Lasiotocus truncatus (Linton, 1910) Thomas, 1959

Genolopa truncatum Linton, 1910.
Proctotrema truncatum (Linton, 1910) Manter, 1940.

Hosts: *Haemulon flavolineatum* (2 of 2); *Haemulon plumieri* (4 of 5); *Haemulon sciurus* (5 of 6).
Site: Pyloric caeca.

Lasiotocus longicaecum (Manter, 1940) Yamaguti, 1954

Proctotrema longicaecum Manter, 1940.

Host: *Anisotremus virginicus* (3 of 6).
Site: Rectum.

Lasiotocus **mugilis** sp. n.
Figures 27, 28, and 29

Host: *Mugil cephalus* (1 of 3), type host.
Site: Intestine.
Holotype: U. S. N. M. Helm. Coll. No. 71311, paratype: No. 71372.

Description (based on 5 wholemounts): Body delicate, 0.8 to 1.3 long by 0.24 to 0.38 wide; forebody narrow; posterior end bluntly rounded. Cuticle spined. Eyespots lacking. Oral sucker weak, usually folded, 0.08 to 0.15 wide. Acetabulum weakly developed, 0.10 to 0.13 long by 0.09 to 0.12 wide. Sucker ratio 1:0.8 to 1.1. Forebody 29 to 34% of body length. Prepharynx shorter or longer than pharynx. Pharynx 0.05 to 0.06 long by 0.05 to 0.06 wide. Esophagus 0.07 to 0.10 long. Intestinal bifurcation usually nearer acetabulum than oral sucker. Caeca terminating near end of body.

Testis slightly irregular, submedian, 0.10 to 0.25 long by 0.08 to 0.12 wide. Posttesticular space 20 to 34% of body length. Cirrus sac large, arcuate, 0.22 to 0.30 long by 0.07 to 0.10 wide, extending near or into gonadal zone; containing ovoid seminal vesicle, well-developed prostatic cells, large saccate cells opening into pars prostatica, long cirrus with thorn-shaped spines 8 to 19 microns long. Genital atrium unspined. Genital pore median or submedian, anterior to acetabulum.

Ovary 0.10 to 0.20 long by 0.07 to 0.14 wide, lobed or unlobed; if lobed, with 3 or 4 lobes; slightly dextral to overlapping testis. Vitelline follicles in compact groups, at gonadal level, intercaecal or overlapping caeca. Terminal organ partially collapsed, not over ½ as long as cirrus sac; anterior portion with spines 16 to 21 microns long, posterior portion unspined. Uterus not extending past midposttesticular level, entering terminal organ near junction of spiny and unspined portions. Eggs 11 to 17 by 9 to 10 microns.

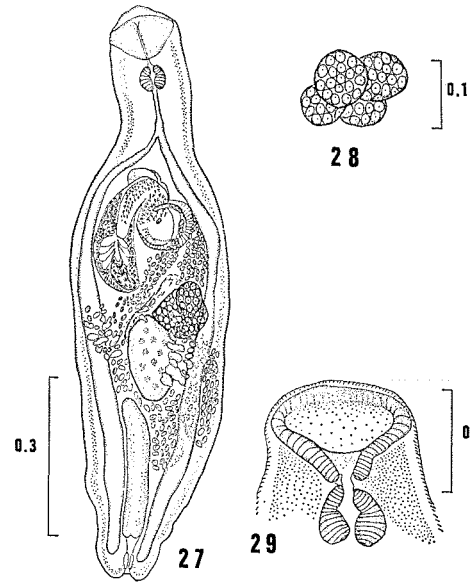

Figure 27. *Lasiotocus mugilis*, holotype, dorsal view. Figure 28. *Lasiotocus mugilis*, ovary from different specimen. Figure 29. *Lasiotocus mugilis*, anterior end.

Excretory vesicle I-shaped, epithelial, extending near or into testicular level; pore terminal.

Discussion: Several species of *Lasiotocus* have caeca extending to near the end of the body and vitellaria at the gonadal level. This species can be differentiated from *L. latus* (Manter, 1942) by body shape and arrangement of gonads; from *L. beauforti* (Hopkins, 1941) by length of excretory vesicle, number of posttesticular uterine coils, and sucker ratio; from *L. longicaecum* Manter, 1940, by body shape and character of oral sucker; from *L. chaetodipteri* Thomas, 1959, by the body shape and amount of posttesticular space; from *L. longovatus* (Hopkins, 1941) and *L. pritchardae* Nahhas and Cable, 1964, by sucker ratio and size of eggs; from *L. malasi* (Nagaty, 1948) by

the site of the vitellaria and length of esophagus and eggs; from *L. himezi* Yamaguti, 1951, *L. odhneri* (Srivastava, 1939), and *L. cacuminata* (Nicoll, 1915) by size of body and eggs and number of posttesticular uterine coils.

Lasiotocus **haemuli** sp. n.
Figure 30

Hosts: *Haemulon plumieri* (2 of 5), type host; *Haemulon sciurus* (2 of 6).
Site: Intestine and pyloric caeca.
Holotype: U. S. N. M. Helm. Coll. No. 71312, paratype: No. 71373.

Description (based on 18 specimens): Body elongate, 0.49 to 0.93 long by 0.16 to 0.22 wide, usually widest at midbody; posterior end pointed or rounded; usually a constriction immediately posterior to level of oral sucker. Cuticle completely spinose. Eyespots absent. Oral sucker terminal, funnel-shaped, 0.11 to 0.17 long by 0.10 to 0.15 wide. Acetabulum weakly developed, 0.05 to 0.06 long by 0.05 to 0.07 wide. Sucker ratio 1:0.4 to 0.6. Forebody 29 to 48% of body length. Prepharynx shorter than pharynx. Esophagus usually shorter than pharynx. Intestinal bifurcation a short distance anterior to acetabulum. Caeca terminating beyond middle of posttesticular space.

Testis slightly irregular, 0.07 to 0.13 long by 0.05 to 0.10 wide. Posttesticular space 17 to 35% of body length. Cirrus sac arcuate, 0.11 to 0.18 long by 0.03 to 0.05 wide, extending around left or dorsal of acetabulum to or near ovarian level; containing large ovoid seminal vesicle, prostatic cells, saccate cells opening into pars prostatica, cirrus with thorn-shaped spines 4 to 5 microns long. Genital atrium short, unspined. Genital pore anterior to acetabulum, sometimes ventral to intestinal bifurcation.

Ovary varying from slightly irregular to triangular, never dextral, and occasionally sinistral to median line through testis, 0.05 to 0.10 long by 0.05 to 0.09 wide. Seminal receptacle absent. Vitelline follicles in lateral groups, 8 to 10 on each side, between levels of acetabulum and ovary. Terminal organ 0.05 to 0.10 long by 0.03 to 0.05 wide, 30 to 90% length of the cirrus sac; proximal vesicle unspined; anterior portion with spines 5 microns long. Uterus may or may not extend past caecal termination, entering terminal organ at junction of spiny and unspined portions. Eggs 17 to 24 by 11 to 13 microns.

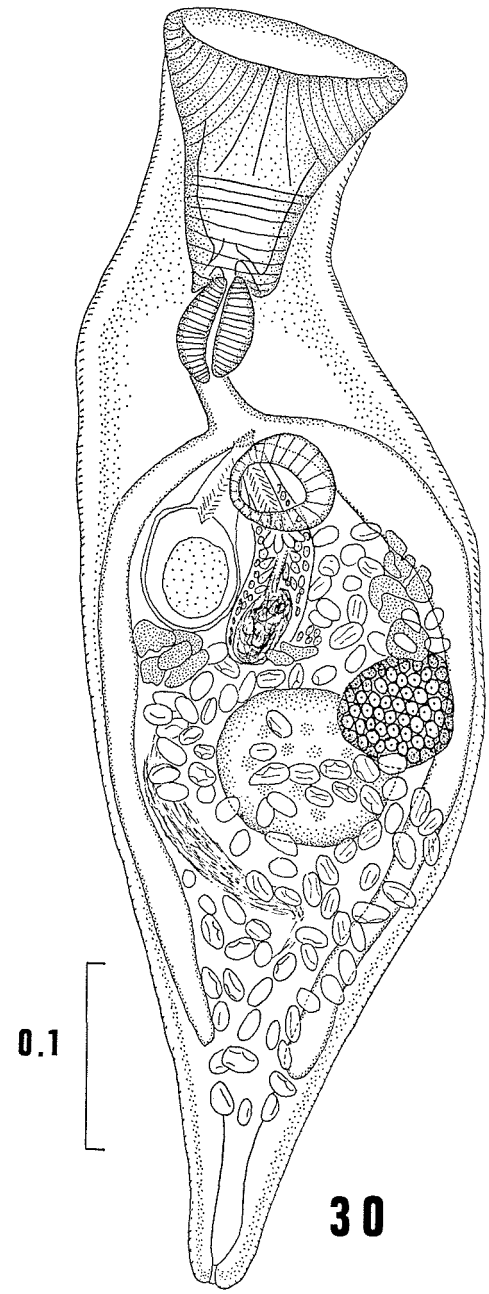

Figure 30. *Lasiotocus haemuli*, holotype, ventral view.

Excretory vesicle short, usually extending to level of caecal termination; pore terminal.

Discussion: *Lasiotocus haemuli* is found with *L. truncatus* and resembles that species but differs from it by having a larger sucker ratio, a non-dextrally located ovary, and a larger pharynx compared with the width of the neck. *Lasiotocus haemuli* differs from *L. longovatus* in the arrangement of the gonads and size and shape of eggs. *Lasiotocus beauforti* and *L. longicaecum* differ from *L. haemuli* in that they are longer; also, *L. beauforti* has a longer genital atrium and *L. longicaecum* has longer caeca and a different position of the cirrus sac. *Lasiotocus pritchardae* (Nahhas and Cable, 1964) is a larger species with a distinctly lobed, dextrally located ovary.

Lasiotocus **albulae** sp. n.
Figures 31 and 32

Host: *Albula vulpes* (6 of 7), type host.
Site: Intestine and pyloric caeca.
Holotype: U. S. N. M. Helm. Coll. No. 71313, paratype: No. 71374.

Description (based on 15 wholemounts and 3 sectioned specimens): Body elongate, 0.7 to 1.2 long by 0.17 to 0.35 wide, slightly wider at acetabular level; neck region attenuated. An immature individual 1.1 long. Spines on entire cuticle, more numerous on neck region. Eyespots or dispersed pigment granules in pharyngeal to midesophageal region. Oral sucker sometimes slightly tapered posteriorly but not funnel-shaped, 0.06 to 0.09 long by 0.08 to 0.10 wide. Acetabulum weakly developed, 0.07 to 0.12 by 0.08 to 0.12. Sucker ratio 1:1.0 to 1.3. Forebody 32 to 52% of body length. Prepharynx contracted, or elongated up to 0.07 in length. Pharynx 0.05 to 0.06 long by 0.04 to 0.05 wide; widest just postequatorial. Esophagus 2 to 5 times length of pharynx. Intestinal bifurcation anterior to acetabulum. Caeca terminating from level of posterior border of testis to near the end of the body.

Testis elongate, 0.10 to 0.17 long by 0.06 to 0.13 wide, in posterior ⅓ to ¼ of body. Posttesticular space 8 to 21% of body length. Cirrus sac slightly to strongly arcuate, 0.16 to 0.28 long; from midway between acetabulum and ovary and ovary; passing at a level dorsal to acetabulum; containing unipartite seminal vesicle, large sac-

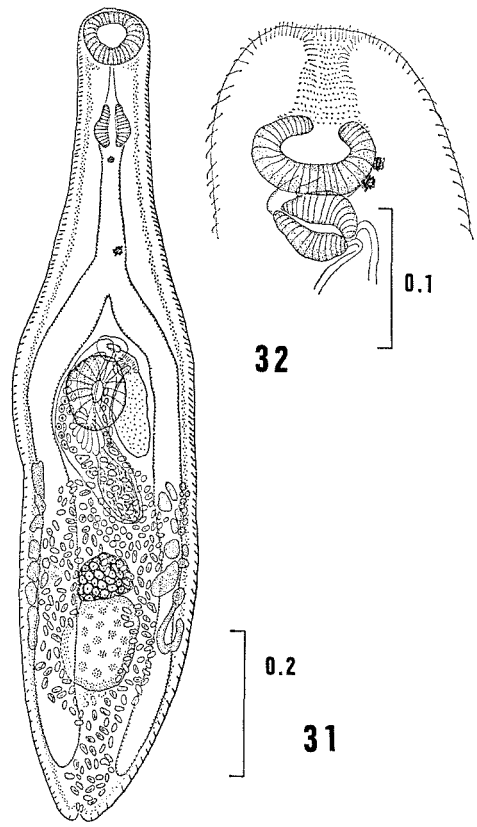

Figure 31. *Lasiotocus albulae*, holotype, ventral view. Figure 32. *Lasiotocus albulae*, withdrawn oral sucker.

cate cells opening into pars prostatica, conspicuous prostatic cells, muscular cirrus with wide-based spines 4 to 5 microns long. Genital pore posterior to caecal bifurcation, median or slightly sinistral. Large, unspined genital atrium.

Ovary subglobular to subtriangular, 0.04 to 0.09 long by 0.05 to 0.10 wide, median to slightly dextral, overlapping anterior edge of testis. Terminal organ well developed, about ¾ as long as cirrus sac; anterior portion with slender spines up to 8 microns long; posterior portion unspined. Vitellaria 8 to 10 large or numerous small follicles on each side, from level of middle or posterior end of cirrus sac to near or beyond posterior border of testis. Many sperm in proximal loops of uterus. Uterus filling body beyond middle or posterior end of cirrus sac; distal portion muscular, entering termi-

nal organ between middle of spiny portion and its junction with unspined portion. Eggs 13 to 17 by 8 to 11 microns.

Excretory vesicle short, occasionally overlapping testis posteriorly; pore terminal.

Discussion: The body is delicate and may be extended greatly. The anterior portion of the worm may be retracted within the body (Figure 32).

Lasiotocus albulae resembles *L. delicatus* Manter and Pritchard, 1961, in having a long esophagus and an oral sucker that is not funnel-shaped. It is, however, smaller than that species, has extensive vitellaria, and is most easily distinguished from *L. delicatus* by the presence of eyespot pigment.

Postmonorchis orthopristis
Hopkins, 1941

Pristisomum orthopristis (Hopkins, 1941) Yamaguti, 1958.

Hosts: *Anisotremus virginicus* (1 of 6)*; *Haemulon aurolineatum* (4 of 7)*; *Haemulon parrai* (2 of 7)*; *Haemulon plumieri* (3 of 5); *Haemulon sciurus* (3 of 6).

Site: Intestine.

Discussion: Manter and Pritchard (1961: 483-484) discussed the invalidity of the generic name *Pristisomum.*

Variability exists in some characters of my specimens. The vitellaria may be at the level of the testis in addition to being anterior to this zone. The cirrus sac may be almost ½ instead of only ⅓ as long as the body. Hopkins (1941:396-397) did not observe the uterus posterior to the testis in any of 106 specimens, but in a few of mine it fills all the available posttesticular space.

Diplomonorchis leiostomi Hopkins, 1941

Diplomonorchis micropogoni Nahhas and Cable, 1964 (new synonym).

Hosts: *Archosargus rhomboidalis* (3 of 5); *Lagodon rhomboides* (2 of 5); *Orthopristis chrysopterus* (3 of 4).

Site: Pyloric caeca and intestine.

Discussion: Considerable variation exists in this species. The testes and vitellaria may be from equatorial in position to within the posterior half of the body. The uterus may have loops at the bifurcal level on one or both sides, the caeca may or may not extend beyond the testes, the posterior portion of the terminal organ may have a few spines or none, and the seminal vesicle may be spherical, oval, or tear-shaped. In most of my specimens, the testes are located toward the posterior end of the worm, and anterior loops of the uterus occur on both sides of the body. Nahhas and Cable (1964:206-207) distinguished *Diplomonorchis micropogoni* from *D. leiostomi* by short caeca terminating near the posterior margin of the testes and by the extent of the uterus. Since my specimens show intergradation between the two species and the two are from the same or related hosts (also see Corkum, 1966:46-47; Nahhas and Powell, 1965:17; and Sogandares-Bernal and Hutton, 1959b:62), I am reducing *D. micropogoni* Nahhas and Cable, 1964, to synonymy with *D. leiostomi.*

Diplomonorchis sphaerovarium
Nahhas and Cable, 1964

Host: *Ophichthus gomesi* (1 of 1)*.

Site: Intestine.

Specimen deposited: U. S. N. M. Helm. Coll. No. 71314.

Discussion: My specimens differ somewhat from the published description. In some, the gonads are irregularly shaped and in others the ovary has three to four indistinct lobes, suggesting that the species is not as atypical as Nahhas and Cable (1964:209) suspected. The large gland cells in the forebody may extend into the hindbody, and the esophagus is not necessarily shorter than the pharynx. Some mature worms are 0.71 long, although immature worms are often larger. Dr. R. M. Cable lent a slide with 12 immature specimens which revealed spines in the posterior portion of the prepharynx, as in my material. The seminal vesicle in some of my specimens appears indistinctly bipartite. In describing *D. sphaerovarium,* Nahhas and Cable (1964:209) broadened the concept of the genus *Diplomonorchis* so that it differs from *Diplomonorcheides* Thomas, 1959, only in possessing species with a unipartite rather than bipartite seminal vesicle. Because Thomas (1959, Figures 9 and 10) figured the seminal vesicle of *Diplomonorcheides magnacetabulum* as being clearly unipartite, I propose *Diplomonorcheides* as a synonym of *Diplomonorchis,* with *Diplo-*

monorchis magnacetabulum (Thomas, 1959) as a new combination.

Hurleytrema eucinostomi
Manter, 1942

Pseudohurleytrema eucinostomi (Manter, 1942) Yamaguti, 1954.

Host: *Eucinostomus gula* (3 of 3).
Site: Rectum.

Discussion: Eight mature specimens differ slightly from the original description. The eyespots are more anteriorly located than originally described and the caeca may extend almost to the midtesticular level. The ovary is usually distinct and dextral. The testis is elongate, with the width 40 to 80% the length. The specimens are 0.52 to 1.24 long, with an immature specimen 0.50 long. Sucker ratios are 1:0.8 to 1.0, usually 1:0.98. The eggs measure 18 to 27 by 14 to 17 microns. Nahhas and Cable (1964:204) gave measurements of specimens from Jamaica, Curaçao, and Puerto Rico.

Hurleytrema shorti (Nahhas and Powell, 1965) comb. n.

Pseudohurleytrema shorti Nahhas and Powell, 1965.
Pseudohurleytrema ottoi Travassos, Freitas, and Bührnheim, 1965 (new synonym).

Host: *Selene vomer* (2 of 2).
Site: Intestine, pyloric caeca, and stomach.

Discussion: My specimens are extremely gravid. The smallest specimen is 0.46 long. Measurements of the organs are slightly less than those of the original description. The acetabulum is weakly developed and the sucker ratio is 1:1.0 to 1.5. Eggs measure 24 to 30 by 13 to 16 microns, with filaments up to at least 3.5 times the length of the eggshell. The caeca may extend posterior to the vitellaria.

I agree with Manter and Pritchard (1961: 487) that *Pseudohurleytrema* Yamaguti, 1954, is a synonym of *Hurleytrema* Srivastava, 1939, and that *Hurleytrema* be temporarily distinguished from *Hurleytrematoides* Yamaguti, 1954, by including species with a unipartite rather than a bipartite seminal vesicle.

The genus *Hurleytrematoides* accordingly includes *H. chaetodoni* (Manter, 1942), *H. coronatum* Manter and Pritchard, 1961, and *H. curacaensis* Nahhas and Cable, 1964; and the genus *Hurleytrema* includes *H. ovo-*

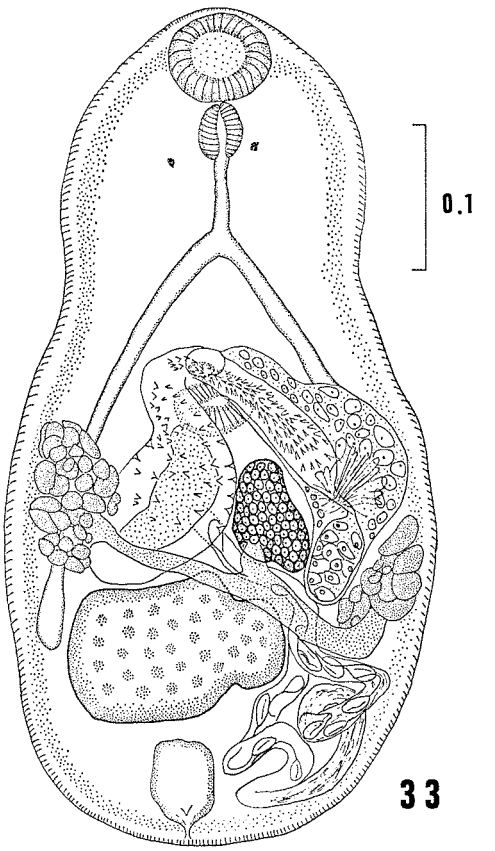

Figure 33. *Hurleytrema pyriforme*, holotype, dorsal view.

caudatum Srivastava, 1939, *H. eucinostomi* Manter, 1942, *H. longitestis* Bravo-Hollis, 1956, *H. trachinoti* Thomas, 1959, *H. malabonensis* (Velasquez, 1961) comb. n., *H. shorti* (Nahhas and Powell, 1965) comb. n., and the new species described next. *Pseudohurleytrema ottoi* Travassos, Freitas, and Bührnheim, 1965, from *Selene vomer* in Brazil and *H. shorti* are the same species. The description of *H. shorti* appeared earlier in 1965 than did that of *P. ottoi*. This synonymy is also recognized by Freitas, Travassos, and Kohn (Freitas, 1968: personal communication).

Hurleytrema **pyriforme** sp. n.
Figure 33

Host: *Trachinotus falcatus* (1 of 6), type host.
Site: Pyloric caeca.

Holotype: U. S. N. M. Helm. Coll. No. 71315, paratype: No. 71375.

Description (based on 5 apparently recently matured specimens): Body pyriform, 0.52 to 0.63 long by 0.28 to 0.33 wide; widest at gonadal level. Cuticle completely spinose. Eyespots at pharyngeal-esophageal level. Oral sucker 0.05 to 0.07 long by 0.07 to 0.08 wide. Acetabulum weakly developed, 0.04 to 0.05 by 0.05 to 0.06. Sucker ratio 1:0.8; 1:0.6 to 0.7 in 6 additional specimens without eggs. Forebody 40 to 48% of body length. Prepharynx 0.01 long. Pharynx 0.04 long by 0.03 to 0.04 wide. Esophagus 0.05 to 0.07 long. Intestinal bifurcation about midway between suckers. Caeca extending almost to or slightly past testis.

Testis single, 0.07 to 0.10 long by 0.15 to 0.18 wide, sinistral, slightly irregular, 0.08 to 0.12 from acetabulum. Cirrus sac large, arcuate, over 0.20 long, extending to testicular level; containing oval seminal vesicle, saccate cells opening into pars prostatica, numerous prostatic cells, cirrus with spines 6 to 11 microns long. Cirrus ½ or more the length of cirrus sac. Genital atrium unarmed. Genital pore immediately anterior to acetabulum, median to slightly sinistral.

Ovary small, longer than wide, swollen at connection with oviduct, dextral and slightly anterior to testis. Seminal receptacle absent; proximal folds of uterus containing sperm. Uterus extending to a level posterior to testis, entering terminal organ near junction of its spiny and unarmed portions. Terminal organ over ¾ as long as cirrus sac; distal portion tubular, heavily spined, anterior portion and sometimes almost all of proximal chamber with spines 5 to 12 microns long with sharp points and wide bases, as spines of cirrus. Vitelline follicles in 2 lateral clusters, between or overlapping acetabulum and testis; may or may not overlap caeca. Vitelline ducts large. Newly-formed eggs 14 to 21 by 11 to 12 microns with filament 2 to 4 times the length of the eggshell.

Excretory vesicle saccate, not reaching testis; collecting ducts sometimes swollen, extending, at least, to vitelline region. Excretory pore terminal to slightly ventral.

Discussion: *Hurleytrema pyriforme* resembles *H. trachinoti* Thomas, 1959, which is found in the same genus of host. It differs from *H. trachinoti* in that the oral sucker is more spherical than funnel-shaped; the oral sucker, acetabulum, and pharynx are half as large; the excretory vesicle does not extend to the testis; and the distance between the acetabulum and testis is greater. Also, the cirrus sac in *H. pyriforme* is larger and contains a unipartite seminal vesicle, the spines in the terminal organ are situated farther posteriorly, and the vitellaria are more compact.

Nahhas and Powell (1965:19) erected the genus *Parahurleytrema* with *P. trachinoti* as type species, characterized by a bipartite seminal vesicle and the uterus entering the terminal organ near the junction of the spiny anterior and unarmed posterior portions. Since the present species, with a unipartite seminal vesicle, shows such a close relationship to *H. trachinoti* and the illustration of the seminal vesicle of *H. trachinoti* by Thomas (1959:106) reveals a rather indistinct bipartite condition, I place *Parahurleytrema* as a synonym of *Hurleytrema*; *P. coronatum* (Manter and Pritchard, 1961) is therefore *Hurleytrematoides coronatum,* as originally described.

FAMILY CRYPTOGONIMIDAE Ciurea, 1933

Siphodera vinaledwardsii (Linton, 1901) Linton, 1910

Monostomum vinaledwardsii Linton, 1901.

Hosts: *Lutjanus mahogoni* (2 of 2)*; *Lutjanus synagris* (5 of 7); *Opsanus beta* (2 of 6).

Site: Intestine and pyloric caeca.

Discussion: The size of eggs in this species is not well documented. It is 17 to 29 by 9 to 12 microns in my specimens.

Metadena globosa (Linton, 1910) Manter, 1947

Stegopa globosa Linton, 1910.

Hosts: *Lutjanus griseus* (1 of 3); *Lutjanus mahogoni* (1 of 2)*; *Lutjanus synagris* (3 of 7)*; *Ocyurus chrysurus* (4 of 5).

Site: Intestine.

Discussion: Manter (1947:333-335) and Hanson (1950:84) used several characters to distinguish *Metadena globosa* from *M. adglobosa.* After studying 27 specimens of *M. globosa* and 12 specimens of *M. adglobosa,* I believe the two may be distinguished best by uterine coils extending an-

terior to the acetabulum in *M. globosa* but not in *M. adglobosa.* The eggs are smaller in my specimens of *M. globosa*: 10 to 13 by 7 to 10 compared to 16 to 23 by 8 to 11 microns, although Manter (1947:334) reported 14 to 15 by 8 to 9 microns for *M. globosa,* and Hanson (1950:84) 10 to 27 by 7 to 12 microns for eggs of *M. adglobosa.* The body is usually more elongate in *M. adglobosa.* The diameter of the oral sucker in *M. globosa* is not always more than half the body width. The percentage is 34 to 55% compared to 35 to 45% in *M. adglobosa.* The sucker ratios are 1:0.20 to 0.51 compared to 1:0.27 to 0.32 in *M. adglobosa.* The seminal vesicle may also occasionally have coils anterior to the acetabulum in *M. globosa;* and even though the pharynx is relatively larger in *M. globosa,* it is approximately the size of the acetabulum in both species. The caeca may extend to the posterior end in both species. Several specimens of *M. globosa* have small, narrow, nondescript, cuticular appendage-like structures on the lateral and posterior margins of the body which contain cytoplasm. These processes were present on the trematodes when removed from the host and are not artifacts.

Metadena adglobosa Manter, 1947

Hosts: *Lutjanus apodus* (2 of 3); *Lutjanus griseus* (2 of 3).
Site: Pyloric caeca.

Metadena sp.

Host: *Lutjanus griseus* (1 of 3).
Site: Pyloric caeca.

Discussion: Specimens from a single *Lutjanus griseus* are similar to *Metadena adglobosa,* except they have a large, heavily-spined ventrogenital pouch. I consider these to be a new species which is described by Schroeder (in press) from the same host near Lower Matecumbe Key, Florida.

Paracryptogonimus americanus Manter, 1940

Paracryptogonimus neoamericanus Siddiqi and Cable, 1960.

Host: *Ocyurus chrysurus* (4 of 5).
Site: Intestine and pyloric caeca.

Discussion: Siddiqi and Cable (1960: 280-281) distinguished *Paracryptogonimus neoamericanus* from *P. americanus* by its smaller size, 0.64 to 0.88, compared to 2.31 to 2.38, excluding a single specimen of 1.0; fewer oral spines, 46 to 51, compared to 52 to 57; terminal oral sucker; and smaller eggs, 16 to 18 by 10 to 15, compared to 20 to 25 by 9 to 10 microns. Dr. Robert Schroeder lent 19 specimens of *P. americanus* from *Lutjanus griseus* and two from *Ocyurus chrysurus,* collected near Lower Matecumbe Key, Florida, to compare with my nine from *O. chrysurus.* Mature specimens from *L. griseus* are from 0.60 to 2.32 long, have 43 to 49 oral spines, possess primarily terminal oral suckers, and have eggs 16 to 20 by 9 to 11 microns. My specimens are 0.84 to 1.17 long, have 46 to 54 oral spines, have oral suckers appearing either terminally or subterminally, and have eggs 12 to 23 by 9 to 11 microns, usually 16 to 19 by 9 to 10 microns. Dr. R. M. Cable lent three specimens of *P. neoamericanus* from *O. chrysurus* which are 0.9 to 1.1 long. There are 45 to at least 56 oral spines, and the few noncollapsed well-developed eggs are 16 to 20 by 9 to 10 microns. This overlap between characters of *P. neoamericanus* and *P. americanus* leads me to place the former as a synonym of the latter. Even though not indicated in the description of *P. neoamericanus,* the cuticle is very thick; in fact, over 0.06 in one specimen from *L. griseus.* The cuticle in Dr. Cable's and my specimens is 12 to 25 microns at the thickest portion, in the forebody. The sucker ratios in the individuals from *L. griseus* are 1:0.5 to 0.8 and encompass the ratios of specimens from *O. chrysurus.*

Pearse (1949:36) has previously reported *P. americanus* in *Opsanus tau* from Beaufort, North Carolina.

FAMILY ACANTHOCOLPIDAE Lühe, 1909

Stephanostomum casum (Linton, 1910) McFarlane, 1934

Stephanochasmus casus Linton, 1910.
Lechradena edentula Linton, 1910.

Hosts: *Lutjanus griseus* (2 of 3); *Lutjanus synagris* (2 of 7); *Ocyurus chrysurus* (1 of 5).
Site: Rectum.

Discussion: My specimens agree with the typical example of *Stephanostomum casum* with the exception of the sucker ratio. That

is, they have 36 oral spines; eggs are 61 to 78 microns long; and metraterm and cirrus are both long and spined, with the metraterm a little shorter than the cirrus sac. The sucker ratio is 1:1.3 to 1:2.2, rather than 1:2.4 to 2.7 (Manter, 1967:personal communication), depending on the amount of expansion of the oral sucker. Manter (1947:304-305) questioned the identifications of *S. casum* from the Pacific Ocean.

Stephanostomum tenue (Linton, 1898) Martin, 1938

Distomum tenue Linton, 1898.
Distomum tenue tenuissime Linton, 1898.

Hosts: *Lutjanus apodus* (2 of 3)*; *Lutjanus mahogoni* (1 of 2)*; *Trachinotus falcatus* (2 of 6)*.
Site: Near or in rectum.

Discussion: Manter and Van Cleave (1951:328) noted that Linton (1940) might have included more than one species in his description of *Stephanostomum tenue*. The specimens I designate as *S. tenue* have a sucker ratio of 1:1.5, which is apparently typical for the species. The ratio in the specimen from *Lutjanus mahogoni* is 1:1.2, but the oral sucker is expanded. The eggs, however, are not longer than about 72 microns, whereas Linton (1940:57; 1889:536) reported 0.084 by 0.04 and 0.088 by 0.044 for eggs from specimens of *Roccus saxatilus* (= *R. lineatus*), the type host. The vitellaria in the two specimens from *L. apodus* extend to the acetabular level as in Figure 7, Plate LII (Linton, 1898) and vitellaria in the two specimens from *Trachinotus falcatus* and one from *L. mahogoni* do not extend to the acetabulum, as Linton noted later (1940:57) for another worm from *R. saxatilus*. Three specimens have 42 oral spines and a fourth 40 or 42.

Anderson (1965:71) reported *S. tenue* from the kidney of *Pomatomus saltatrix* from Sandy Hook, New Jersey, to Marathon, Florida but did not state whether it was a metacercarial or adult stage.

Stephanostomum sentum (Linton, 1910) Manter, 1947

Stephanochasmus sentus Linton, 1910.
Stephanostomum mediovitellarum Pérez Vigueras, 1955.
Stephanostomum lopezneyrai Pérez Vigueras, 1955.

Hosts: *Calamus bajonado* (1 of 1); *Haemulon carbonarium* (1 of 1)*; *Ogcocephalus cubifrons* (1 of 2)*.
Site: Rectum.

Discussion: Three specimens agree with the diagnosis of *Stephanostomum sentum* by Manter (1947:306-307), but they differ from that given by Sogandares-Bernal (1959:89) in having sucker ratios of 1:1.6, 1:1.7, and 1:1.8, rather than 1:1.0 to 1.3. The specimen from *Ogcocephalus cubifrons* is 2.4 long with eggs 74 to 78 by 39 to 41 microns, which is still larger than *S. minutum* (Looss, 1901) at 1.2 to 1.9 with eggs 47 by 36 microns. Vitellaria are poorly developed anteriorly. In the specimen from *Calamus bajonado,* the anterior testis is not formed, and the posterior one is elongated. The excretory vesicle of this species ends immediately anterior to the posterior testis. Unlike Caballero (1952), Sogandares-Bernal (1959:89) did not consider *S. sentum* a synonym of *S. minutum* because he found immature specimens of *S. sentum* larger than mature *S. minutum* occurring in the same host.

Stephanostomum ditrematis (Yamaguti, 1939) Manter, 1947

Echinostephanus ditrematis Yamaguti, 1939.
Stephanostomum longisomum Manter, 1940.
Stephanostomum filiforme Linton, 1940.
Stephanostomum manteri Pérez Vigueras, 1955.
Stephanostomum cubanum Pérez Vigueras, 1955.

Hosts: *Caranx crysos* (1 of 2); *Caranx hippos* (2 of 3).
Site: Rectum.

Discussion: The number of oral spines varies in my specimens as in those of Manter (1947:308-309). One individual clearly shows the unspined metraterm joining the cirrus sac near the base of the acetabulum. The genital atrium is unspined. Sogandares-Bernal (1959:88-89) discussed possible synonyms of *S. ditrematis*.

Stephanostomum megacephalum Manter, 1940

Host: *Caranx hippos* (2 of 3).
Site: Rectum.

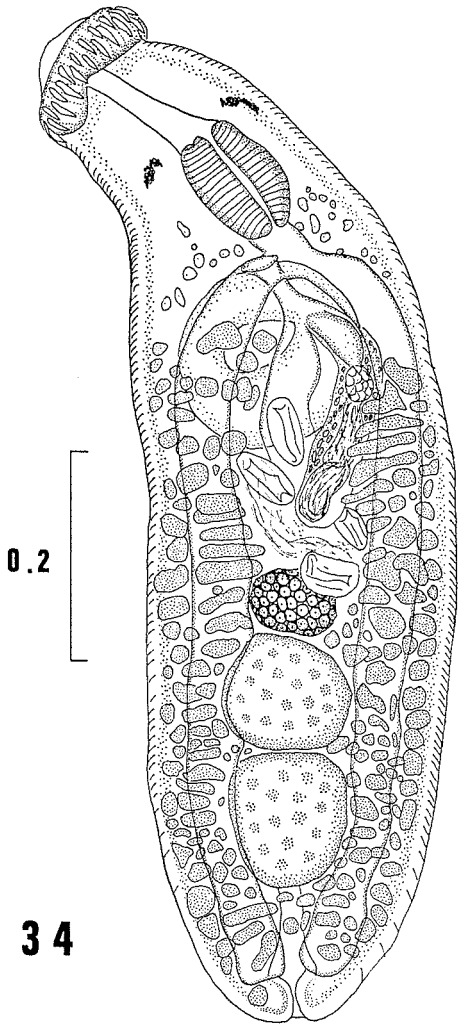

Figure 34. *Stephanostomum* sp., dorsal view, vitelline follicles dorsal and ventral to gonads omitted.

Stephanostomum sp.
Figure 34

Host: *Opsanus beta* (1 of 6).
Site: Intestine.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71317.

Discussion: Linton (1901:468-469) reported *Stephanostomum tenue* from *Opsanus tau* and referred to the original description (Linton, 1898:535-536). His identification probably is incorrect because he considered more than one species as *S. tenue*. The present specimen may well be a new species. It has the following characteristics: Body 1.0 long. Oral sucker 0.13 wide. Acetabulum 0.18 wide. Sucker ratio 1:1.33. Forebody 27% of body length. Apparently 38 oral spines. Prominent eyespots at level of anterior of pharynx. Esophagus about as long as pharynx. Uroproct present. Ovary 0.11 from acetabulum, with cirrus sac extending ⅔ that distance. Prostatic vesicle short. Posttesticular space 12% of body length. Gonads nearly contiguous. Vitellaria extending from midacetabular level to posterior end of body; with follicles not shown in Figure 34 dorsal and ventral to gonads; meeting dorsally between testes, but not between ovary and anterior testis as in *S. dentatum* from flounders (Manter, 1947: 308). Longest collapsed eggs 68 by 31 microns.

Manteria brachydera (Manter, 1940) Caballero, 1950

Dihemistephanus brachyderus Manter, 1940.
Stephanostomum sp. Linton, 1940.
Manteria costalimai Freitas and Kohn, 1964 (new synonym).

Host: *Oligoplites saurus* (2 of 2).
Site: Pyloric caeca.

Discussion: The present material differs from *Manteria brachydera* as described by Manter (1940a:399-400) in the respects given by Siddiqi and Cable (1960:289). The pharynx is 0.05 to 0.07 wide instead of 0.08 to 0.09. Oral spines are smaller and number 38 to 45 rather than 50 to 60, and the vitelline follicles extend farther anteriorly, relative to the seminal vesicle. Bravo-Hollis (1954:234-238) described additional material from the Pacific coast of Mexico which compared well with Manter's material from Ecuador (Manter, 1940a; Caballero, 1950). My specimens are more like the one illustrated by Siddiqi and Cable (1960, Figures 58 to 61) which reveals 32 oral spines and greater extent of vitellaria.

Freitas and Kohn (1964) erected *M. costalimai* for specimens with a wide pharynx and variation in the extent of vitellaria anteriorly. They distinguished it from *M. brachydera* by having fewer oral spines, a slightly larger acetabulum, a smaller posttesticular region, and a longer genital

atrium. Since my specimens show all but the number of oral spines to be integrated characteristics, I agree with Sogandares-Bernal and Hutton (1959a:268-269), who discussed the low number of oral spines in their material from the west coast of Florida and did not feel justified in erecting a new species on that basis. *Manteria costalimai* is therefore considered a synonym of *M. brachydera* with not more than subspecific status.

My specimens do not show the dorsal interruption of the oral spines found in some of Manter's material. Also, the tubular prostatic vesicle is very sinuous, a character not suggested in the illustrations by Siddiqi and Cable, Sogandares-Bernal and Hutton, and Freitas and Kohn. Partially-collapsed eggs measure 63 to 69 by 37 to 41 microns.

FAMILY HEMIURIDAE Lühe, 1901

Aponurus elongatus Siddiqi and Cable, 1960

Host: *Chaetodipterus faber* (1 of 2).
Site: Stomach.

Discussion: Six specimens 0.99 to 1.38 long have forebody 21 to 25% of body length, postovarian space 30 to 35% of body length, oral sucker 0.12 to 0.14 wide, acetabulum 0.26 to 0.28 wide, sucker ratio 1:1.9 to 2.3, and eggs 25 to 32 by 12 to 16 microns. Nahhas and Short (1965:45-46) distinguished this species from *Aponurus laguncula* Looss, 1907, by the larger sucker ratio (1:2.5 compared to 1:1.7 to 2.1), more elongate body, more anterior ventral sucker, greater postovarian space, and longer-than-wide vitellaria. The measurements of eggs in my specimens lie between those given by Siddiqi and Cable and those of Nahhas and Short. The hindbodies are slightly contracted, giving a shorter postovarian space, and the sucker ratio is less than 1:2.5; it is 1:2.7 from the diameters of suckers illustrated in Figure 125 of Siddiqi and Cable (1960). The vitellaria, anterior acetabulum, and postovarian space, however, are still useful in separating *A. elongatus* from *A. laguncula.* This species shows a marked similarity to *A. callionymi* Yamaguti, 1938, *A. rhinoplagusiae* Yamaguti, 1934, and *A. acropomatis* Yamaguti, 1938, all species from Japanese waters. *A. elongatus* differs from them in having slightly smaller eggs and convoluted caeca in unextended specimens. Variation in the size and shape of the seminal receptacle and vitellaria in my specimens suggests caution in appraising these characters.

Parahemiurus merus (Linton, 1910) Woolcock, 1935

Hemiurus merus Linton, 1910.
Parahemiurus parahemiurus Vaz and Pereira, 1930.
Parahemiurus platichthyi Lloyd, 1938.
Parahemiurus atherinae Yamaguti, 1936.
Parahemiurus harengulae Yamaguti, 1938.
Parahemiurus noblei King, 1962.

Hosts: *Caranx crysos* (2 of 2); *Caranx hippos* (1 of 3); *Lagodon rhomboides* (2 of 5); *Sardinella anchovia* (3 of 3).
Site: Stomach.

Discussion: Travassos *et al.* (1967:31-33) gave an extensive synonymy for *Parahemiurus merus.*

Progenetic metacercariae of *P. merus* occur in the coelom of *Sagitta hispida* from Biscayne Bay. I found a 3.2 per cent incidence of infection in 250 specimens of *S. hispida* collected by Mr. Gary Hendrix on 30 November 1967. Two of three infected chaetognaths maintained in separate beakers for 29 days had metacercariae with young eggs in the uterus. The body of the longest metacercaria of *P. merus* is 1.23.

Parahemiurus anchoviae Pereira and Vaz, 1930 Figure 35

Host: *Anchoa lyolepis* (2 of 2)*.
Site: Stomach.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71318.

Description (based on 4 specimens): Body 0.51 to 0.63 long excluding ecsoma; 0.15 to 0.18 in maximum width, at vitelline level; ecsoma short, 0.06 to 0.12 long. Cuticular plications along entire body length. Oral sucker subterminal, 0.03 wide with small papillae about ventral mouth. Ventral sucker 0.07 wide. Sucker ratio 1:2.1 to 2.4. Forebody 16 to 17% of body length. Prepharynx absent. Pharynx spherical to slightly elongate, about 0.025 in diameter. Esophagus short. Caeca terminating near or in ecsoma.

Testes near the middle of the body, tandem to diagonal, in contact or slightly separate. Genital pore ventral, at midlevel of

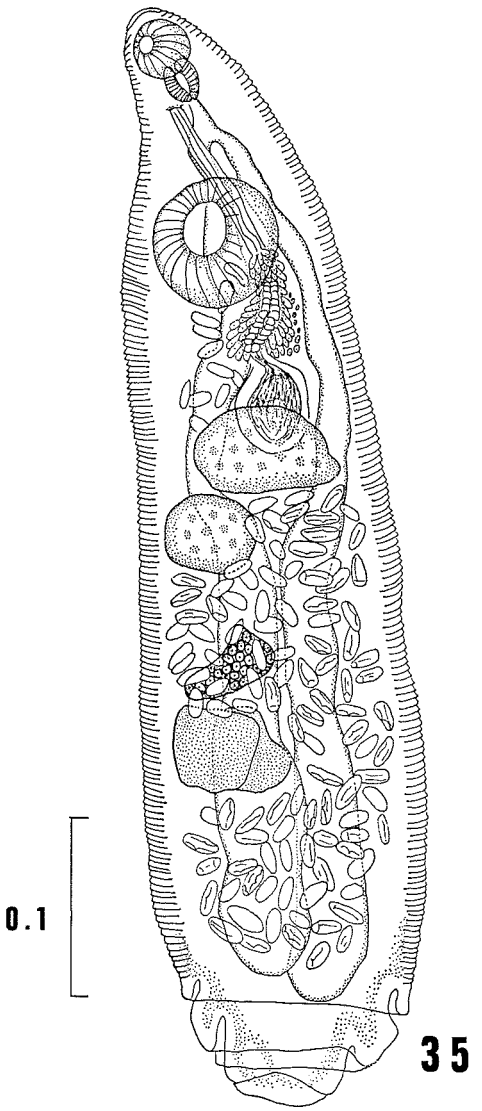

Figure 35. *Parahemiurus anchoviae,* ventral view.

oral sucker, either sinistral or dextral. Seminal vesicle muscular, 0.06 to 0.09 long by 0.04 wide, ending posteriorly in zone of anterior testis. Prostatic vesicle sometimes sinuous, as long as or longer than seminal vesicle, extending anteriorly to near mid-acetabular level, surrounded by numerous prostatic cells. Sinus sac a slender, elongated muscular tube.

Ovary spherical or slightly irregular, separated from testes by more or less than length of a testis. Vitellaria 2 large, compact, slightly irregular masses, immediately postovarian. Postvitelline region 13 to 27% of body length. Uterus extending to or into ecsoma. Eggs 19 to 25 by 9 to 11 microns.

Discussion: The present specimens differ in many respects from the original description (Pereira and Vaz, 1930b:705-706), which lacks an illustration. Their specimens are from the intestine instead of the stomach, are 1.8 rather than 0.6 long, and apparently have a greater relative length of the "pars prostatica." Also, those authors reported the cuticular plications as being more easily distinguished on the posterior ⅔ of the body, the genital pore median, the seminal vesicle not extending to the testes, the posterior extent of the uterus at the beginning of the posterior ⅓ of the body, and newly-formed eggs 28 by 8 microns. They could not determine the termination of the caeca.

Because my specimens are from a related host, host specificity in this group is low, and considerable morphological variation exists, I am not inclined to ascribe specific magnitude to the differences between the present specimens and the original description of *P. anchoviae.* This species was described from *Anchovia olida,* probably a synonym of *Lycengraulis olidus* (Günther, 1874), also from Brazil and in the same family as *Anchoa lyolepis.*

Parahemiurus anchoviae differs from other species with cuticular plications along the entire body. *P. clupeae* Yamaguti, 1953, is much larger and has a long ecsoma; *P. equadori* Manter, 1940, has the oral sucker larger than the acetabulum and an elongated pharynx; and *P. australis* Woolcock, 1935, has a more elongated seminal vesicle. The plications also extend near or to the end of the body in *P. lovelliae* Crowcroft, 1947, in which the seminal vesicle reaches the ovary.

Ectenurus americanus (Manter, 1947) Manter and Pritchard, 1960

Parectenurus americanus Manter, 1947.
Magnacetabulum americanum (Manter, 1947) Yamaguti, 1954.

Host: *Synodus foetens* (3 of 7).
Site: Stomach.

Ectenurus virgulus Linton, 1910

Hosts: *Caranx crysos* (1 of 2)*; *Caranx hippos* (1 of 3).
Site: Stomach.

Sterrhurus musculus Looss, 1907

Sterrhurus laeve (Linton, 1898) of Manter, 1931 (in part).
Sterrhurus floridensis Manter, 1934 (in part).
Brachyphallus musculus (Looss, 1907) Skrjabin and Guschanskaja, 1955.

Hosts: *Achiris lineatus* (1 of 1); *Anisotrema virginicus* (1 of 6)*; *Caranx hippos* (1 of 3)*; *Diplectrum formosum* (3 of 4); *Epinephelus striatus* (1 of 2)*; *Eucinostomus gula* (1 of 3)*; *Haemulon aurolineatum* (1 of 7)*; *Haemulon parrai* (1 of 7)*; *Lutjanus apodus* (1 of 3); *Lutjanus griseus* (2 of 3); *Ogcocephalus cubifrons* (2 of 2); *Orthopristis chrysopterus* (2 of 4); *Paralichthys albigutta* (1 of 1); *Scorpaena plumieri* (1 of 4); *Synodus foetens* (5 of 7).
Site: Stomach; also intestine of *O. cubifrons*.

Lecithochirium parvum Manter, 1947

Sterrhurus floridanus Manter, 1934 (in part).
Brachyphallus parvus (Manter, 1947) Skrjabin and Guschanskaja, 1955.

Hosts: *Archosargus rhomboidalis* (2 of 5)*; *Bathygobius soporator* (3 of 9)*; *Caranx crysos* (1 of 2)*; *Elops saurus* (2 of 3)*; *Eucinostomus gula* (1 of 3)*; *Haemulon flavolineatum* (1 of 2)*; *Lagodon rhomboides* (2 of 5)*; *Lutjanus synagris* (2 of 7)*; *Mycteroperca bonaci* (2 of 3)*; *Mycteroperca microlepis* (1 of 2)*; *Scorpaena grandicornis* (1 of 2)*; *Synodus foetens* (2 of 7).
Site: Stomach.

Discussion: Characteristics vary among specimens. The ecsoma may be extended, with the caeca terminating inside it, the testes may be separated, and the seminal vesicle is not always tripartite. Some specimens have slightly larger eggs and a slightly larger or smaller sucker ratio than described. I usually identify this species by the combination of small size, preacetabular pit, weakly-developed sinus sac, and low number of postovarian coils of the uterus. *Lecithochirium parvum* and *Sterrhurus musculus* should not be placed in the genus *Brachyphallus* Odhner, 1905, because both lack cuticular plications, a diagnostic character of *Brachyphallus*.

Lecithochirium microstomum Chandler, 1935

Sterrhurus monticelli (Linton, 1898) of Manter, 1931 (in part).
Lecithochirium sinaloense Bravo-Hollis, 1956.

Hosts: *Centropomus undecimalis* (2 of 4)*; *Epinephelus striatus* (1 of 2)*; *Lutjanus synagris* (1 of 7)*; *Mycteroperca bonaci* (2 of 3)*; *Oligoplites saurus* (2 of 2)*; *Pomatomus saltatrix* (1 of 1)*; *Synodus foetens* (2 of 7).
Site: Stomach.

Discussion: Several workers (Sogandares-Bernal and Hutton, 1959a:269; Manter and Pritchard, 1960a:94-95, 1960b:175-176; Reid, Coil, and Kuntz, 1965:203) have recently discussed variations and increased ranges of measurements in this species.

Manter (1931:406) reported *Sterrhurus monticelli* from *Pomatomus saltatrix* at Beaufort, North Carolina. In 1947 (:342) he changed the identification to a species of *Lecithochirium,* probably *L. branchialis*. He recently re-examined a specimen and found it to be *L. microstomum* (personal communication, 1968). Examination of specimens of *L. branchialis* (Stunkard and Nigrelli, 1934) may show it to be the same as *L. microstomum*.

Lecithochirium synodi Manter, 1931

Hosts: *Opsanus beta* (2 of 6)*; *Synodus foetens* (3 of 7).
Site: Stomach.

Lecithochirium sp.

Host: *Selene vomer* (1 of 2).
Site: Stomach.

Discussion: Two specimens appear to be *Lecithochirium texanus* (Chandler, 1941) Manter, 1947, although they are 1.9 to 2.1 rather than 3.25 to 3.60 in length. The sucker ratio of both is 1:3.0.

Leurodera decora Linton, 1910

Host: *Haemulon aurolineatum* (1 of 7)*.
Site: Stomach.

Brachadena pyriformis Linton, 1910

Distomum bothryophoron (Olsson, 1868) of Linton, 1901 and 1905 (in part).
Lecithaster anisotremi MacCallum, 1921.
Lecithaster gibbosus (Rudolphi, 1802) of Linton, 1940 (in part).
Aponurus symmetrorchis Siddiqi and Cable, 1960.

Hosts: *Anisotremus virginicus* (2 of 6); *Calamus bajonado* (1 of 1); *Haemulon carbonarium* (1 of 1)*; *Haemulon parrai* (2 of 7).
Site: Stomach.

Myosaccium opisthonemae (Siddiqi and Cable, 1960) comb. n.

Neogenolinea opisthonemae Siddiqi and Cable, 1960.

Host: *Sardinella anchovia* (3 of 3).
Site: Stomach.

Discussion: Twelve specimens ranging from 0.44 to 0.90 long with sucker ratios of 1:1.6 to 1.8 and eggs 21 to 26 by 9 to 11 microns compare well in all respects with what Siddiqi and Cable (1960:313) called *Neogenolinea opisthonemae* except that eggs are smaller than 29 to 32 by 12 to 15 microns. Partially-collapsed eggs measure 21 to 26 by 9 to 11 microns. The cuticular plications extend to the posterior end of the body on small specimens and to about the level of the vitellaria on larger ones. I do not think at this time that enough difference exists to erect a new species.

The genus *Neogenolina* is a synonym of *Myosaccium* Montgomery, 1957. I have examined a paratype of *M. ecaude,* lent by Dr. H. W. Manter, and there is some confusion in the description of *Myosaccium.* The region that Montgomery labels (1957, Figure 28) as the ejaculatory duct is the sinus organ. This is the same organ as in *Erilepturus* Woolcock, 1935, *Dinurus* Looss, 1907, and *Ectenurus* Looss, 1907, and is discussed by Manter (in press). The muscle fibers surrounding the prostatic vesicle are spirally arranged, rather than distinctly longitudinally, and the internal vesicular cells do not reveal nuclei. The specimens from *Sardinella anchovia* do not have filaments or spines on the eggs, although a look at collapsed specimens on a fixed plane strongly suggests their presence. Specimens from *Opisthonema oglinum* lent by Dr. R. M. Cable also do not have filamented eggs. The paratype of *M. ecaude* has collapsed eggs crowded together, and I could not positively distinguish any filaments. Filaments are probably not present on the eggs of this species. These corrections in Montgomery's description remove supposed differences of *Myosaccium* from *Neogenolina.* Kohn and Bührnheim (1964), however, also report *M. ecaude* with filamented and spined eggs. Their specimens were collected from *Sardinella aurita* in Brazil and are 0.65 to 1.04 long with eggs 30 to 41 by 9 to 13 microns. *M. opisthonemae* could well be small or progenetic forms of *M. ecaude.* Study of additional specimens probably can settle this problem.

Opisthadena dimidia Linton, 1910

Opisthadena cortesi Bravo-Hollis, 1966 (new synonym).

Host: *Kyphosus sectatrix* (6 of 6).
Site: Stomach.

Discussion: Bravo-Hollis (1966:144) used six characters to separate *Opisthadena cortesi* Bravo-Hollis, 1966, from *O. dimidia.* I do not find these differences to be valid because of the intergradation discussed below, and consider the two species synonymous. My 18 mounted specimens have sucker ratios of 1:2.3 to 3.4 and diameter-of-pharynx to diameter-of-oral sucker ratios of 1:1.4 to 1.7. The genital pore is usually at a level just below the pharynx, and the sinus sac is along the anterior border of the acetabulum, but if specimens are fixed in certain positions, those features appear to be more anterior or posterior than usually observed. Also depending on fixation, the seminal receptacle may be anterior to the ovary, even with that gonad, or anywhere between. The eggs are 25 to 45 by 12 to 17 microns, some specimens having larger eggs than others.

Dictysarca virens Linton, 1910

Host: *Hippocampus erectus* (2 of 4).
Site: Swim bladder.

Discussion: My two specimens have measurements and ratios which fall between those given by Linton (1910:58-59) and Manter (1947:364-365). A difference, however, is that the ovary is not completely posterior to the vitellaria. One specimen

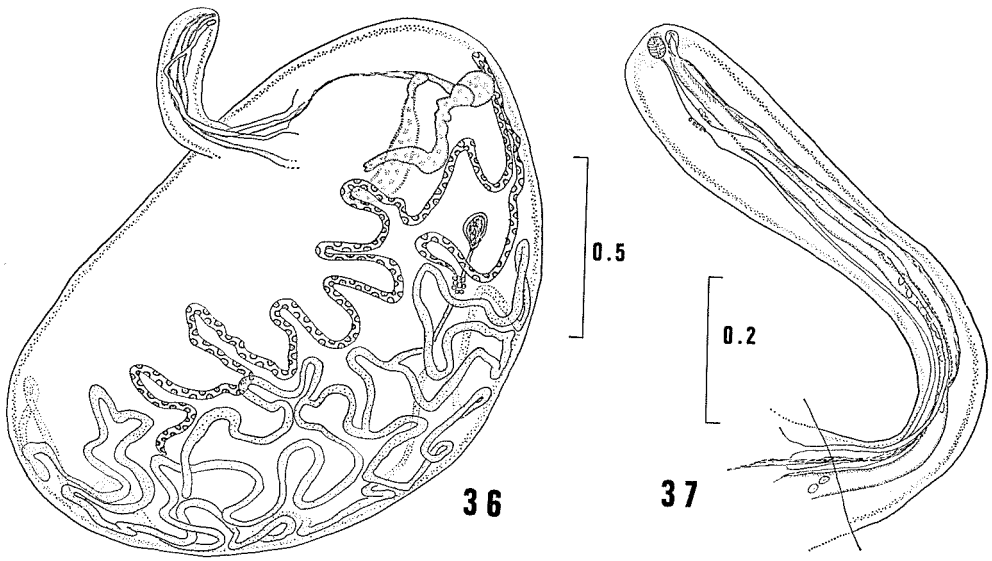

Figure 36. *Didymocystis scomberomori.* Figure 37. *Didymocystis scomberomori,* anterior end.

has one testis only. The eggs measure 24 to 35 by 12 to 19 microns.

Daigger and Lewis (1967:8) reported *Dictysarca virens* in Biscayne Bay from the same host, under its synonym *Hippocampus punctulatus.* The trematode was previously known only from swim bladders of moray eels.

Gonocercella trachinoti (MacCallum, 1913) Yamaguti, 1954

Distomum sp. Linton, 1905 (from *Trachinotus carolinus*).
Distomum trachinoti MacCallum, 1913.
Gonocercella atlantica Manter, 1940.

Host: *Albula vulpes* (2 of 7)*.
Site: Stomach and upper intestine.

Discussion: Of five specimens with developed gonads, the two largest are contracted specimens 2.4 and 2.5 long that have poorly-formed eggs, such as those reported for the type of *Gonocercella pacifica* (Manter, 1940a:437-439). MacCallum (1913:410-411) described *Distomum trachinoti* from *Trachinotus carolinus* from which Linton (1905:367) described *Distomum* sp. Both authors were confused in interpreting the vitellaria. Apparently unaware of MacCallum's paper, Manter (1940a:437-439) erected *G. atlantica* and later (1947:358) separated *G. atlantica* from *G. pacifica* by the presence of more profuse prostatic cells, longer and more coiled seminal vesicle, and shorter eggs (27 compared with 34 microns). My specimens are like *G. atlantica,* except that eggs from the most mature specimens are 49 to 59 by 21 to 29 microns and the testes are symmetrical, as illustrated by Pearse (1949), rather than diagonal. MacCallum, however, described eggs as 0.09 long by 0.03 wide. Numerous gland cells surround the spherical excretory vesicle in my specimens. The study of fully-mature specimens will permit better understanding of the genus. Manter, Pearse, and MacCallum reported *G. trachinoti* from *Monacanthus hispidis*, *Fundulus majalis*, and *Roccus saxatilus* (=*R. lineatus*).

FAMILY SCLERODISTOMATIDAE Dollfus, 1932

Sclerodistomum sphoeroidis Manter, 1947

Hosts: *Chilomycterus schoepfi* (2 of 6); *Sphaeroides testudineus* (1 of 5)*.
Site: Stomach.

Discussion: Three specimens are 4.6 to 6.4 long and have eggs 24 to 31 by 19 to 24 microns. The genital pore is at the pharyngeal level in two specimens and ⅓ the distance from the oral sucker to the acetabulum in the other. Sogandares-Bernal and Hutton (1959b:66) discussed the prob-

able error in some records of sites for species in this genus.

FAMILY DIDYMOZOIDAE Poche, 1907

Didymocystis scomberomori (MacCallum and MacCallum, 1916) Yamaguti, 1954
Figures 36 and 37

Distomum (*Koellikeria*) sp. Linton, 1901.
Koellikeria scomberomori MacCallum and MacCallum, 1916.

Hosts: *Scomberomorus maculatus* (2 of 2); *Scomberomorus regalis* (1 of 2)*.
Site: Encysted in pairs in wall of stomach, intestine, and pyloric caeca.
Specimen deposited: U. S. N. M. Helm. Coll. No. 71319.

Description (based on 24 wholemounts and 1 sectioned cyst): Hermaphroditic, enclosed as pair in globular to subglobular cyst. Hindbody hemispherical to reniform, 0.43 to 1.32 long at median axis by 0.86 to 2.17 wide in wholemounts. Forebody attaching near anterior margin of hindbody, 0.23 to 0.92 long by 0.07 to 0.16 wide; widest at anterior level. Oral sucker replaced by a spherical glandular organ, sometimes overlapping pharynx. Pharynx muscular, 0.021 to 0.035 long by 0.017 to 0.026 wide. Esophagus longer or shorter than ½ width of forebody. Caeca usually narrow in forebody, and vesicular in hindbody.

Testes tubular, paired, near midlevel at side of hindbody; straight, arcuate, or sinuous. Genital pore subterminal or terminal, near pharynx. Vas deferens sinuous or not.

Ovary tubular, either undivided or dividing near seminal receptacle into 2 stems, usually of unequal length, each extending in opposite directions, winding sinuously along lateral and posterior margins of hindbody, without secondary branching. Seminal receptacle saccate, site variable from almost median to midway to lateral margin, near base of hindbody or well interior. Mehlis's gland lateral to receptacle. Vitellaria tubular, slender, sinuous, extending along posterior or dorsolateral margins of hindbody; branching more in some specimens than in others; number of free ends variable; occasionally vitellaria occupying a little more than ½ of posterior margin of hindbody and a branch of ovary occupying the remainder of the margin. Uterus extensive, occupying almost all available space in hindbody. Reservoir apparently present. Eggs slightly reniform, 12 to 15 by 8 to 11 microns, usually 14 by 10 microns.

Discussion: My specimens are apparently of the same species as that reported and illustrated by Linton (1901:447) as *Distomum* (*Koellikeria*) sp. from the same host. Linton gave measurements on length, width, diameter of neck, and eggs from a single specimen. MacCallum and MacCallum (1916:153), not citing Linton's report, gave almost identical measurements for *K. scomberomori* but did not provide a detailed description.

The anterior glandular organ might be the same as the "feebly muscular" oral sucker in *D. submentalis* Yamaguti, 1938. There is a thin membrane around the structure, but the membrane is not muscular.

Discussion

Three hundred and thirty-three individuals comprising 113 species of teleost fishes were examined for digenetic trematodes. Of these fishes, 214 (64.3 per cent), representing 69 species, were parasitized by adult Digenea. This does not imply that the 44 species which were not parasitized are not definitive hosts for Digenea in Biscayne Bay, because they were represented by only 83 individuals, some of which were immature and most of which were small. Immature Digenea which might have been able to attain maturity were present in some of those fishes. Of the 69 species which harbored Digenea, only 36 of the 250 individuals examined did not have adult Digenea. Again, most of these were immature fishes or small species such as *Blennius cristatus* and *Bathygobius soporator*. Nineteen of the 69 species were infected by only one species of Digenea.

Most of the previously-described Digenea from my collection have been reported from waters south of the mainland of Florida. *Bucephaloides bennetti*, *Lepocreadium floridanum*, *Bianium vitellosum*, and *Genitocotyle cablei* have been reported previously from the Gulf of Mexico only. I suspect that these trematodes will be discovered in areas between Miami and where they were reported, when more collections are made. *Didymocystis scomberomori* is known only from the Atlantic in areas north of Florida.

Botulisaccus pisceus and *Pseudocreadium*

scaphosomum have been reported from hosts in the Pacific Ocean only. Not including *Bucephaloides arcuatus* from Pacific barracuda, which is a misidentification, there are 30 species of trematodes in my collection which are also found in hosts from the American Pacific coast. Manter, who first compared the Atlantic and Pacific faunas, listed (1940b and 1947:379) 24 common species. However, with the present knowledge, all but four species of trematodes from Biscayne Bay which are also found in the American Pacific are common to the Tortugas. Of the four, two are from hosts Dr. Manter did not examine.

Only 22 species in my study, including *Vitellibaculum spinosum* and *Lecithochirium microstomum,* have been reported from waters adjacent to the American mainland north of Biscayne Bay. This does not include species described from tropical fishes in the New York Aquarium. Fourteen additional species, however, have been reported from Bermuda. Another 18 species were reported from the Bahama Islands which were not reported from Bermuda. Sogandares-Bernal (1959:108-110) commented on the difference between Bahamian and Bermudian trematode faunas, noting that, from known collections, the Biminian fauna was more similar to the faunas of Tortugas and the American Pacific than to the Bermudian fauna.

The trematode fauna reported from Biscayne Bay seems to be more closely affiliated with the tropical faunas than with the more temperate faunas. Even though some of these trematodes are specific to tropical fishes, several others are from fishes which are present, or whose related species are present, in more northern waters. Undoubtedly, more trematode species will be reported from these and other hosts in the northern waters when parasitologists study additional collections.

The significant findings of this study are the numerous undescribed species, intermediate forms, and new host records from Biscayne Bay. I do not believe that these species or populations are restricted to this area but rather that they indicate how little is known about the Digenea from the Atlantic and Caribbean, areas that are considered to be some of the best studied in the world.

Alphabetical List of Host-Species with the Parasites Found in Each

The first number following the name of the family indicates the number of individuals examined, and the numbers in parentheses indicate the length or range of lengths of the hosts expressed as fork lengths in centimeters.

Abudefduf saxatilis (Linnaeus), sergeant major (Pomacentridae)—2 (9)
none

Acanthurus chirurgus (Bloch), doctorfish (Acanthuridae)—1 (11)
none

Achirus lineatus (Linnaeus), lined sole (Soleidae)—1 (10)
Sterrhurus musculus

Acyrtops beryllinus (Hildebrand & Ginsburg), emerald clingfish (Gobiesocidae)—3 (2)
none

Albula vulpes (Linnaeus), bonefish (Albulidae)—7 (42-65)
Botulisaccus pisceus
Claribulla longula
Diphtherostomum albulae
Gonocercella trachinoti
Lasiotocus albulae

Alutera schoepfi (Walbaum), orange filefish (Balistidae)—1 (9)
none

Anchoa lyolepis (Evermann & Marsh), dusky anchovy (Engraulidae)—2 (7)
Parahemiurus anchoviae

Anisotremus virginicus (Linnaeus), porkfish (Pomadasyidae)—6 (15-20)
Apocreadium cryptum
Apopodocotyle oscitans
Brachadena pyriformis
Diplangus parvus
Diplangus paxillus
Diphtherostomum anisotremi
Genolopa ampullacea
Helicometrina execta
Lasiotocus longicaecum
Lasiotocus longovatus
Postmonorchis orthopristis
Sterrhurus musculus

Apogon maculatus (Poey), flamefish (Apogonidae)—1 (10)
none

Archosargus rhomboidalis (Linnaeus) (= *A. unimaculatus*), sea bream (Sparidae)—5 (19-28)
Apopodocotyle oscitans
Diphtherostomum americanum
Diplomonorchis leiostomi
Lecithochirium parvum
Megasolena hysterospina
Steringotrema corpulentum

Ariosoma impressa (Poey), bandtooth conger (Congridae)—1 (24)
none

Arius felis (Linnaeus) (=*Galeichthys f.*), sea catfish (Ariidae)—2 (28-39)
none

Atherinomorus stipes (Müller and Troschel), hardhead silverside (Atherinidae)—1 (6)
none

Balistes capriscus Gmelin, gray triggerfish

(Balistidae)—4 (20-31)
Apocreadium mexicanum
Neoapocreadium coili
Pseudocreadium lamelliforme
Xystretrum solidum

Bathygobius mystacium Ginsburg (?), island frillfin (Gobiidae)—1 (5)
none

Bathygobius soporator (Valenciennes), frillfin goby (Gobiidae)—9 (5-11)
Helicometrina executa
Lecithochirium parvum
Opegaster pritchardae

Blennius cristatus Linnaeus, molly miller (Blenniidae)—6 (5-11)
Helicometra executa

Blennius marmoreus Poey, seaweed blenny (Blenniidae)—6 (5-7)
none

Calamus bajonado (Bloch & Schneider), jolthead porgy (Sparidae)—1 (28)
Host from ocean side of Sands Key
Brachadena pyriformis
Pachycreadium crassigulum
Proctoeces maculatus
Stephanostomum sentum

Callionymus pauciradiatus Gill, dragonet (Callionymidae)—3 (3)
none

Caranx crysos (Mitchill), blue runner (Carangidae)—2 (20-21)
Bucephalus varicus
Ectenurus virgulus
Lecithochirium parvum
Parahemiurus merus
Stephanostomum ditrematis
Tergestia pectinata

Caranx hippos (Linnaeus), crevalle jack (Carangidae)—3 (30-46)
Bucephalus varicus
Ectenurus virgulus
Parahemiurus merus
Stephanostomum ditrematis
Stephanostomum megacephalum
Sterrhurus musculus

Carapus bermudensis (Jones), pearlfish (Carapidae)—1 (14)
none

Centropomus undecimalis (Bloch), snook (Centropomidae)—4 (50-86)
Lecithochirium microstomum

Chaetodipterus faber (Broussonet), Atlantic spadefish (Ephippidae)—2 (7-22)
Aponurus elongatus
Multitestis inconstans
Vitellibaculum spinosum

Chilomycterus schoepfi (Walbaum), striped burrfish (Diodontidae)—6 (12-17)
Diploproctodaeum vitellosum
Sclerodistomum sphoeroidis

Chriodorus atherinoides Goode & Bean, hardhead halfbeak (Exocoetidae)—1 (17)
none

Citharichthys spilopterus Günther, bay whiff (Bothidae)—3 (9-17)
none

Coryphopterus glaucofraenum Gill, bridled goby (Gobiidae)—4 (6)
none

Coryphopterus thrix Böhlke & Robins, threadfin goby (Gobiidae)—1 (5)
none

Corythoichthys albirostris Heckel, whitenose pipefish (Syngnathidae)—2 (10)
none

Dactyloscopus tridigitatus Gill, sand stargazer (Dactyloscopidae)—2 (4)
none

Diplectrum formosum (Linnaeus), sand perch (Serranidae)—4 (12-22)
Sterrhurus musculus

Diplodus holbrooki (Bean), spottail pinfish (Sparidae)—1 (19)
none

Elops saurus Linnaeus, ladyfish (Elopidae)—3 (36-45)
Lecithochirium parvum

Epinephelus adscensionis (Osbeck), rock hind (Serranidae)—1 (21)
Helicometra torta

Epinephelus striatus (Bloch), Nassau grouper (Serranidae)—2 (33-38)
Helicometra torta
Lecithochirium microstomum
Sterrhurus musculus

Equetus acuminatus (Bloch & Schneider) (= *E. pulcher*), high hat (Sciaenidae)—3 (7-9)
Manteriella crassa
Pseudopecoeloides equesi

Erotelis smaragdus (Valenciennes), emerald sleeper (Eleotridae)—1 (9)
none

Eucinostomus gula (Quoy & Gaimard), silver jenny (Gerridae)—3 (8-10)
Crassicutis marina
Hurleytrema eucinostomi
Lecithochirium parvum
Sterrhurus musculus

Eupomacentrus fuscus (Cuvier) (= *Pomacentrus f.*), dusky damselfish (Pomacentridae)—1 (7)
none

Eupomacentrus leucostictus (Müller & Troschel) (= *Pomacentrus l.*), beaugregory (Pomacentridae)—6 (5-9)
Diphtherostomum americanum

Eupomacentrus variabilis (Castelnau), cocoa damselfish (Pomacentridae)—1 (11)
none

Fistularia tabacaria Linnaeus, cornetfish (Fistulariidae)—1 (19)
none

Floridichthys carpio (Günther), goldspotted killifish (Cyprinodontidae)—8 (4-6)
none

Fundulus similis (Baird & Girard), longnose killifish (Cyprinodontidae)—4 (4-5)
none

Gobiesox strumosus Cope, skilletfish (Gobiesocidae)—1 (2)
none

Gobionellus smaragdus (Valenciennes), emerald goby (Gobiidae)—2 (4)
none

Gobionellus stigmaticus (Poey), marked goby (Gobiidae)—1 (5)
none

Gymnothorax nigromarginatus (Girard), blackedge moray (Muraenidae)—2 (35)
none
Haemulon aurolineatum Cuvier (= *Bathystoma a.*), tomtate (Pomadasyidae)—7 (12-17)
Apocreadium foliatum
Genolopa ampullacea
Lasiotocus longovatus
Leurodera decora
Postmonorchis orthopristis
Sterrhurus musculus
Haemulon carbonarium Poey, Caesar grunt (Pomadasyidae)—1 (21)
Apocreadium foliatum
Brachadena pyriformis
Diplangus parvus
Diplangus paxillus
Stephanostomum sentum
Haemulon flavolineatum (Desmarest), French grunt (Pomadasyidae)—2 (15-16)
Lasiotocus truncatus
Lecithochirium parvum
Genolopa ampullacea
Haemulon parrai (Desmarest), sailors choice (Pomadasyidae)—7 (15-24)
Apocreadium cryptum
Apocreadium foliatum
Brachadena pyriformis
Diplangus parvus
Diplangus paxillus
Genolopa ampullacea
Lasiotocus longovatus
Postmonorchis orthopristis
Sterrhurus musculus
Haemulon plumieri (Lacépède), white grunt (Pomadasyidae)—5 (12-17)
Diphtherostomum anisotremi
Diplangus parvus
Genolopa ampullacea
Lasiotocus haemuli
Lasiotocus truncatus
Postmonorchis orthopristis
Haemulon sciurus (Shaw), bluestriped grunt (Pomadasyidae)—6 (15-19)
Diphtherostomum anisotremi
Diplangus parvus
Diplangus paxillus
Genolopa ampullacea
Infundibulostomum spinatum
Lasiotocus haemuli
Lasiotocus longovatus
Lasiotocus truncatus
Postmonorchis orthopristis
Halichoeres bivittatus (Bloch), slippery dick (Labridae)—11 (14-19)
Helicometrina executa
Nicolla halichoeri
Halichoeres pictus (Poey), painted doncella (Labridae)—2 (19-20)
Helicometrina executa
Nicolla sp.
Halichoeres poeyi (Steindachner), blackear wrasse (Labridae)—1 (12)
none
Halichoeres radiatus (Linnaeus), puddingwife (Labridae)—8 (12-24)
Helicometrina executa
Nicolla halichoeri
Hippocampus erectus Perry (= *H. punctulatus*), spotted seahorse (Syngnathidae)—4 (13-14)
Dictysarca virens
Genitocotyle cablei
Hippocampus zosterae Jordan & Gilbert, dwarf seahorse (Syngnathidae)—1 (6)
none
Histrio histrio (Linnaeus), sargassumfish (Antennariidae)—1 (4)
none
Holacanthus isabelita (Jordan & Rutter), blue angelfish (Chaetodontidae)—1 (12)
Antorchis urna
Kyphosus sectatrix (Linnaeus), Bermuda chub (Kyphosidae)—6 (20-28)
Cadenatella americana
Cadenatella floridae
Deontacylix ovalis
Enenterum aureum
Opisthadena dimidia
Schikhobalotrema kyphosi
Labrisomus kalisherae (Jordan), downy blenny (Clinidae)—2 (8-9)
Helicometrina executa
Labrisomus nuchipinnis (Quoy & Gaimard), hairy blenny (Clinidae)—1 (17)
Helicometrina mirzai
Lactophrys quadricornis (Linnaeus) (= *L. tricornis*), cowfish (Ostraciidae)—3 (14-21)
Dermadena lactophrysi
Megapera sp.
Thysanopharynx elongatus
Lagodon rhomboides (Linnaeus), pinfish (Sparidae)—5 (14-20)
Diphtherostomum americanum
Diplomonorchis leiostomi
Lecithochirium parvum
Lepocreadium floridanum
Parahemiurus merus
Proctoeces lintoni
Steringotrema corpulentum
Lutjanus apodus (Walbaum), schoolmaster (Lutjanidae)—3 (14-22)
Helicometrina nimia
Metadena adglobosa
Stephanostomum tenue
Sterrhurus musculus
Lutjanus griseus (Linnaeus), gray snapper (Lutjanidae)—3 (18-25)
Hamacreadium mutabile
Metadena adglobosa
Metadena globosa
Metadena sp.
Stephanostomum casum
Sterrhurus musculus
Lutjanus mahogoni (Cuvier), mahogany snapper (Lutjanidae)—2 (18-23)
Helicometrina nimia
Metadena globosa
Siphodera vinaledwardsii
Stephanostomum tenue
Lutjanus synagris (Linnaeus), lane snapper (Lutjanidae)—7 (12-22)
Hamacreadium mutabile
Lecithochirium microstomum
Lecithochirium parvum
Metadena globosa

Siphodera vinaledwardsii
Stephanostomum casum

Malacoctenus macropus (Poey), rosy blenny (Clinidae)—1 (5)
none

Monacanthus ciliatus (Mitchill), fringed filefish (Balistidae)—1 (8)
none

Monacanthus hispidus (Linnaeus), planehead filefish (Balistidae)—6 (9-26)
Pseudocreadium scaphosomum
Xystretrum solidum

Mugil cephalus Linnaeus, striped-mullet (Mugilidae)—3 (23-36)
Hymenocotta manteri
Lasiotocus mugilis

Mugil curema Valenciennes, white mullet (Mugilidae)—1 (16)
none

Mycteroperca bonaci (Poey), black grouper (Serranidae)—3 (22-41)
Lecithochirium microstomum
Lecithochirium parvum
Postporus epinepheli
Prosorhynchus pacificus

Mycteroperca microlepis (Goode & Bean), gag (Serranidae)—2 (20-24)
Lecithochirium parvum
Neolepidapedon macrum
Prosorhynchus pacificus

Nicholsina usta (Valenciennes), emerald parrotfish (Scaridae)—3 (18)
Schikhobalotrema sparisoma

Ocyurus chrysurus (Bloch), yellowtail snapper (Lutjanidae)—5 (15-20)
Hamacreadium confusum
Helicometrina nimia
Lepocreadium trulla
Metadena globosa
Paracryptogonimus americanus
Stephanostomum casum

Ogcocephalus cubifrons (Richardson), batfish (Ogcocephalidae)—2 (25-28)
Helicometrina mirzai
Stephanostomum sentum
Sterrhurus musculus

Oligoplites saurus (Bloch & Schneider), leatherjacket (Carangidae)—2 (26-27)
Lecithochirium microstomum
Manteria brachydera

Ophichthus gomesi (Castelnau), shrimp eel (Ophichthidae)—1 (48)
Diplomonorchis sphaerovarium

Opsanus beta (Goode & Bean), gulf toadfish (Batrachoididae)—6 (15-34)
Helicometrina mirzai
Helicometrina nimia
Lecithochirium synodi
Siphodera vinaledwardsii
Stephanostomum sp.

Orthopristis chrysopterus (Linnaeus), pigfish (Pomadasyidae)—4 (12-24)
Diplomonorchis leiostomi
Lasiotocus longovatus
Sterrhurus musculus

Paralichthys albigutta Jordan & Gilbert, gulf flounder (Bothidae)—1 (25)
Bucephaloides bennetti
Sterrhurus musculus

Pomacanthus arcuatus (Linnaeus) (= *P. aureus*), gray angelfish (Chaetodontidae)—4 (20-28)
Antorchis urna
Barisomum erubescens
Cleptodiscus reticulatus
Hexangitrema pomacanthi

Pomacanthus paru (Bloch) (= *P. arcuatus*, in part), French angelfish (Chaetodontidae)—1 (18)
Antorchis urna

Pomatomus saltatrix (Linnaeus), bluefish (Pomatomidae)—1 (46)
Lecithochirium microstomum

Prionotus scitulus Jordan & Gilbert, leopard searobin (Triglidae)—2 (13-23)
none

Pristigenys alta (Gill), short bigeye (Priacanthidae)—1 (6)
none

Sardinella anchovia Valenciennes, Spanish sardine (Clupeidae)—3 (12-13)
Lepocreadium pyriforme
Myosaccium opisthonemae
Parahemiurus merus

Scomberomorus maculatus (Mitchill), Spanish mackerel (Scombridae)—2 (30-35)
Didymocystis scomberomori
Rhipidocotyle adbaculum

Scomberomorus regalis (Bloch), cero (Scombridae)—2 (30-35)
Bucephaloides arcuatus
Didymocystis scomberomori
Rhipidocotyle adbaculum

Scorpaena grandicornis Cuvier, lionfish (Scorpaenidae)—2 (18-23)
Bucephalus scorpaenae
Helicometrina nimia
Lecithochirium parvum

Scorpaena plumieri Bloch, spotted scorpionfish (Scorpaenidae)—4 (21-27)
Bucephalus scorpaenae
Pseudopecoelus scorpaenae
Sterrhurus musculus

Selene vomer (Linnaeus), lookdown (Carangidae)—2 (19-21)
Hurleytrema shorti
Lecithochirium sp.
Tergestia sp.

Sparisoma aurofrenatum (Valenciennes), redband parrotfish (Scaridae)—1 (18)
none

Sphaeroides nephelus (Goode & Bean), southern puffer (Tetraodontidae)—1 (26)
none

Sphaeroides spengleri (Bloch), bandtail puffer (Tetraodontidae)—2 (11-15)
Bianium plicitum

Sphaeroides testudineus (Linnaeus), checkered puffer (Tetraodontidae)—5 (17-25)
Bianium plicitum
Sclerodistomum sphoeroidis
Xystretrum solidum

Sphyraena barracuda (Walbaum), great barracuda (Sphyraenidae)—1 (35)
Claribulla longula

Strongylura timucu (Walbaum), timucu (Belonidae)—3 (40-43)
Schikhobalotrema acutum

Symphurus plagiusa (Linnaeus), blackcheek tonguefish (Cynoglossidae)—1 (15)
none
Syngnathus floridae (Jordan & Gilbert), dusky pipefish (Syngnathidae)—6 (14-19)
none
Syngnathus louisianae Günther, chain pipefish (Syngnathidae)—3 (15-17)
none
Syngnathus scovelli (Evermann & Kendall), gulf pipefish (Syngnathidae)—2 (12)
none
Synodus foetens (Linnaeus), inshore lizardfish (Synodontidae)—7 (13-26)
Ectenurus americanus
Lecithochirium microstomum
Lecithochirium parvum
Lecithochirium synodi
Sterrhurus musculus
Trachinotus carolinus (Linnaeus), pompano (Carangidae)—1 (8)
none
Trachinotus falcatus (Linnaeus), permit (Carangidae)—6 (7-10)
Helicometrina exacta
Hurleytrema pyriforme
Stephanostomum tenue
Tylosurus crocodilus (Peron & Lesueur), houndfish (Belonidae)—1 (91)
Steganoderma nitens

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