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DIGENETIC TREMATODES OF MARINE FISHES FROM THE GULF OF PANAMA AND BIMINI, BRITISH WEST INDIES[1]

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CONTENTS

[1] Studies from the Department of Zoology, University of Nebraska, No. 315.

I. Introduction

This paper is based on collections of trematodes made during the summer of 1956 in the Gulf of Panama and the summer of 1957 at Bimini, British West Indies. The trematode faunas of both these regions are little known. Manter (1940a) reported a few species from Panama, a region later studied by Caballero and colleagues (Caballero, et al, 1952, 1953, 1956). The nearest well studied region to Bimini is the Tortugas, Florida region (Linton, 1910; Manter, 1947).

A total or 484 specimens representing 208 species of fishes were examined. Eighty-eight species of Digenea were collected and studied. These included two new genera, 17 new species, and 29 new host records. Observations were made on the exact location of the trematodes in the digestive tract of the host.

II. The Digenea of the Gulf of Panama and Bimini, B.W.I.

The following account includes almost all of the species of Digenea collected. A few were too immature or too macerated to identify with certainty. A few agreed well with some early descriptions which, however, probably represented more than one species. These specimens will need to be compared with holotypes of the species in question.

The exact location of a trematode along the intestine is indicated as from the pyloric junction; for example, "anterior 1/3 intestine" means within the distance from the pyloric valve to 1/3 the distance to the anus.

All measurements are in millimeters unless otherwise stated.

Holotypes of new species have been deposited in the United States National Museum Helminthological Collection.

All figures, except diagrams, were made with the aid of a camera lucida. Each projected scale has the value indicated in millimeters.

A. *Family ASPIDOGASTRIDAE Poche, 1907*

Lobatostoma ringens (Linton, 1907) Eckmann, 1932

Host.—Calamus bajonado (Bloch & Schneider), jolt-head porgy.

Location.—Rectum.

Locality—W. side (opposite Lerner Laboratory), N. Bimini, B.W.I.

Discussion.—La Rue (1957) considered the non-reproduction by larvae of aspidogastrids sufficient to separate this group from the Digenea. Although Le Rue stated (p. 310) that the Aspidogastrea "belong to a separate class", he apparently intended to follow Faust and Tang (1936) and others in separating them from the subclass Digenea. They are clearly members of the class Trematoda.

Although *Aspidogaster conchicola* has a direct life cycle, (Williams, 1942) and its larvae do not reproduce, there is a possibility that this freshwater species maturing in bivalves may be atypical of the group. Adult aspidogastrids have so many morphological similarities to certain Digenea that they are here retained as a family of Digenea.

B. *Family BUCEPHALIDAE Poche, 1907*

Bucephalus varicus Manter, 1940

Hosts.—Palometa media (Peters), palometa [new host record]; *Caranx crysos* (Mitchill), hard tailed jack [new host record]; *Caranx hippos* (Linn.), common jack; *Caranx latus* Agassiz, horse-eyed jack; *Caranx ruber* (Bloch), skip jack.

Location.—Anterior 1/4 intestine of *P. media;* pyloric ceca and length of entire intestine of *C. latus;* mid-intestine of *C. ruber.*

Locality.—P. media from Taboga Island, Panama Pacific. The other hosts from Bimini, B.W.I.

Discussion.—B. varicus is a common parasite of carangids in the region of the Tropical American Pacific, Tortugas, Florida; Bimini, B.W.I.; the Red Sea, and the Okinawan area. Manter (1955) has already noted faunal similarities of trematodes of these areas.

Prosorhynchus gonoderus Manter, 1940 (Figure 1)

Host.—Epinephelus analogus Gill, *cabrilla pinta* [new host record].

Location.—Intestine.

Locality.—Taboga Island, Panama Pacific [new locality record].

Discussion.—P. gonoderus was named and described from a specimen from a "yellow-

spotted grouper" from the Galapagos Islands by Manter (1940a). Manter found *P. gonoderus* associated with *P. ozakii* Manter, 1934. I have examined paratype specimens of *P. gonoderus* and have found one specimen which agrees almost exactly with my specimen from *Ephinephelus analogus*.

Prosorhynchus ozakii Manter, 1934

Host.—*Epinephelus analyogus* Gill, *cabrilla pinta* [new host record].

Location.—Intestine.

Locality.—Taboga Island, Panama Pacific [new locality record].

Ddiscussion.—*P. ozakii* was originally described from *Epinephelus niveatus* (Cuv. & Val.) at Tortugas, Florida by Manter (1934). Later, Manter (1940a) reported the same species from a "yellow-spotted grouper" in the Galapagos Islands.

Prosorhynchus pacificus Manter, 1940

Host.—*Mycteroperca venenosa venenosa* (Linn.).

Location.—Pyloric ceca.

Locality.—Bimini, B.W.I. [new locality record].

Discussion.—*Mycteroperca v. venenosa* has 13 pyloric ceca. One cecum, which had a surface area of approximately 320 square millimeters, contained 6 *P. pacificus* and 3 immature lepocreadiids. Some ceca had no trematodes. If trematodes were found, there were more than one per cecum.

P. pacificus has been reported from *Mycteroperca olfax* and *M. xenarcha* in the Galapagos Islands by Manter (1940a) and from *M. venenosa* and *M. microlepis* in Tortugas by Manter (1940); and from *Sebastopyr ruberrimus* in Bermuda by Hanson (1950). This record from Bimini, extends the Southeastern range of *P. pacificus* in the Atlantic.

Hanson (1950) considered *P. atlanticus* Manter, 1940 a synonym of *P. pacificus* Manter, 1940.

Dollfustrema **muraenae,** sp. nov.[2]
(Figures 2-5)

Host.—*Gymnothorax vicinus* (Castelnau), brown moray.

Location.—Proximal to pyloric junction in one host and in 3/4 intestine of another.

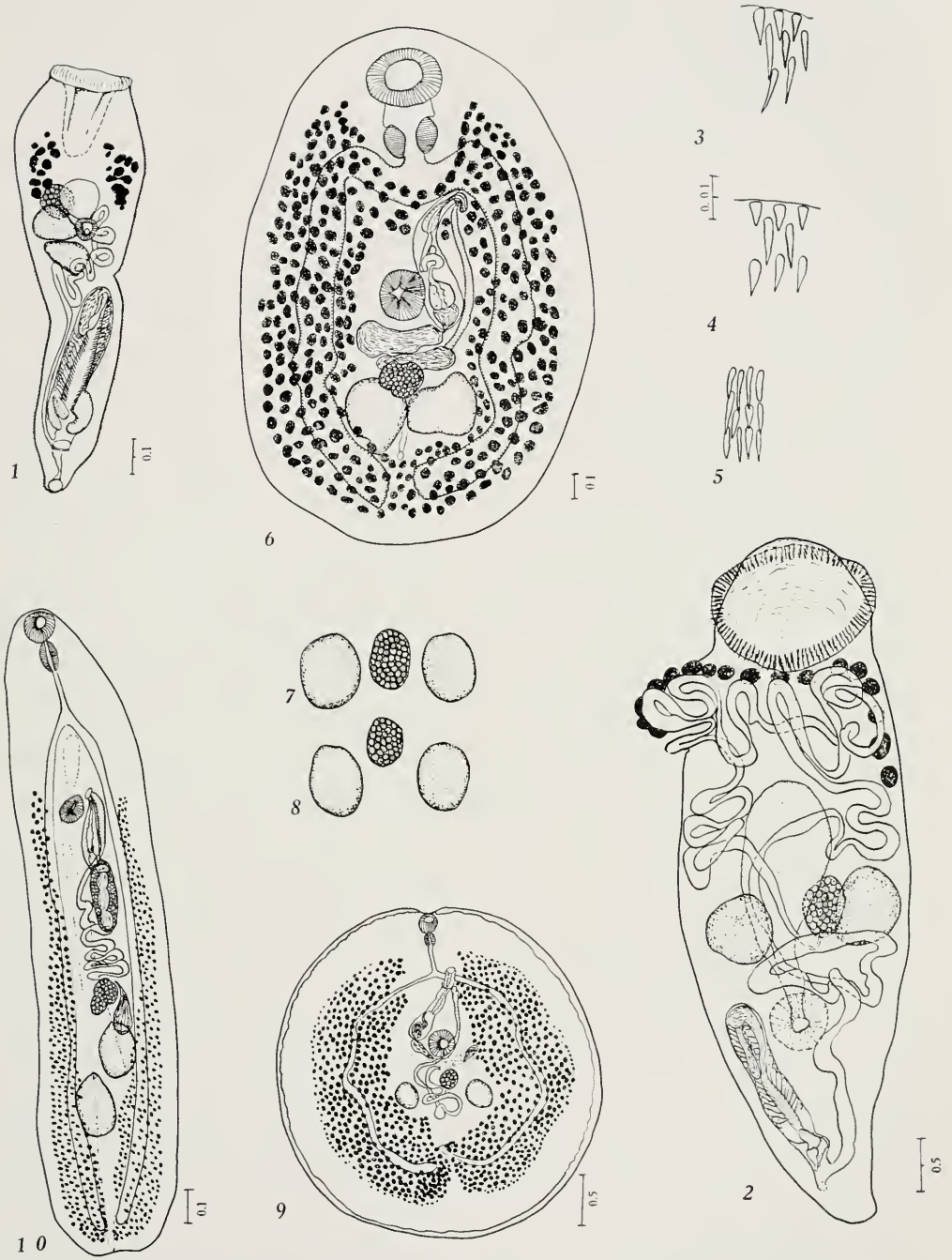
Locality.—N. Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38860.

Diagnosis (based on 2 specimens; 4 specimens lost).—Body completely spined, elongate, rounded at anterior end, tapering to a point posteriorly, 1.273 to 1.35 long by 0.399 to 0.47 wide. Rhynchus terminal, well developed, elliptical in shape, with 3 equatorial rows of spines. Spines difficult to measure due to their position. Dorsal spines in linear arrangement, (fig. 5) approximately equal in length, from 12 to 24 microns long, (fig. 3A). Ventral spines, alternately arranged, (figs 3, 4), unequal in length; anterior spines shortest, from 10 to 11 microns long by 5 microns at their base; middle usually longest, 20 to 22 microns long by 3 microns wide at their base and tapering only very gradually to a point; bottom row of spines approximately 3/4 length and same diameter of spines in middle row. Mouth postequatorial, level with anterior tip of cirrus sac. Pharynx immediately following mouth, globular, 0.101 to 0.114 long by 0.121 to 0.126 wide. Cecum club-shaped, extending from pharynx approximately 2/3 distance to posterior edge of rhynchus. Gonads immediately postequatorial, side by side in a transverse row. Testes spherical, on each side of body, separated by cecum and ovary in one specimen; ovary to right of sinistral testis and cecum, and intertesticular in another specimen. Cirrus sac dextral, in posterior 1/3 body; 0.295 to 0.37 long; internal seminal vesicle with one ascending one one descending loop in anterior half of sac; pars prostatica in posterior half of sac; genital lobe single in a genital atrium which is approximately 1/10 length of cirrus sac; genital pore ventral 0.075 to 0.167 from posterior end of body. Vitellaria follicular, beginning at anterior level of cecum on each side of body, confluent at mid-body immediately posterior to edge of rhynchus. Ovary intertesticular or dextral to right testis, but always at level of testes. Uterus descending posteriorly beyond ovary for a short distance, ascending to fill area between rhynchus and anterior edge of cecum, descending again to end in genital atrium. Eggs 24 to 33 by 19 to 27 microns. Excretory vesicle not observed.

Discussion.—Five species of Dollfustrema Eckmann, 1934 (syn. *Dollfusina* Eckmann,

[2] The name *muraenae* indicates the host which is in the family Muraenidae.



Figures 1-10. **1.** *Prosorhynchus gonoderus* Manter, ventral view. **2.** *Dollfustreama muraenae*, sp. nov., ventral view. **3,4.** *D. muraenae*, portion or rhynchus showing spines, ventral view. **5.** *D. muraenae*, portion of rhynchus showing spines, dorsal view. **6.** *Pseudocreadium biminensis*, sp. nov., ventral view. **7,8.** *Pseudocreadium scaphosomum* Manter, schematic diagrams showing position of ovary between testes. **9.** *Pseudocreadium lamelliforme* (Linton), ventral view. **10.** *Lepidapedon truncatum*, sp. nov., ventral view.

1932) have been named. These species are: *D. californiae* Montgomery, 1957; *D. echinatum* (Komiya & Toyami, 1941) Yamaguti, 1953 (described from its metacercaria); *D. gravidum* Manter, 1940; *D. macracanthum* Hanson, 1950; and *D. vaneyi* (Tseng & Shen, 1930) Eckmann, 1934 (type species).

In *D. californicum*, *D. gravidum*, *D. macracanthum*, and *D. vaneyi*, the testes are tandem, whereas in *D. echinatum* and *D. muraenae*, the testes are side by side. *D. muraenae* differs from *D. echinatum* by having a postequatorial mouth, pharynx opposite anterior edge of cirrus sac, and secum extending only two-thirds distance from pharynx to rhynchus as compared with a preequatorial mouth, pharynx distant from anterior edge of cirrus sac, and cecum almost in contact with rhynchus.

All of the species of *Dollfustrema* reported from the coasts of the American Continent have been from *Gymnothorax*. One record (*D. vaneyi*) from the China coast has been from a fish other than eel. The other record (*D. echinatum*) is of a metacercaria in the muscle of a fish.

Bucephaloides arcuatus (Linton, 1900) Hopkins, 1954

Host.—*Sphyraena barracuda* (Linn.), barracuda.

Location.—Pyloric ceca of 2 hosts and rectum of 1 host (the one with only one trematode).

Locality.—N. shore of S. Bimini [new locality record].

Discussion.—Manter (1940b) discussed the systematic status of this species in detail. The hosts examined in this study were caught over sandy bottom in water no deeper than one fathom. Host stomachs and intestines were either empty or contained only fish remains. *B. arcuatus* has been reported from Woods Hole, Mass., Beaufort, N.C., and Tortugas, Fla. Sparks (1957) reported trematodes from *S. barracuda* collected in the vicinity of Nassau but did not list *B. arcuatus*.

C. *Family PARAMPHISTOMATIDAE Fischroeder, 1901*

Cleptodiscus reticulatus Linton, 1910

Host.—*Pomacanthus aureus* (Bloch), black angelfish.

Location.—Immature specimens in pyloric ceca and mature specimens in rectum.

Locality.—Lerner Fish Pens and N. shore, N. Bimini, B.W.I. [new locality record].

Cleptodiscus kyphosi Sogandares, 1959

Host.—*Kyphosus sectatrix* (Linn.), bermuda club.

Location.—Mid intestine.

Locality.—Bimini, B.W.I.

D. *Family PRONOCEPHALIDAE Looss, 1902*

Barisomum erubescens Linton, 1910

Host.—*Pomacanthus aureus* (Bloch), black angelfish.

Location.—Rectum.

Locality.—N. shore, N. Bimini, B.W.I. [new locality record].

Discussion.—Linton (1910) and Manter (1947) reported *B. erubescens* from different fishes, all in the family Holacanthidae, from Tortugas, Florida. In addition, Linton reported specimens from a parrot fish, perhaps an accidental infection.

E. *Family LEPOCREADIIDAE Nicoll, 1935*

Lepocreadium trulla (Linton, 1907) Linton, 1910)

Hosts.—*Ocyurus chrysurus* (Bloch), yellowtail; *Lutjanus buccanella* (Cuv. & Val.), black-finned snapper [new host record].

Location.—Pyloric ceca and 1/4 intestine of *O. chrysurus* and 1/3 intestine of *L. buccanella*.

Locality.—*O. chrysurus* from Lerner Fish Pens, Bimini and near Cat Cay, B.W.I.; and *L. buccanella* from 1 mi. W. of N. Bimini (20 fathoms), B.W.I.

Discussion.—*L. trulla* has been reported from *O. chrysurus* in Bermuda by Linton (1907) and from the same host by Linton (1910) and Manter (1947) in Tortugas, Florida. Manter noted that Linton's (1910) record of one specimen of *L. trulla* in *Calamus calamus* in Tortugas, probably represents an accidental infection. The specimen of *L. trulla* found in *L. buccanella* from Bimini is also believed to be accidental in this host.

Pseudocreadium **biminensis,** sp. nov.[3] (Figure 6)

Host.—*Balistes capriscus* Gmelin, ocean tally.

[3] The name *biminensis* indicates the type locality.

Location.—1/3 intestine in one host and 1/3 intestine (mature specimen) and 2/3 intestine (immature specimen).

Locality.—W. side of N. Bimini and near Cat Cay, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38861.

Diagnosis (based on 2 mature specimens).—Body elongate elliptical, spined; 1.577 to 2.294 long by 1.007 to 1.596 wide. Forebody 0.779 to 1.003 long. Posterior body 0.608 to 1.007 long. Oral sucker simple, subterminal, 0.208 to 0.281 long by 0.241 to 0.348 wide. Acetabulum equatorial, 0.208 to 0.255 long by 0.174 to 0.214 wide. Sucker ratio 1:0.51 to 0.89. Prepharynx as wide as, and half length of, pharynx which measures 0.161 long by 0.181 to 0.255 wide. Esophagus approximately half length of pharynx. Cecal bifurcation in anterior 1/3 body. Ceca arch laterally on each side of body, completely encircling testes, ending a short distance from posterior end of body. Genital pore sinistral, almost reaching inner edge of left cecum midway between acetabulum and anterior end of body. Gonads postequatorial. Testes round to irregular, side by side, in the posterior 1/3 body; right testis 0.348 to 0.779 long by 0.295 wide; left testis 0.235 to 0.295 long by 0.201 to 0.318 wide. Cirrus sac extending from genital pore to slightly posterior to acetabulum, entirely to left of acetabulum, cirrus in anterior third of sac, followed by narrow coiled prostatic vesicle which tubular anteriorly and almost bulbular posteriorly; internal seminal vesicle spherical, in posterior 1/6 sac. External seminal vesicle voluminous, extending from cirrus sac transversally between ovary and acetabulum. Ovary indistinctly tri-lobed, median, in contact with right testis, 0.134 to 0.181 long by 0.147 to 0.181 wide. Seminal receptacle club-shapde, between left testis and posterior tip of cirrus sac in one specimen and transverse, near midbody, immediately posterior to external seminal vesicle in another. Vitellaria extending from level of posterior edge of oral sucker on each side of body, confluent medianly at level of cecal bifurcation and genital pore, separating anterior to acetabulum and overlapping ceca on each side of body for their posterior extent to terminate a short distance from posterior end of body, confluent posterior to testes. Uterus anterior to ovary, entering muscular metraterm to left of and slightly longer than cirrus sac. Eggs 64 to 72 by 32 to 36 microns. Excretory pore dorsal, median, between inner aspect of tips of ceca and testes. Excretory vesicle partly visible in immature specimen; tubular, extending to mid-testicular level where two cornua branch off, one on each side of body; giving vesicle a Y-shaped appearance; they are not visible anterior to seminal receptacle.

Discussion.—Layman (1930) named the genus *Pseudocreadium* for *Pseudocreadium monacanthi.* Ozaki (1936) named the genera *Leptocreadium* and *Hypocreadium. Leptocreadium* Ozaki, 1936 *proparte* and *Hypocreadium* Ozaki, 1936 were considered synonyms of *Pseudocreadium* Layman, 1930 by Manter (1940a, 1945). Yamaguti (1953) considered *Hypocreadium* distinct from *Pseudocreadium* on the basis that the ovary is between the testes in the former genus and in advance of the testes in the latter genus. Bravo and Manter (1957) accepted Yamaguti's (1953) two genera on the basis of intertesticular ovarian position and posterior extent of the uterus. Examination of paratypes of Panamanian *Pseudocreadium scaphosomum* Manter, 1940, reveals variation in intertesticular ovarian position (figs. 7, 8). Furthermore, if a series of the species *P. scaphosomum* Manter, 1940, *P. spinosum* Manter, 1940, *P. galapagoense* Manter, 1945 and *P. monacanthi* Layman, 1930 are studied, they will clearly show intergradation from intertesticular to pretesticular ovarian position. Extent of uterus posterior to ovary is also not constant. A study of a large series of *P. scaphosomum* showed the uterus extending from mid-ovary to posterior to ovary, to posterior level of testes and slightly beyond. This observed variation did not appear to be correlated with size of individual specimens. For this reason, the genus *Hypocreadium* is considered a synonym of *Pseudocreadium.*

Manter (1945) transferred four species of *Pseudocreadium* to *Lepocreadium.* These were: *P. balistes* Nagaty, 1942, *P. elongatum* Nagaty, 1942, *P. sohali* Nagaty, 1942, and *P. vitellosum* (Ozaki, 1936) Manter, 1940 (syn: *Leptocreadium vitellosum* Ozaki, 1936). Other species in the genus *Pseudocreadium* are: *P. anandrum* Manter,

1947 (syn: *H. anandrum* (Manter, 1947) Yamaguti, 1953); *P. dampieriae* (Yamaguti, 1942) n. comb., (syn: *H. dampieriae* Yamaguti, 1942); *P. galapagoensis* Manter, 1945; *P. lamelliforme* (Linton, 1907) Manter, 1945, (syn: *Distomum lamelliforme* Linton, 1907 *pro parte*); *P. monacanthi* Layman, 1930, (syn: *Leptocreadium skarjabini* Ozaki, 1936); *P. ovale* Yamaguti, 1942; *P. patellare* (Yamaguti, 1938) Manter, 1940, (syn: *H. patellare* Yamaguti, 1942); *P. scaphosomum* Manter, 1940; (syn: *H. scaphosomum* (Manter, 1940) Yamaguti, 1942; *H. myohelicatum* Bravo & Manter, 1947, new synonymy); *P. spinosum* Manter, 1940, (syn: *H. spinosum* (Manter, 1940) Yamaguti, 1942); *P. symmetrorchis* (Ozaki, 1936) Manter, 1940, (syn: *H. symmetrorchis* Ozaki, 1936).

Pseudocreadium biminensis is most closely related to *P. galapagoensis*. Both differ from all other species of *Pseudocreadium* by having the metraterm and cirrus sac on the left side of the acetabulum. *P. biminensis* differs from *P. galapagoensis* by having vitellaria which extend only to posterior edge of oral sucker as compared with vitellaria extending anteriorly as far as anterior border of oral sucker; sucker ratio of from 1:0.51 to 0.89 as compared with sucker ratio 1:1 to 1.13; transverse, median external seminal vesicle as compared with a lateral diagonal external seminal vesicle; cirrus sac extending posteriorly beyond acetabulum as compared with cirrus sac extending to mid-acetabulum or slightly beyond, median position of acetabulum as compared with acetabulum more anterior to equator, and locality Atlantic rather than Pacific Ocean.

Pseudocreadium scaphosomum Manter, 1940

Host.—*Balistes naufragium* Jordan & Starks, cochino [new host records]; *Balistes verres* Gilbert & Starks, pez puerco.

Location.—Intestine, near pyloric junction.

Locality.—Taboga Island, Panama Pacific.

Discussion.—Caballero et al (1953) reported *P. scaphosomum* from *Balistes polylepis* (type host) in Panama. Bravo and Manter (1957) named *Hypocreadium myohelicatum* from the intestine of *Balistes capistratus* (=*Balistes verres*). They differentiated *H. myohelicatum* from *H. scaphosomum* (=*Pseudocreadium scaphosomum*) on the basis of vitellaria overlapping the ceca in the former but not the latter species. I examined the paratype series of *P. scaphosomum* and found that at least a few vitellaria always overlap the ceca. *H. myohelicatum* is here considered a synonym of *Pseudocreadium scaphosomum.*

Pseudocreadium lamelliforme (Linton, 1907) Manter, 1945

Host.—*Balistes vetula* Linn., queen triggerfish [new host record].

Location.—1/4 intestine and 1/2 intestine.

Locality.—Lerner fish pens, and N. shore, N. Bimini, B.W.I.

Dermadena lactophrysi Manter, 1945

Synonym.—*Distomum lamelliforme* (Linton, 1907) *pro parte.*

Host.—*Lactophrys trigonus* (Linn.); *Lactophrys tricornis* (Linn.), trunkfish.

Location.—Mid-intestine of *L. trigonus* and 3/4 intestine of *L. tricornis*.

Locality.—L. trigonus from Lerner fish pens and *L. tricornis* from off Lerner Laboratory pier, Bimini, B.W.I.

Lepidapedon **truncatum,** sp. nov.[4] (Figure 10)

Host.—*Holocentrus ascencionis* (Osbeck), squirrelfish.

Location.—Pyloric ceca (immature specimens) and 1/3 intestine (mature specimens).

Locality.—Lerner fish pens, Bimini, and from near Cat Cay, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38862.

Diagnosis (based on 3 mature specimens).—Body elongate, sides almost parallel, widest in testicular area, tapering anteriorly and truncate posteriorly; cuticle spined; 1.976 to 2.261 long by 0.475 to 0.513 wide at testicular level. Forebody 0.551 to 0.646 long. Posterior body 1.330 to 1.501 long. Oral sucker subterminal; 0.107 to 0.121 long by 0.101 to 0.121 wide. Acetabulum 0.094 long by 0.074 to 0.094 wide. Sucker ratio 1:0.73 to 0.77. Prepharynx very short, almost absent. Pharynx

[4] The name *truncatum* is for the characteristic truncate appearance of the posterior end of body.

ovoid, 0.094 to 0.101 long by 0.074 to 0.081 wide. Esophagus from equal to, to 1½ times length of, pharynx. Cecal bifurcation approximately in middle of forebody; ceca extending to posterior end of body, ending blindly. Genital pore sinistral to anterior border of acetabulum. Gonads postequatorial. Testes diagonal, in posterior 1/3 body, oval and smooth; anterior testis to left, posterior to right of midline; anterior testis 0.194 to 0.215 long by 0.134 wide; posterior testis 0.201 to 0.248 long by 0.134 wide. Cirrus sac extends from genital pore to approximately 1/3 distance from acetabulum to ovary; cirrus and prostatic vesicle occupy anterior 5/6 sac; anterior seminal vesicle in posterior 1/6 sac. Posterior seminal vesicle approximately as long as cirrus sac with one to three slight constrictions; surrounded by prostatic cells which are in turn surrounded by membrane originating from cirrus sac. Cirrus sac and posterior seminal vesicle extending approximately 3/4 distance from acetabulum to ovary. Trilobed ovary median, separated from or in contact with anterior testis, 0.101 to 0.134 long by 0.134 wide. Club-shaped seminal receptacle to left of ovary and in contact with anterior testis. Vitellaria extending from anterior border of acetabulum posteriorly, overlapping ceca, to end slightly beyond tips of ceca. Uterus anterior to ovary; entering muscular metraterm which may be as long as 1/2 length of cirrus. Uncollapsed eggs 67 to 72 microns long by 48 microns wide, (collapsed eggs 53 to 68 by 24 to 40 microns). Excretory pore posterior and terminal. Excretory vesicle tubular, dorsal, beginning at excretory pore where it is constricted by a bulbulomuscular sphincter, ending at level of cecal bifurcation.

Discussion.—There are six species of *Lepidapedon* that possess an excretory vesicle extending to the cecal bifurcation; these are: *L. congeri* Manter, 1954; *L. epinepheli* Bravo & Manter, 1957; *L. hancocki* Manter, 1940; *L. levenseni* (Linton, 1907) Manter, 1947; *L. nicolli* Manter, 1934; and *L. trachinoti* Hanson, 1950. *L. truncatum* differs *from L. epinepheli, L. levenseni* and *L. trachinoti* by possessing vitellaria which extend to the acetabulum as compared with vitellaria never extending to the acetabulum. *L. truncatum* further differs from *L. trachinoti* by lacking an accessory lateral sucker, possessing a trilobed ovary and testes diagonal as compared with tandem testes. *L. truncatum* also differs from *L. epinepheli* and *L. levenseni* by possessing diagonal instead of tandem testes and trilobed instead of smooth ovary. *L. truncatum* differs from *L. congeri* by having vitellaria which are not confluent preacetabularly, genital pore sinistral as compared with median or only slightly submedian, and posterior seminal vesicle far posterior to acetabulum as compared with posterior seminal vesicle dorsal and extending only slightly posterior to acetabulum. *L. truncatum* is most closely related to *L. nicolli* and *L. hancocki,* differing from these species by having separated diagonal testes as compared with contiguous testes in tandem, distinctly trilobed ovary as compared with smooth oval ovary, and truncate posterior end of body as compared with more pointed posterior end.

One abnormal mature specimen (not described) possessed only one testis which was median in posterior 1/3 of body. This specimen agreed in all other respect with *L. truncatum.*

Lepidapedon **parepinepheli,** sp. nov.[5]
(Figure 11)

Host.—Epinephelus tigris (Cuv. & Val.), tiger grouper.

Location.—2 in pyloric ceca and 9 in 1/4 intestine.

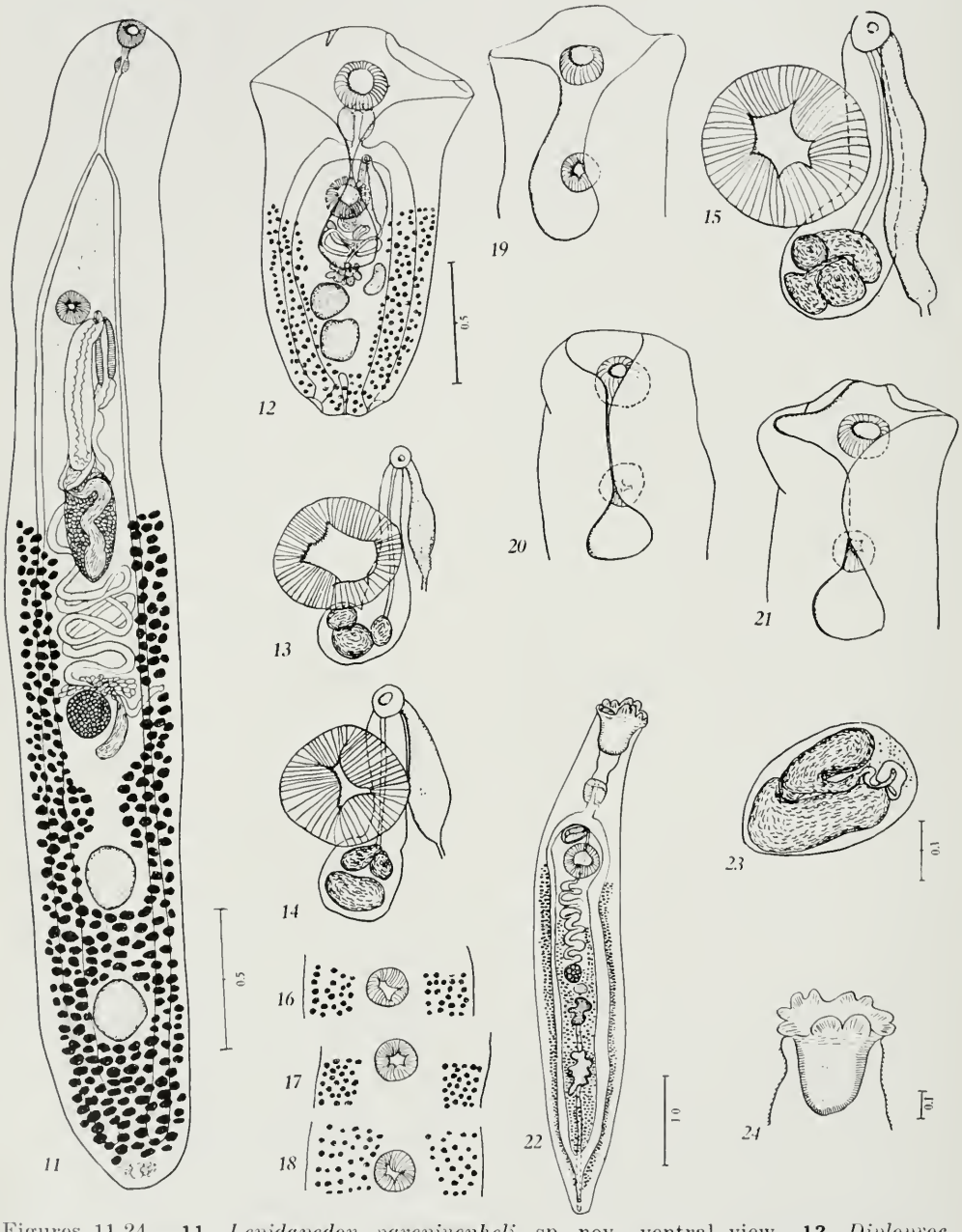
Locality.—1 mile W. of N. Bimini, B.W.I.; in 18 fathoms.

Holotype.—U.S.N.M. Helm. Coll. No. 38863.

Diagnosis (based on 11 specimens).—Body elongate, sides of body almost parallel, tapering to a rounded end anteriorly and posteriorly; cuticle spined; 3.857 to 5.263 long by 0.380 to 0.627 wide. Forebody 0.950 to 0.969 long. Posterior body 2.774 to 4.18 long. Oral sucker terminal; 0.047 to 0.087 long by 0.101 to 0.121 wide. Acetabulum approximately in anterior 1/4 body; 0.114 to 0.134 long by 0.114 to 0.148 wide. Sucker ratio 1:1.11 to 1.29. Prepharynx from 1/4 to equal in pharynx length. Pharynx 0.067 to 0.081 long by

[5] The name *parepinepheli* indicates the close relationship of this species with *Lepidapedon epinepheli; para* (=alongside), *epinepheli* (=*Lepidapedon epinepheli*).

0.054 to 0.067 wide. Esophagus from 2 to 4 times as long as pharynx. Cecal bifurcation approximately in mid-forebody, ceca extending to near posterior end of body, ending blindly. Genital pore sinistral to anterior border of middle of acetabulum Gonads postequatorial. Testes tandem in posterior 1/4 body, oval and smooth; sepa-



Figures 11-24. **11.** *Lepidapedon parepinepheli*, sp. nov., ventral view. **12.** *Diploproctodaeum plicitum* (Linton), ventral view. **13-15.** *D. plicitum*, ratio of metraterm length to cirrus sac length. **16-18.** *D. plicitum*, variation of anterior extent of vitellaria. **19-21.** *D. plicitum*, variation in shape of anterior end of body. **22.** *Enenterum aureum* Linton, ventral view. **23.** *E. aureum*, cirrus sac. **24.** *E. aureum*, oral sucker.

rated from each other by a distince from 1 to 1½ times length of anterior testis; anterior testis 0.168 to 0.268 long by 0.147 to 0.023 wide; posterior testis 0.181 to 0.318 long by 0.168 to 0.268 wide. Cirrus sac extending approximately halfway from genital pore to ovary; 0.57 to 0.804 long; cirrus and prostatic vesicle occupying anterior 6/7 sac; anterior seminal vesicle in posterior 1/7 sac. Convoluted posterior seminal vesicle approximately 1/2 length of cirrus sac, 0.268 to 0.482 long, surrounded by prostatic cells which are in turn surrounded by a membrane originating from rear portion of cirrus sac. Cirrus sac and posterior seminal vesicle extending approximately 2/3 distance from acetabulum to ovary. Median, smooth, oval ovary approximately halfway between anterior testis to posterior tip of posterior seminal vesicle; 0.134 to 0.188 long to 0.127 to 0.168 wide. Club-shaped seminal receptacle to left of ovary, tapering to the Mehlis, gland complex which is median and immediately anterior to ovary. Laurer's canal extending from ootype laterally on the left side of body level with anterior border of ovary to open dorsally between left cecum and edge of body. Vitellaria extending from anterior to posterior edge of cirrus sac or posterior tip of posterior seminal vesicle towards posterior end of body overlapping ceca along posterior extent, confluent between testes, filling posttesticular space to end near posterior end of body. Uterus anterior to ovary entering muscular metraterm which is half length of cirrus sac. Eggs from 56 to 69 by 24 to 32 microns. Excretory pore posterior and terminal. Excretory vesicle tubular, dorsal, extending to near cecal bifurcation.

Discussion.—There are seven species of *Lepidapedon* which possess an excretory vesicle extending to the cecal bifurcation, these are: *L. congeri* Manter, 1954; *L. epinepheli* Bravo & Manter, 1957; *L. hancocki* Manter, 1940; *L. levenseni* (Linton, 1907) Manter, 1947; *L. nicolli* Manter, 1934; *L. trachinoti* Hanson, 1950 and *L. truncatum* (this paper). *L. parepinepheli* differs from *L. congeri, L. hancocki, L. nicolli* and *L. truncatum* in possessing vitellaria which never extend to acetabulum as compared with vitellaria extending to acetabulum or beyond. *L. parepinepheli* differs from *L. trachinoti* by lacking an accessory lateral sucker as compared with lateral sucker present. *L. parepinepheli* is most closely related to *L. levenseni* and *L. epinepheli,* differing from *L. levenseni* in sucker ratio, 1:1.11 to 1.29 as compared with 1:0.75, posterior edge of external seminal vesicle lying 2/3 distance from acetabulum to ovary as compared with approximately 1/3 distance from acetabulum to ovary, seminal receptacle sinistral to ovary as compared with between ovary and anterior testis, and vitellaria confluent between the testes. *L. parepinepheli* is very closely related to *L. epinepheli.* I have examined the paratypes of *L. epinepheli* and except for two details—my specimens agree in almost all characters. The posterior seminal vesicle of *L. parepinepheli* is approximately half length of cirrus sac and never longer as compared with a length almost always twice as long as cirrus sac in *L. epinepheli.* In addition, the posterior tip of the posterior seminal vesicle lies 2/3 the distance from acetabulum to ovary in *L. parepinepheli* while it is never more than 1/2 way from acetabulum to ovary in *L. epinepheli.*

Diploproctodaeum haustrum (McCallum, 1918) La Rue, 1926

Host.—*Ceratacanthus scripta* (Osbeck), scrawled filefish.

Location.—1/3 intestine.

Locality.—Bimini Vicinity; B.W.I.

Discussion.—Sogandares and Hutton (1958) have indicated that *Bianium lecanocephalum* Perez-Vigueras, 1955 is a synonym of *Diploproctodaeum haustrum. D. haustrum* and *D. plicitum* are very closely related. Further studies of larger series of specimens may reveal the species to be synonymous. At present, the constantly more sagittate forebody and longer esophagus of *D. haustrum* may be used to separate that species from *D. plicitum.*

Diploproctodaeum plicitum (Linton, 1928) Sogandares & Hutton, 1958
(Figures 12-22)

Host.—*Sphoeroides annulatus* (Jenyns), tamboril; *Diodon hystrix* (Linn.).

Location.—1/3 intestine.

Locality.—Bella Vista Beach and off mouth of Chiman River, Gulf of Panama.

Discussion.—Some observed variations in

D. plicitum from Panama are illustrated in figs. 13-21.

Enenterum aureum Linton, 1910
(Figures 22-24)

Hosts.—*Kyphosus sectatrix* (Linn.), Bermuda chub; *Kyphosus elegans* (Peters), chopa.

Location.—Mid and 3/4 intestine of *K. sectatrix* and 3/4 intestine of *K. elegans.*

Locality.—*K. sectatrix* from W shore, Lerner Fish Pens, and 1 Mi. W. Entrance Point, N. Bimini, B.W.I.; and *K. elegans* from Taboga Island, Gulf of Panama.

Discussion.—Manter (1947) redescribed and figured *E. aureum.* I have examined specimens of *E. aureum* from *K. sectatrix* and *K. incisor* from Tortugas, Florida. My specimens from Bimini agree in all details with the Florida specimens. *E. aureum* from *K. elegans* in Panama (fig. 22) differ only in that the vitellaria do not overlap the ceca. Live specimens of *E. aureum* from Bimini were observed for this detail. The vitellaria overlap of ceca is variable and is dependent upon contraction and flattening pressure. Manter examined 2037 fishes of 237 species in Tortugas, Fla. and found *E. aureum* only in *Kyphosus.* Examinations of 224 species of fishes from Bimini and the Panama Pacific also yielded *E. aureum* from *Kyphosus.* Winter (1957) reported *E. aureum* from *K. elegans* in the Mexican Pacific.

Two specimens of *K. sectatrix* measuring 15 and 45 mm respectively were taken from Sargassum weed 1 mi. W. of Entrance Point, N. Bimini, but did not harbor *E. aureum.*

Jeancadenatia brumpti Dollfus, 1946
(Figure 25)

Host.—*Kyphosus sectatrix* (Linn.), Bermuda chub.

Location.—1/4 intestine.

Locality.—W. shore (opposite Lerner Laboratory), N. Bimini, B.W.I. [new locality record].

Discussion.—*L. brumpti* was described by Dollfus (1946) from *Kyphosus sectatrix* in Dakar, Africa. The species has not since been reported in the literature. Dollfus' specimens were in poor condition and his description of the species was a provisional one. Dollfus was in doubt as to the presence of a seminal receptacle as he stated, "Le receptaculum seminis n'a pas été reconnu, peut-être est-il représenté par un masse volumnieuse, un peu en S, située en avant de la glande de Mehlis et de l'ovaire: sur ce point, je reste dans l'incertitude . . . " The seminal receptacle in my two specimens was clearly visible and is as described by Dollfus except that in one specimen it was C-shaped. The ceca and excretory vesicle open to the outside as in *Enenterum aureum* Linton, 1910. There is a single testis in both my specimens of *J. brumpti.* Dollfus (1946) believed two testes to be present and stated, "(Par suite de la macération, la limite entre les deux testicules n'est pas observable)", and his figure shows one testis with a deep constriction at the equator. My specimens do not show this constriction. That a single testis may become divided into two testes with age has been demonstrated by Montgomery (1957) for the genus *Scorpidicola* (Waretrematidae). Thus there is a possibility that the testes in Dollfus' material were almost separated. Dollfus does not mention the presence of an external seminal vesicle in his description of *J. brumpti.* An external seminal vesicle is present; after leaving the short cirrus sac it coils twice and ends approximately midway between the acetabulum and seminal receptacle. Fig. 25 shows that the accessory suckers, are 15 and 17 in number in each specimen respectively, and are surrounded by gland cells.

Cableia trigoni, gen. nov., sp. nov.[6]
(Figure 26)

Host.—*Lactophrys trigonus* (Linn.), common trunkfish.

Location.—Intestine, next to pyloric junction.

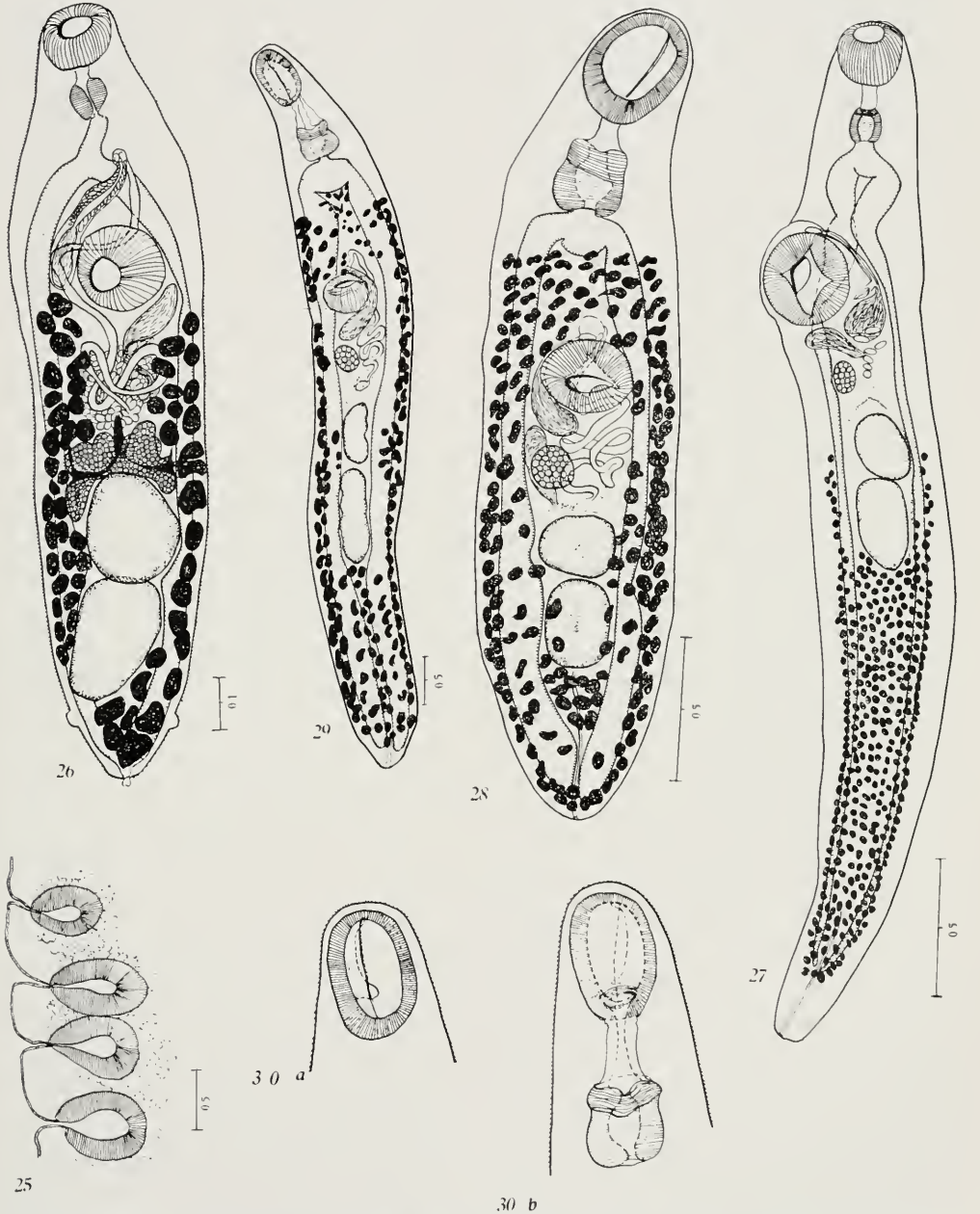
Locality.—Lerner fish pens, Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38864.

Diagnosis (based on 1 specimen).—Body elongate; widest between oral sucker and acetabulum; spined; 1.596 long by 0.399 wide. Two lateral, papilla-like elevations, one on each side of body, between posterior end of posterior testis and posterior end of

[6] The genus is named in honor of Dr. R. M. Cable, Purdue University, in recognition of his work on the life cycles of trematodes. The name *trigoni* indicates the host species *Lactophrys trigoni.*

body; another vesicular swelling ventral, on dextral side of body posterior to lateral dextral swelling, directly over right cecum. Forebody 0.475 long; hind-body 0.931 long. Oral sucker 0.147 long by 0.161 wide. Acetabulum in anterior 1/3 body 0.19 long by 0.201 wide. Sucker ratio 1:1.25. Prepharynx approximately 1/2 length of phar-



Figures 25-30. **25.** *Jeancadenatia brumpti* Dollfus, accessory suckers, lateral view showing gland cells surrounding suckers. **26.** *Cableia trigoni*, gen. nov., sp. nov., ventral view. **27.** *Apocreadium balistis* Manter, ventral view. **28.** *Apocreadium coili*, sp. nov., ventral view. **29.** *Apocreadium angustum*, sp. nov., ventral view. **30.** *A. angustum:* **a,** ventral view of oral sucker to show lateral fleshy lobes; **b,** dorsal view of oral sucker to show band of circular muscles at connection with prepharynx.

ynx. Pharynx 0.081 long by 0.074 wide. Esophagus approximately as long as pharynx. Cecal bifurcation between pharynx and acetabulum. Ceca extending to posterior end of body where they join excretory vesicle to form a uroproct. Genital pore to left of midbody at level of cecal bifurcation. Gonads postequatorial, intercecal. Testes tandem, in contact, oval, smooth, longer than wide; anterior testis 0.235 long by 0.201 wide; posterior testis 0.302 long by 0.188 wide. Cirrus sac extending sinistrally from dextral side of posterior 1/4 acetabulum, obliquely across body to genital pore; internal seminal vesicle in posterior 1/2 of sac, cirrus and ejaculatory duct surrounded by prostate cells in anterior 1/2 of sac. External seminal vesicle absent. Ovary median, deeply 6-lobed, in contact with anterior testis; 0.121 long by 0.268 wide. Club-shaped seminal receptacle extending along the left posterior edge of acetabulum from posterior to mid-acetabulum to the median ootype. Mehlis' gland large, occupying most of intercecal area between ovary and acetabulum. Laurer's canal not visible. Vitellaria of massive follicles, extending from posterior edge of acetabulum to posterior end of body, overlapping ceca. Vitelline ducts fusing ventral to ovary to form median vitelline receptacle. Uterus coiling between ovary and acetabulum, passing along right side of acetabulum. Eggs 27 to 32 by 12 to 16 microns. Excretory pore at posterior end of body. Excretory vesicle not visible anteriorly beyond posterior testis.

Generic diagnosis of Cableia.—Elongate, medium sized Lepocreadiidae. Cuticle spined. Oral sucker terminal. Acetabulum in anterior 1/3 body. Ceca joining excretory vesicle to form a uroproct. Genital pore sinistral to cecal bifurcation. Testes tandem, postequatorial. Cirrus sac with internal seminal vesicle, and ejaculatory duct surrounded by prostate cells. External seminal vesicle absent. Ovary median, deeply lobed. Seminal receptacle present. Mehlis' gland massive, from ovary to acetabulum. Vitellaria follicular, overlapping ceca, extending to posterior end of body. Uterus restricted to intercecal area between genital pore and ovary. Eggs small, operculate, thick shelled. Excretory pore terminal. Excretory vesicle not observed anterior to testes. Type species: *Cableia trigoni.*

There are only two genera of Lepocreadiidae which lack an external seminal vesicle; these are: *Stegodexamene* MacFarlane, 1951; and *Proenenterum* Manter, 1954; *Cableia* differs from both genera by possessing a uroproct as compared with ceca ending blindly in *Stegodexamene,* and ceca joining but not forming a uroproct in *Proenenterum.* In addition, *Cableia* differs from *Stegodexamene* by having tandem postequatorial testes as compared with oblique preequatorial testes; and from *Proenenterum* by possessing an elongate instead of an almost round cirrus sac. The large vitelline follicles are common in the family *Lepocreadiidae,* but the small, thick-shelled eggs are unusual.

Rhagorchis odhneri Manter, 1931

Host.—*Ceratacanthus scripta* (Osbeck), *scrawled filefish* [new host record].

Location.—1/3 intestine.

Locality.—Lerner fish pens, Bimini, B.W.I. [new locality record].

Discussion.—One immature specimen agreed in almost all details with *R. odhneri* described by Manter (1931) from *Ceratacanthus schoepfi* in Beaufort, N.C. and later reported from the same host and *Monocanthus ciliatus* in Tortugas by Manter (1947).

Homalometron elongatum Manter, 1947

Hosts.—*Gerres cinereus* (Walbaum); *Eucinostomus californiense* (Gill), mojarra [new host record].

Location.—Entire length of intestine in *G. cinereus* and mid-intestine of *E. californiense.*

Locality.—*G. cinereus* from off Lerner Laboratory Pier, Bimini, B.W.I. [new locality record]; and *E. californiense* from Taboga Island, Panama Pacific [new locality record].

Discussion.—Manter (1947) reported *H. elongatum* from *Gerres cinereus* in Tortugas, Florida. The Bimini specimens of *H. elongatum* agree in all details with the paratypes. The single specimen from Panama appears mature in all respects except in lacking eggs, and is a little shorter than the minimum range given by Manter for *H. elongatum.* Bravo and Manter (1957) described papillae on the oral sucker of *H. elongatum.* The immature Panama speci-

men and the Bimini specimens have these papillae.

Crassicutis marina Manter, 1947

Host.—*Gerres cinereus* (Walbaum), mojarra.

Location.—Rectum.

Locality.—Off Lerner Laboratory Pier, N. Bimini, B.W.I. [new locality record].

Discussion.—One mature specimen of *C. marina* agreed in all essential details with the paratypes of *C. marina.* Manter (1947) reported this species from *Eucinostomus lefroyi* and *Gerres cinereus* at Tortugas, Florida.

Apocreadium longisinosum Manter, 1937

Host.—*Sphoeroides annulatus* (Jenyns), tamboril.

Location.—Intestine.

Locality.—Bella Vista Beach, Panama City Panama Pacific.

Discussion.—*A. longisinosum* in the collection possessed eggs whose maximum measurements were 105 microns. I have compared my specimens with paratypes and they agree in all details. Manter (1937) described the species in detail and aside from egg size nothing more need be mentioned here regarding its morphology.

Caballero, et al, (1952) reported an immature specimen of this species from *Sphoeroides annulatus* in Panama.

Apocreadium balistis Manter, 1947

Host.—*Balistes capriscus* Gmelin, ocean tally [new host record].

Location.—1/3 intestine.

Locality.—Near Cat Cay, B.W.I. [new locality record].

Discussion.—One specimen believed to be *A. balistis* was collected. It differed from *A. balistis* in that the acetabulum is in the anterior one-fourth body as compared with the anterior one-third body in the holotype. Collapsed eggs measured from 67 to 75 by 32 to 40 microns as compared with eggs 73 to 78 by 49 microns in the holotype. In addition, the testes of the holotype have a peculiar equatorial ridge which was not present in my specimen. Since *A. balistis* was described from a single specimen, the significance of the testicular ridge in the holotype is not evident.

A. balistis is hitherto known from *Balistes vetula.*

Apocreadium **coili,** sp. nov.[7]

(Figure 28)

Hosts.—*Balistes capriscus* Gmelin, ocean tally; *Balistes vetula* Linn., queen triggerfish.

Location.—In rectum of all host specimens examined.

Locality.—*B. capriscus* from near Cat Cay, B.W.I. and *B. vetula* from N. Shore, N. Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38865.

Diagnosis (based on one mature specimen).—Body elongate, almost equally wide along its length, rounded at anterior and posterior ends, completely spined, 2.975 long by 0.225 wide. Oral sucker subterminal, elliptical, with two lateral fleshy lobes and a sphincter muscle at junction of prepharynx and sucker, 0.429 long by 0.335 wide. Acetabulum immediately preequatorial, 0.268 long by 0.335 wide. Sucker ratio 1:1. Prepharynx half as long as pharynx. Pharynx with a band of circular muscles in its anterior half, 0.268 long by 0.255 wide. Esophagus absent, ceca branching immediately extending parallel to posterior end of the body. Genital pore median, immediately preacetabular. Testes two, postequatorial, tandem, intercecal, smooth; anterior testis 0.220 long by 0.275 wide; posterior testis almost in contact with anterior testis, 0.320 long by 0.247 wide. The posttesticular region about half as long as forebody. Seminal vesicle curved, club-shaped, extending from genital atrium, dorsal to right half of acetabulum, almost to ovary. Cirrus and cirrus sac absent. Globular ovary dextral, intercecal, between acetabulum and anterior testis; 0.150 long by 0.147 wide. Mehlis' gland sinistral, between anterior testis and ovary. Seminal receptacle club-shaped, dorsal to ovary, comples and between ovary and anterior testis. Vitellaria follicular, from cecal bifurcation to posterior end of body, confluent anterior to acetabulum, posterior to testes, and posterior to tips of ceca. Uterus extending anteriorly from ootype, with few coils. Collapsed eggs 80 to 88 by 20 to 40 microns. Excretory vesicle visible as a narrow tube extending at least to posterior testes. A

[7] This species is named in honor of Dr. William H. Coil.

lymphatic vessel extends along the inner side of each cecum, at least between anterior testis and acetabulum.

Discussion.—Previously five species of *Apocreadium* have been named: *A. mexicanum Manter,* 1937 (type); *A. longisinosum* Manter, 1937; *A. balistis* Manter, 1940; *A. synagris* Yamaguti, 1953; and *A. caballeroi* Bravo, 1954.

A. coili differs from all in its short posttesticular region, acetabulum far back near midbody, and vitellaria confluent anterior to the acetabulum. Most similar to *A. coili* is a species to be described (p. 000) from *Balistes naufragium* in the Panama Pacific.

Apocreadium **angustum,** sp. nov.[8]
(Figures 29-30)

Host.—*Lactophrys trigonus* (Linn.), common trunkfish.

Location.—Intestine, near pyloric junction.

Locality.—Lerner fish pens, Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38866.

Diagnosis (based on one mature specimen).—Body elongate, almost equally wide along its entire length, tapering to rounded ends; spined to level of posterior testis; 7.750 long by 1. wide. Oral sucker subterminal, elliptical, 0.670 long by 0.0389 wide; with two lateral fleshy lobes and a set of sphincter muscles at junction of prepharynx and sucker. Acetabulum about one-third body length from anterior end, 0.4 long by 0.5 wide. Sucker ratio 1:1.29. Prepharynx four-fifths length of pharynx. Anterior fourth of pharynx composed of circular muscles, 0.375 long by 0.4 wide. Short esophagus about one-sixth length of pharynx. Ceca extending to posterior end of body, ending blindly. Genital pore median, immediately preacetabular. Genital atrium very short, cannot be accurately measured because of its vertical position. Testes separated from each other by a short distance, postequatorial between acetabulum and posterior end of body, intercecal, tandem, with but slight superficial lobation; anterior testis 0.625 long by 0.26 wide; posterior testis 1.0 by 0.26 wide. Posttesticular space about six-sevenths as long as forebody. Seminal vesicle extending from genital atrium, curving around left side of acetabulum, continuing posteriorly past acetabulum to come nearly in contact with ovary. Globular, dextral, intercecal ovary between anterior testis and acetabulum, 0.26 long by 0.25 wide. Mehlis' gland and ootype median, between anterior testis and ovary. Seminal recepticle tubular, dorsal to ovary, Vitellaria beginning posterior to and confluent anterior to acetabulum, overlapping ceca to posterior end of body, filling posttesticular space. Uterus preovarian with few coils. Eggs 60 to 74 by 11 to 14 microns. Excretory pore terminal, vesicle not observed. One pair of lymphatic vessels extending along inner side of each cecum, visible between anterior testis and acetabulum.

Discussion.—This species is like *A. coili* in that the vitellaria are confluent anterior to the acetabulum, but its body is much narrower, the testes are much longer than wide, and the eggs considerably smaller.

Apocreadium **uroproctoferum,** sp. nov.[9]
(Figure 31)

Host.—*Balistes vetula* Linn., queen triggerfish.

Location.—2/3 intestine.

Locality.—N. Shore, N. Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38867.

Diagnosis (based on 8 mature specimens).—Body lanceolate, widest at midposttesticular region, completely spined; 2.019 to 4.009 long by 0.270 to 1.045 wide at acetabular level and from 0.703 to 1.254 at widest point. Forebody 0.532 to 0.798 long. Hindbody 1.501 to 2.495 long. Oral sucker simple, subterminal, 0.181 to 0.248 long by 0.211 to 0.268 wide. Acetabulum at end of anterior fourth of body, recessed into body, 0.261 to 0.369 long by 0.268 to 0.362 wide. Sucker ratio 1:1.18 to 1.41. Prepharynx one-half to three-fourths length of pharynx. Anterior fourth of pharynx with a weak band of circular muscles, 0.141 to 0.181 long by 0.067 to 0.147 wide. Esophagus approximately one-fourth length of pharynx. Ceca ending in a uroproct a short distance from posterior end of body. Genital pore median, immediately preacetabular. Genital atrium extending from genital pore posteriorly dosal to anterior

[8] The name *angustum* (L. *narrow*) refers to the slender body.

[9] The name *uroproctoferum* indicates that the species bears a *uroproct.*

Figures 31-34. **31.** *Apocreadium uroproctoferum,* sp. nov., ventral view. **32.** *Apocreadium bravoi,* sp. nov., ventral view. **33.** *Stephanostomum provitellosum,* sp. nov., ventral view. **34.** *S. provitellosum,* oral sucker and spines, ventral view.

half of acetabulum. Testes equatorial, tandem, in contact or slightly overlapping each other; edges indented; anterior testis almost square, usually half length of posterior testis, 0.268 to 0.402 long by 0.215 to 0.567 long; posterior testis widest in its anterior region, tapering posteriorly rather sharply in some specimens to produce an almost triangular appearance, 0.318 to 0.643 long by 0.328 to 0.556 wide at its anterior end. Posttesticular space approximately equal with distance from anterior testis to anterior tip of body; 0.798 to 1.520 long. Seminal vesicle club-shaped, extending from genital atrium, dorsal to acetabulum, to near or in contact with ovary. Ovary globular, dextral, intercecal, usually in contact with anterior testis; 0.168 to 0.369 long by 0.141 to 0.261 wide. Mehlis' gland median, immediately anterior to anterior testis, posterior to ovary. Club-shaped seminal receptacle dorsal to ovary. Vitellaria extending from

anterior edge of acetabulum or sometimes from level of ovary, mostly lateral to ceca, not confluent anterior to testes, filling post-testicular space. Uterus anterior to ootype, coiling a few times, to enter genital atrium at mid-acetabular level. Uncollapsed eggs 64 to 80 by 40 to 45 microns. Excretory vesicle Y-shaped, extending anteriorly from terminal excretory pore to posterior testis where it forks, sending one branch on each side of body, along inner border of ceca crossing ceca anterior to acetabulum, along outer borders of ceca, branching profusely at level of oral sucker; branches extending anterior to oral sucker. Lymphatic system present; vessels extending along inner side of ceca. A lymphatic sinus surrounding dorsal side of acetabulum, extending anteriorly at least as far as cecal bifurcation. One vessel (expecially visible in immature specimens) forks from main stem vessel at posterior end of body next to uroproct, curves outwards from main stem on each side of body to come in contact with each side of body at level of posterior testis.

Discussion.—This species differs from all others in the genus *Apocreadium* by possessing a uroproct but otherwise is a typical member of the genus. The presence of a uroproct is considered a generic character in certain Opecoelidae but not in the Acanthocolpidae (genus *Stephanostomum*). Among the species of *Apocreadium, A. uroproctoferum* has a relatively wide body.

Apocreadium **bravoi,** sp. nov.[10]
(Figure 32)

Host.—*Balistes naufragium* Jordan and Starks, cochino.

Location.—Intestine.

Locality.—Saint Bartholomew Island, Archipielago de las Perlas, Panama Pacific.

Holotype.—U.S.N.M. Helm. Coll. No. 38868.

Diagnosis (based on five specimens).—Body elongate, rounded at both ends, cylindrical, spined at least to level of testes, 3.21 to 3.71 long by 0.7 to 0.93 wide at level of acetabulum. Oral sucker subterminal, lacking papillae but with one large lateral fleshy lobe on each side of mouth. Sucker 0.46 to 0.48 long by 0.32 to 0.36 wide. Forebody 0.93 to 1.03 long. Hindbody 1.96 to 2.34 long. Acetabulum one-third from anterior end of body, 0.25 to 0.28 long by 0.25 to 0.27 wide. Sucker ratio from 1:0.7 to 0.81. Prepharynx from one-fourth to one-half length of pharynx. Pharynx 0.25 to 0.29 long by 0.23 to 0.25 wide with prominent anterior circular muscle band. Esophagus short, about one-fifth length of pharynx. Cecal bifurcation one-fourth to one-half to three-fourths distance from oral sucker to anterior border of acetabulum. Ceca extending to posterior tip of body; ending blindly. Genital pore median, immediately preacetabular. Testes tandem, intercecal, posterior to midbody, in contact with one another or separated by about one-fifth length of posterior testes. Seminal vesicle sac-like from mid-dorsal region of acetabulum extending posterior to acetabulum one-half way to ovary. Genital atrium a slender tube dorsal to anterior half of acetabulum. Prostatic cells around anterior part of seminal vesicle and posterior part of atrium.

Ovary ovoid, unlobed, dextral, just anterior to right edge of anterior testis and near right cecum, 0.17 to 0.21 long by 0.15 to 0.19 wide. Mehlis' gland large, median, immediately anterior to anterior testes to left of ovary. Seminal receptacle claviform, extending forward from oviduct dorsal to ovary, overlapping right side of seminal vesicle. Vitellaria from cecal bifurcation to posterior end of body, confluent anterior to acetabulum and posterior to testes. Uterus with few coils, anterior to Mehlis' gland. Eggs 72 to 91 by 41 to 51 microns. Excretory vesicle thin-walled, extending from excretory port at posterior end of body to posterior edge of rear testis where it sends one excretory branch on each side of body anteriorly to vicinity of oral sucker. Excretory branches overlapping ceca in a torturous course. Lymphatic vessels two, one on each side of body, following excretory branches, extending at least from anterior to genital atrium to posterior to testes where they curve laterally to come close to each side of body.

Discussion.—A. bravoi is most similar to *A. coili* which it resembles in confluence of vitellaria anterior to the acetabulum and in

[10] The species is named for Miss Margarita Bravo-Hollis of the Instituto Nacional de Biologia, Mexico, in recognition of her contributions to the knowledge of marine fish trematodology from the Pacific Coast of Mexico.

arrangement of the gonads. However, the sucker ratio is different (1:0.7 to 0.8 as compared with 1:1); the posttesticular region is much longer.

The Genus Apocreadium

The genus *Apocreadium* is closely related to *Homalometron,* differing in the presence of lymphatic vessels. The four new species named above raise the total to nine. All are from plectognath fishes with the exception of *A. mexicanum* which is from *Labrisomus xanti* (family Clinidae), and *A. synagris* which is from *Synagris taeniopterus* (family Lutjanidae). Of the nine species, five are from *Balistes* (trigger fishes), one from puffers, and from trunkfishes.

The genus is predominantly American; 4 species are from Bimini; 1 Tortugas; 3 from the American Pacific from Mexico to the Galapagos Islands. The only non-American species is *A. synagris* from the Celebes Islands.

The nine species may be segregated into three groups: (1) those with oral sucker possessing two lateral, fleshy lobes (*A. bravoi, A. coili, A. angustum*); (2) those with simple oral sucker and without a uroproct (*A. mexicanum, A. balistis, A. caballeroi, A. longisinosum, A. synagris*); (3) one with simple oral sucker and with a uroproct (*A. uroporctoferum*).

As the genus grows it may prove advisable to recognize three genera, or at least three subgenera on the basis of these differences.

Another grouping based on the anterior confluence of vitellaria is possible. This character is more easily observed than a uroproct. Three (*A. coili, A. angustum, A. bravoi*) have vitellaria confluent anterior to the acetabulum; the other six do not.

F. *Family MEGAPERIDAE Manter, 1934*

Megapera gyrina (Linton, 1907) Manter, 1934

Hosts.—*Lactophrys tricornis* (Linn.); *Lactophrys bicaudalis* (Linn.), trunkfish.

Location.—Middle intestine of *L. tricornis* and 2/3 intestine of *L. bicaudalis.*

Locality.—N. shore N. Bimini, B.W.I. and near Cat Cay, B.W.I.

Thysanopharynx elongatus Manter, 1933

Host.—*Lactophrys tricornis* (Linn.), trunkfish.

Location.—Middle intestine.

Locality.—N. Shore of N. Bimini, B.W.I.

G. *Family ACANTHOCOLPIDAE Lühe 1909*

Stephanostomum **provitellosum,** sp. nov.[11]

(Figures 33-34)

Hosts.—*Balistes naufragium* Jordan & Starks; *Balistes polylepis* Steindachner, trigger fish, cochino.

Location.—Rectum.

Locality.—*B. naufragium* from Taboga Island, Panama; and *B. polylepis* from Galapagos Islands (Manter's collection).

Holotype.—U.S.N.M. Helm. Coll. No. 38869.

Diagnosis (based on ten specimens; measurements on nine).—Body 2.622 to 3.572 long by 0.513 to 0.665 wide, spined to posterior end. Cuticle heavily spined, with anteriormost row of spines (proximal to oral spines) larger than other body spines. If the second and third row of body spines are missing, the oral crown appears to have three rows of spines of which the posterior row is separated by some distance; this latter row of spines is to be interpreted, I believe, as the anterior row of body spines. Forebody 0.893 to 1.116 long. Posterior body 1.425 ot 1.950 long. Oral sucker terminal, 0.285 to 0.361 long by 0.241 to 0.342 wide; with two rows of 28 spines each; spines in both rows approximately 40 microns long. Acetabulum immediately anterior to midbody from 0.285 to 0.361 long by 0.268 to 0.323 wide. Sucker ratio from 1:0.94 to 1.12. Prepharynx 0.285 to 0.4 long. Pharynx pear-shaped, with a band of circular muscles around its anterior third; 0.133 to 0.190 long by 0.133 to 0.19 wide. Esophagus a little shorter than pharynx. Ceca extend to posterior end of body where they join the excretory bladder to form a uroproct. Genital pore median, close to anterior edge of acetabulum. Gonads postequatorial, tandem, intercecal. Testes in contact with each other or slightly overlapping, globular; anterior testis 0.304 to 0.435 long by 0.235 to 0.342 wide; posterior testis 0.380 to 0.494 long by 0.228 to 0.323 wide.

[11] The name *provitellosum* is from the latin *pro-*, anterior and *vitellus,* yolk glands, in reference to the anterior band of vitelline follicles which characterize the species.

Cirrus sac extending posterior to acetabulum from 1/2 way to almost in contact with ovary; internal seminal vesicle in posterior 1/2 to 1/3 sac; cirrus in anterior 1/2 to 2/3 sac, spined. Ovary globular, pretesticular, median, usually in contact with anterior testis, 0.190 to 0.266 long by 0.152 to 0.266 wide. Vitellaria follicular, filling posttesticular space, overlapping dorsally and ventrally and extending across body immediately anterior to acetabulum, interrupted at acetabular level. Uterus intercecal between ovary and genital pore; entering a thin-walled metraterm which is as long as cirrus sac and unspined. Eggs thin-shelled. Collapsed eggs in utero, 57 to 75 microns long. Uncollapsed eggs in utero proximal to ovary 58 to 74 by 46 to 53 microns. Excretory vesicle not observed anterior to posterior testis.

Discussion.—At least 40 species have been named in the genus *Stephanostomum* Looss, 1899. *S. provitellosum* differs from all by possessing a transverse band of vitelline follicles anterior to acetabulum and with follicles interrupted at the level of the acetabulum. The species is probably of the *S. dentatum* (Linton, 1901) type, but differs in details of vitellaria and in having a uroproct. It resembles *S. casum* (Linton, 1910) in possessing a uroproct but differs in distribution of vitellaria and number of oral spines.

Stephanostomum hispidum (Yamaguti, 1934) Manter, 1940

Host.—*Seriola mazatlana* Steindachner, bohala [new host record].

Location.—Rectum.

Locality.—Saint Bartholomew Island and Galera Island, Archipielago de Las Perlas, Panama Pacific.

Discussion.—Yamaguti (1934) described this species from Seriola *quinqueradiata* in the Japanese Pacific and Manter (1940a) recorded it from *Seriola dorsalis* and *Seriola* sp. "not *dorsalis*" in Mexico, and from *Seriola dorsalis* in Panama. I have studied the specimens from *Seriola* spp. and these agree with the *S. hispidum* in my collection and with some specimens sent by Yamaguti to Manter. Two specimens of the *S. hispidum* of Manter (1940a) from *Elagatis bipinnulatus* in Panama were also studied. One was decapitated, the other intact. The crown spines of the intact specimen reveal that it is probably *S. ditrematis.*

Stephanostomum ditrematis (Yamaguti, 1939) Manter, 1947

Hosts.—*Caranx latus* Agassiz, horse-eyed jack; *Elagatis bipinnulatus* (Quoy & Gaimard), blue runner.

Location.—Rectum of *C. latus* and intestine other than rectum in *E. bipinnulatus.*

Locality.—*C. latus* from Lerner fish pens, and off Lerner Laboratory Pier, N. Bimini, B.W.I. [new locality record]; and *E. bipinnulatus* from Niagara Rock, between San Jose and Pedro Gonzales Islands, Archipielago de Las Perlas, Panama Pacific.

Discussion.—This species was described by Yamaguti (1939) from *Ditrema temnicki* in Japan. *S. ditrematis* has been previously reported from *Caranx caballus* at Woods Hole by Linton (1940) and from *Caranx ruber* and *C. latus* at Tortugas. These fishes are related to *Elagatis bipinnulatus.* Perez-Vigueras (1955) described *Stephanostomum manteri* and *Stephanostomum cubanum* from *Caranx ruber* in Cuba. *S. manteri* was described from one mature specimen and *S. cubanum* from an immature one. Neither species can be differentiated from *Stephanostomum ditrematis,* and are here considered synonyms of it. The other species of *Stephanostomum* described by Pérez-Vigueras (1955), are also synonyms of one species or another, I believe. *S. mediovitellarum* and *S. lopezneyrai* agree in detail with the description of *S. sentum,* and in addition have been collected from the same hosts by Manter (1947) at Tortugas and by myself from *Calamus* at Bimini. *S. microcephalum* was described from one specimen in which some of the peribuccal spines were missing. The descriptions and figure of *S. microcephalum* agree in morphological detail with both *S. ditrematis* and *S. hispidum.* The true specific nature of *S. microcephalum* cannot be understood until the peribuccal spines and arrangement are studied in the holotype. *S. admicrostephanum* from *Epinephelus mystacinus* in Cuba is believed to be a synonym of *S. microstephanum* Manter, 1934 from the same host at Tortugas. Pérez-Vigueras (1955) compared the two species and stated the differences as being (1) sucker ratio 1:1.33 as compared with 1:1.49, (2)

"the separation between the esophageal bifurcation and the acetabulum"; and (3) the number and disposition of the peribuccal spines. Manter (1934) stated that the sucker ratio was "about" 4:3; — the figure given by Manter and his description of *S. microstephanus* show no difference of position of the esophageal bifurcation from *S. admicrostephanus;* and Manter stated that the peribuccal spines in his specimens were easily lost which probably accounts for the dorsal and ventral bare spots of the oral crown in Vigueras' specimen.

Stephanostomum hispidum (Yamaguti, 1934) Manter, 1940 and *Stephanostomum ditrematis* (Yamaguti, 1939) Manter, 1947 are very closely related and may prove to be one species.

Stephanostomum sentum (Linton, 1900) Manter, 1947

Host.—*Calamus bajonado* (Bloch & Schneider), jolthead porgy; *Cynoscion albus* (Gunther), corvina [new host record] *Malacanthus plumieri* (Bloch), sand fish [*new* host record]

Location.—Rectum.

Locality.—*C. banjonado* from 1/2 mi. W. (off Lerner Laboratory grounds) of N. Bimini, B.W.I.; *C. albus* from Taboga Island, Panama Pacific; and *M. plumieri* from between S. Bimini and Cat Cay, B.W.I.

Discussion.—These specimens were identified as *S. sentum* for the following reasons: (1) the vitellaria extend anteriorly only to the middle of the cirrus sac; (2) the cirrus sac extends less than halfway between acetabulum and ovary; (3) the oral spines are 36 in number in two alternate rows of 18 spines each; (4) the pre-pharynx is more than twice the length of the pharynx; (5) the sucker ratio is from 1:1.0 to 1.3; (6) the testes are in contact with each other in the posterior half of the body; and (7) some vitelline follicles come between the ovary and anterior testis. *S. casum* (Linton, 1910) is very closely related to *S. sentum,* differing mainly in that the cirrus sac does not extend halfway between acetabulum; the vitellaria are less extensive anteriorly, and extend between the anterior testis and ovary.

Stephanostomum dentatum (Linton, 1910) Manter, 1947

Host.—*Mycteroperca v. venenosa* (Linn.), yellow-fin grouper.

Location.—Rectum.

Locality.—Lerner fish pens, N. Bimini, B.W.I. [new locality record].

Stephanostomum minutum (Looss, 1901) Manter, 1940

Host.—*Malacanthus plumieri* (Bloch), sandfish [new host record].

Location.—Rectum.

Locality.—Between S. Bimini and Cat Cay, B.W.I. [new locality record].

Discussion.—Caballero (1952) considered *S. sentum* (Linton, 1910) Manter, 1947 a synonym of *S. minutum.* I do not agree with such synonymy because *S. minutum* is fully mature at a much smaller size than *S. sentum* from the same host. The host from which *S. minutum* is reported in this paper also possessed two immature specimens of what I have considered *S. sentum.* These immature specimens of *S. sentum* are approximately twice the size of the fully mature *S. minutum.* In addition, the oral spines of *S. minutum* are more delicate than those of *S. sentum.* I prefer to retain *S. minutum* at least until life cycles of the two species are studied. Morphological differences may be found in the cercariae of the two species.

Stephanostomum coryphaenae Manter, 1947

Host.—*Coryphaena hippurus* Linn., dolphin.

Location.—Rectum.

Locality.—Lerner fish pens, Bimini, B.W.I. [new locality record].

Discussion.—Yamaguti (1934) reported collections of trematodes from *Coryphaena hippurus* in Japan, but apparently never found *S. coryphaenae* in that area. Both Manter (1940a) and I have examined a number of dolphins from the tropical American Pacific but have not found *Stephanostomum coryphaenae. S. coryphaenae* has been reported only from the American Atlantic. So far as is known, this appears to be a case where the host is widespread but harbors *S. coryphaenae* in only one ocean. This may indicate that the life cycle of *S. coryphaenae* may be completed only in the American Atlantic, and that the dolphin does not migrate easily from one ocean to the other.

Stephanostomum **pseudocarangis,** sp. nov.[12]

(Figures 35-36)

Host.—*Holocentrus ascensionis* (Osbeck), squirrel-fish.

Location.—Immature in pyloric cecum, mature forms in rectum.

Locality.—Lerner fish pens, N. Bimini; and near Cat Cay, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38870.

Diagnosis (based on 3 mature specimens).—Body elongate, widest at testicular level, spined, 3.267 to 3.629 long by 0.513 to 0.646 wide at acetabulum. Two eyespots present at level of mid-prepharynx. Forebody 0.969 to 1.045 long. Hindbody 1.976 to 2.067 long. Oral sucker terminal; 0.107 to 0.167 long by 0.167 to 0.201 wide; with 36 peribuccal spines in alternate rows of 18 each, measuring from 47 to 54 microns long. Acetabulum approximately in anterior 1/3 body; 0.241 to 0.255 long by 0.249 to 0.308 wide. Sucker ratio 1:1.27 to 1.53. Prepharynx approximately 2.25 times longer than pharynx. Pharynx pyriform, almost equidistant between oral sucker and acetabulum; 0.160 to 0.214 long by 0.167 wide. Esophagus about 1.25 times longer than pharynx. Cecal bifurcation approximately midway between pharynx and acetabulum; ceca joining excretory vesicle to form a uroproct. Genital pore median, immediately preacetabular. Genital atrium to about mid-acetabulum on left side. Gonads intercecal ,tandem in posterior third of body. Testes slightly separated from each other or juxtaposed, roundish and smooth; anterior testis 0.274 to 0.295 long by 0.228 to 0.282 wide; posterior testis 0.308 to 0.362 long by 0.227 to 0.261 wide. Cirrus sac from genital atrium to approximately 2/3 distance from acetabulum to ovary; internal seminal vesicle bulbular in posterior 1/4 sac; cirrus heavily spined, in anterior 3/4 sac. Ovary rounded, immediately anterior to testes and juxtaposed or separated from testes by a short distance. Vitellaria forming a transverse band preacetabularly between cecal bifurcation and acetabulum, extending to posterior end of body, overlapping ceca dorsally and ventrally, filling posttesticular space. Uterus coiling a few times between ovary and cirrus sac; metraterm spined, to left of cirrus sac, almost as long or longer than cirrus sac—depending on whether the cirrus is restracted or protruded. Genital atrium short. Eggs thin shelled, 51 to 59 by 32 to 35 microns. Excretory pore terminal; excretory vesicle not visible anterior to posterior testis.

Discussion.—Only three species of *Stephanostomum* possess vitellaria that are confluent anterior to the acetabulum; these are: *S. carangis* (Yamaguti, 1951) Caballero, 1952; *S. microcephalum* Manter, 1934; and *S. provitellosum* (this paper). *S. pseudocarangis* differs from all three by possessing a spinous metraterm. It further differs from *S. carangis* by possessing a cirrus sac which extends posteriorly 2/3 distance from the acetabulum to the ovary, as compared with an extent midway from acetabulum to ovary. *S. pseudocarangis* differs from *S. microcephalum* by possessing 36 peribuccal spines in 2 rows of 18 each as compared with 150 spines in 3 concentric rows. *S. pseudocarangis* further differs from *S. provitellosum* by possessing vitellaria which are not interrupted opposite the acetabulum.

Tormopsolus orientalis Yamaguti, 1934

(Figure 37)

Host.—*Seriola mazatlana* Steindachner, amberjack, bohala [new host record].

Location.—Intestine.

Locality.—Saint Bartholomew Island, Archipelago de las Perles, Panama.

Discussion.—This species was described from *Seriola quinqueradiata* in Japan. Yamaguti (1934) illustrated the type specimen with the cirrus sac reaching approximately 3/4 distance from the acetabulum to beginning of the vitellaria, the hermaphroditic duct about 1/4 length of cirrus sac, and the genital pore immediately preacetabular. Yamaguti stated that the posterior limit of the cirrus sac may sometimes reach the level of the vitellaria or even beyond. My specimen of *T. orientalis* does not agree with the type specimen with respect to extent of the cirrus sac and length of the hermaphroditic duct. The hermaphroditic duct is almost as long as cirrus sac, the junction of uterus with hermaphroditic duct

[12] The name *pseudocarangis* indicates the close relationship of the species with *Stephanostomum carangis* (Yamaguti, 1951) Caballero, 1952.

Figures 35-39. **35.** *Stephanostomum pseudocarangis*, sp. nov., ventral view. **36.** *S. pseudocarangis*, oral sucker and spines, ventral view. **37.** *Tormopsolus orientalis* Yamaguti, ventral view. **38.** *Myodera magna*, sp. nov., latero-ventral view. **39.** *M. magna*, hermaphroditic sac.

is approximately 1/3 distance from acetabulum to vitellaria (as compared with immediately behind acetabulum in the holotype). I have examined Hanson's (1950) specimens of *T. orientalis* reported from a bonito in Bermuda. These specimens agree with mine in all details. The differences between my specimen and the figured holotype apparently are similar to the variations in *T. orientalis* described by Yamaguti.

Measurements of my specimen are as follows: Body 11.286 long by 0.475 wide at acetabular level. Forebody 0.665 long. Hindbody 10.298 long. Oral sucker 0.209 long by 0.209 wide. Acetabulum 0.323 long by 0.361 wide. Sucker ratio approximately

1:1.55. Pharynx 0.152 long by 0.114 wide. Ovary 0.21 long by 0.152 wide. Anterior testis 0.475 long by 0.190 wide. Posterior testis 0.490 long by 0.247 wide. Posttesticular space 0.665 long. Eggs 54 to 87 by 26 to 60 microns.

H. *Family WARETREMATIDAE Srivastava, 1939*

Myodera **magna,** sp. nov.[13]

(Figures 38-39)

Host.—*Kyphosus elegans* Peters, chopa, chub.

Location.—Intestine.

Locality.—Taboga Island, Gulf of Panama.

Holotype.—U.S.N.M. Helm. Coll. No. 38875.

Diagnosis (based on one specimen).—Body cylindrical, spined anteriorly, 5.237 long by 0.77 wide. Oral sucker terminal, 0.228 long by 0.228 wide. Forebody 0.737 long, with ventrolateral parenchymal muscle bands. Posterior body 4.5 long. Acetabulum 0.282 long, retractile, distally located on a peduncle; with one muscular, conical, equatorial papilla on each side of longitudinal aperture. Acetabular peduncle 0.335 long. Sucker length ratio 1:1.22. Prepharynx approximately 1/7 length of pharynx. Pharynx 0.282 long by 0.282 wide, with anterior and posterior circular bands 1/3 and 1/7 length of pharynx respectively. Esophagus approximately twice longer than pharynx, muscular, bifurcating for 1/4 its posterior length before connecting with ceca. Ceca voluminous, extending to posterior end of body, joining excretory vesicle to form a uroproct. Testis single, in posterior 1/4 body, intercecal, more than 3 times longer than wide, 0.740 long by 0.201 wide. Hermaphroditic sac 0.310 long, between acetabulum and oral sucker, surrounded by prostatic cells which are in turn surrounded by a thin membrane. Hermaphroditic sac (fig. 39) contains an internal seminal vesicle which occupies posterior 3/4 of the sac, a small prostatic vesicle, and a tube which opens on a genital lobe separated from the hermaphroditic sac by a weak muscular band. Also within the sac is a muscular metraterm which opens on the genital lobe separately from the male duct. External seminal vesicle tubular, entering right side of posterior end of hermaphroditic sac after first making one anterior loop at level of mid-hermaphroditic sac, extending posteriorly to near ovary. Ovary globular, 0.268 long by 0.268 wide, intercecal, widely separated from testis by a space almost equal to posttesticular space. Mehlis' gland dorsal to ovary. Uterine seminal receptacle present. Laurer's canal opening dorsally at level of Mehlis' gland. Vitellaria extending from about 0.5 posterior to cecal bifurcation to posterior end of body, dorsal and ventral to ceca. Uterus intercecal, anterior to ovary, entering left side of posterior end of hermaphroditic sac to connect with muscular metraterm. Eggs with polar filaments approximately 3 times longer than egg, 60 to 64 by 20 to 36 microns. Excretory vesicle not visible anterior to testis. One pair of lymphatic vessels on each side of body visible a short distance posterior to cecal bifurcation.

Discussion.—*Myodera magna* differs from *M. medialunae* Montgomery, 1957, the only other species in the genus, as follows: (1) the anterior portion of the uterus is non-muscular; (2) the acetabular peduncle is not as long; (3) the posterior body is about 4 times longer than forebody as compared with only half as long; (4) external seminal vesicle extends almost to ovary as compared with extending only 2/3 distance from hermaphroditic sac to ovary; (5) the ovary is separated from the testis by a distance of almost 3/4 length of testis as compared with ovary and testis almost in contact; (6) papillae absent from posterior end of body; and, (7) polar filaments 3 times longer than egg as compared with filaments 4 to 5 times longer than egg.

Although Montgomery (1957) did not figure or describe a membrane around the prostatic cells surrounding the hermaphroditic sac, a study of a paratype specimen of *M. medialunae* shows that there is a very delicate membrane present. The paratype of *M. medialunae* at my disposal is very darkly stained and details of a lymphatic system cannot be accurately observed. If *Myodera medialunae* does not possess a lymphatic system, a new genus may be erected for *M. magna.* Manter (1947) has already used this character to separate *Homalometron* from *Apocreadium* in the Lepocreadiidae.

[13] The name *magna* indicates the large size of the body.

Megasolena **kyphosi,** sp. nov.[14]
(Figures 40-42)

Host.—*Kyphosus analogus* (Gill), salema.

Location.—Intestine.

Locality.—Taboga Island, Gulf of Panama.

Holotype.—U.S.N.M. Helm. Coll. No. 38876.

Diagnosis (based on four specimens).—Body unspined, elongate, cylindrical, 2.790 to 2.83 long by 0.480 to 0.660 wide, bearing eyespots slightly lateral to, or overlapping, dorsal posterior edge of oral sucker. Oral sucker subterminal, 0.320 to 0.399 wide, posterior portion of sucker with circular muscle band 1/14 to 1/24 length of sucker (fig. 42). Acetabulum 0.893 to 0.912 from anterior end of body, 0.17 to 0.228 wide. Sucker ratio 1:0.53 to 0.58. Prepharynx approximately 1/4 length of pharynx. Pharynx 0.230 to 0.275 long by 0.023 to 0.260 wide, with anterior circular muscle band 1/4 to 1/3 length of pharynx. Esophagus approximately same length as pharynx. Cecal bifurcation slightly posterior to or dorsal to acetabulum. Ceca voluminous, indented on inner aspect at level of each testis, extending to posterior end of body, ending blindly. Genital pore slightly sinistral, usually at level with left posterior edge of pharynx. Testes intercecal, immediately postequatorial, round in shape, tandem; anterior testis separated from posterior testis by approximately half its length, 0.228 to 0.320 long by 0.190 to 0.220 wide; posterior testis 0.266 to 0.322 long by 0.190 to 0.247 wide. Posttesticular space 0.684 to 0.799. Hermaphroditic sac immediately to left of midline, 0.270 to 0.370 long, partly ventral to pharynx, partly dorsal to acetabulum, posterior end extending to mid- or posterior-edge of acetabulum or slightly beyond. Internal seminal vesicle connecting with metraterm near middle of hermaphroditic sac. Genital sinus leads to a short genital atrium which opens to outside through genital pore. Prostatic cells surrounding internal seminal vesicle and genital sinus within hermaphroditic sac. External seminal vesicle from halfway between acetabulum and ovary from anterior edge of ovary, to hermaphroditic sac. Ovary 1/4 to 1/2 distance from anterior testis to acetabulum, globular in shape, 0.13 to 0.174 long by 0.131 to 0.152 wide. Vitellaria extending from about 1/2 way from anterior testis to acetabulum, to posterior end of body, overlapping ceca along posterior extent, fusing medially between ovary and anterior testis, between testes, to fill posttesticular area. Uterus preovarian, intercecal entering genital sinus on left side of hermaphroditic sac, basal portion sometimes swollen with sperm. Eggs 64 to 74 by 43 to 47 microns. Excretory vesicle Y-shaped, bifurcating immediately behind ovary, arms extending laterally and dorsally to level with posterior edge of acetabulum. Lymphatic system present, but vessels not clearly visible.

Immature specimens.—Measurements (3 specimens): body 2.280 to 2.740 long by 0.532 to 0.665 wide. Oral sucker subterminal, 0.320 to 0.360 wide. Acetabulum 0.836 to 0.391 from anterior end of body, 1.311 to 1.824 from posterior end of body, 0.171 to 0.190 wide. Sucker ratio 1:0.49 to 0.56. Pharynx 0.210 to 0.370 long by 0.230 to 0.240 wide. Anterior testis 0.108 to 0.25 long by 0.055 to 0.103 wide. Posterior testis 0.250 to 0.228 long by 0.114 to 0.130 wide. Ovary 0.090 to 0.190 long by 0.090 to 0.209 wide. Vitelline glands apparently just differentiating in a specimen 2.74 long (fig. 41).

Discussion.—*M. kyphosi* is closely related to *M. estrix* Linton, 1910 (figs. 43, 44). Manter (1935) redescribed the latter. I have studied specimens from *Kyphosus incisor* and *K. sectatrix* from Tortugas, Florida. *M. kyphosi* has vitellaria confluent between the ovary and anterior testis and between testes. In all six specimens of *M. estrix* observed, the testes are always in close contact and no vitelline follicles come between them. This character appears to be constant and easily separates the two species.

I. *Family HAPLOSPLANCHNIDAE Poche, 1925*

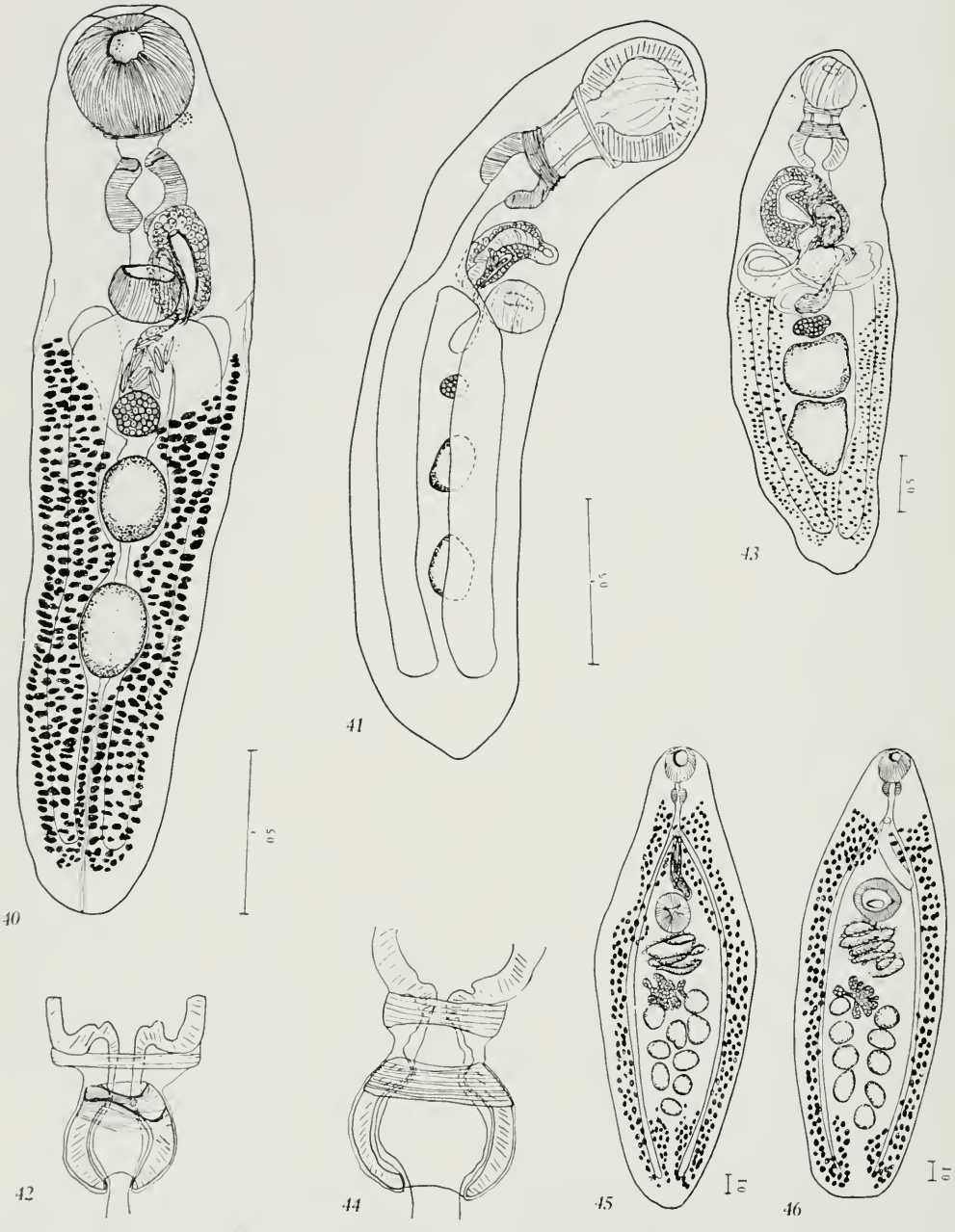
Haplosplanchnus acutus (Linton, 1910) Manter, 1937

Hosts.—*Thyrinops pachylepis* (Gunther) [new host record]; *Tylosurus raphidoma* (Ranzani), needle fish.

Location.—Intestine, next to pyloric junction.

Locality.—*T. pachylepis* from Bella Vista Beach, Panama City, Panama Pacific; and

[14] The name *kyphosi* is for the host genus *Kyphosus*.



Figures 40-46. **40.** *Megasolena kyphosi*, sp. nov., ventral view of mature specimen. **41.** *M. kyphosi*, ventral view of immature specimen. **42.** *M. kyphosi*, ventral view, showing circular muscle bands at base of oral sucker and anterior border of pharynx. **43.** *Megasolena estrix* (Linton), dorsal view. **44.** *M. estrix*, dorsal view, showing circular muscle bands at base of oral sucker and anterior border of pharynx. **45.** *Helicometrina nimia* Linton, ventral view, from *Lutjanus synagris*. **46.** *H. nimia*, ventral view, from *Haemulon sciurus*.

T. raphidoma from off Lerner Laboratory pier, N. Bimini, B.W.I. [new locality record].

Discussion.—*H. acutus* has been reported from *Tylosurus rhaphidoma* and *T. acus* in Bermuda by Linton, and from *T. marinus* at Tortugas by Manter (1947). Caballero, Bravo and Grocott (1953) reported it from *Tylosurus fodiator* in the Panama Pacific. I examined one specimen each of *Tylosurus stolzmani* and *T. pacificus* but did not find *H. acutus.* The record from *Thyrinops pachylepis* is believed to represent an accidental infection. Manter (1940a) reported a single specimen of *H. acutus* from *Kyphosus.* His record from this host may also represent an accidental infection. The trematode is typically a parasite of needle fishes.

J. *Family OPECOELIDAE Ozaki, 1925*

Helicometrina nimia Linton, 1910
(Figures 45-46)

Hosts.—*Epinephelus analogus* Gill, grouper [new host record]; *Haemulon album* Cuv. & Val., margatefish [new host record]; *Haemulon sciurus* (Shaw), blue-striped grunt [new host record]; *Lutjanus synagris* (Linn.), lane snapper.

Location.—Pyloric ceca.

Locality.—*E. analogus* from tidepool in Bella Vista, Panama City, Panama Pacific; *H. album* from Lerner Fish Pens, N. Bimini, and *H. sciurus* and *L. synagris* from N. shore, N. Bimini, B.W.I.

Discussion.—*H. nimia* has been reported from 16 and 7 host species from the Atlantic and Pacific coasts of the continent respectively. Twelve families of fishes serve as definitive hosts for *H. nimia.* The only fish family which *H. nimia* has in common as a host from both oceans is the Scorpaenidae.

Helicometra torta Linton, 1910
(Figure 47)

Host.—*Epinephelus striatus* (Bloch), Nassau grouper.

Location.—1/4 intestine.

Locality.—Lerner Fish Pens, N. Bimini, B.W.I. [new locality record].

Helicometra exacta Linton, 1910

Host.—*Haemulon sciurus* (Shaw), blue-striped grunt; *Gymnothorax* vicinus (Castelnau), brown moray [new host record].

Location.—1/4 intestine of *H. sciurus;* and mid intestine of *G. vicinus.*

Locality.—*H. sciurus* from N. shore, N. Bimini; *G. vicinus* from opposite Lerner Laboratory Pier, N. Bimini, B.W.I. [new locality record].

Stenopera equilata Manter, 1933
(Figure 48)

Host.—*Holocentrus ascencionis* (Osbeck), squirrel-fish.

Location.—Pyloric ceca.

Locality.—Lerner Fish Pens, N. Bimini, and near Cat Cay, B.W.I. [new locality record].

Neonotoporus yamagutii Manter, 1947

Host.—*Selar crumenopthalmus* (Bloch), goggle-eyed scad.

Location.—1/2 intestine.

Locality.—Off Lerner Laboratory Pier, Bimini, B.W.I. [new locality record]. Previously known from Tortugas.

Pseudopecoeloides gracilis Manter, 1947

Host.—*Selar crumenopthalmus* (Bloch), goggle-eyed scad; *Apogon binotatus* (Poey), cardinal fish.

Location.—Mid-intestine of *S. crumenopthalmus* and 3/4 intestine of *A. binotatus.*

Locality.—Off Lerner Laboratory Pier, N. Bimini, B.W.I.

Podocotyle **mycteropercae,** sp. nov.[15]
(Figure 49)

Host.—*Mycteroperca falcata* (Poey), scamp.

Location.—Pyloric ceca.

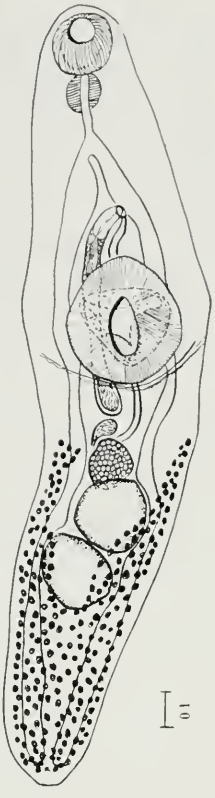
Locality.—"Bimini vicinity", B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38871.

Diagnosis (measurements on one mature specimen).—Body elongate, widest at level of acetabulum and tapering to a rounded end; cuticle unspined; 2.360 long by 0.540 at greatest width. Forebody 0.750 long. Hindbody 1.210 long. Oral sucker subterminal, 0.201 long by 0.201 wide. Acetabulum short pedunculated, 0.402 long by 0.369 wide. Sucker ratio 1:1.83. Prepharynx absent. Pharynx 0.101 long by 0.094 wide. Esophagus about equal to pharynx length. Ceca extending to posterior end of body, ending blindly. Genital pore slightly sinistral, midway between cecal bifurcation

[15] The name *mycteropercae* is for the host genus, *Mycteroperca.*

47



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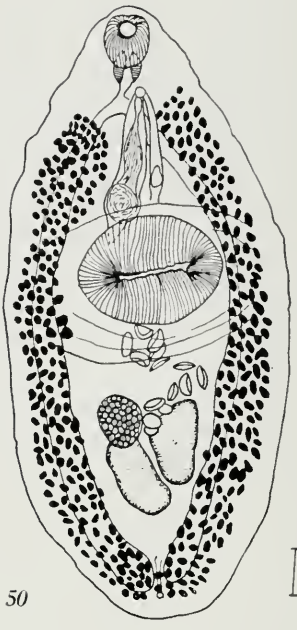

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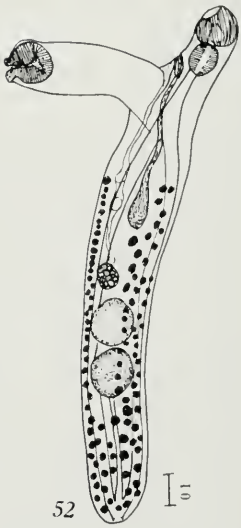


52

Figures 47-52. **47.** *Helicometra torta* Linton, ventral view. **48.** *Stenopera equilata* Manter, ventral view. **49.** *Podocotyle mycteropercae*, sp. nov., ventral view. **50.** *Pachycreadium lerneri*, sp. nov., ventral view. **51.** *Opecoelus sphaericus* Ozaki, ventral view. **52.** *Pseudopecoeloides equesi* Manter, latero-ventral view.

and acetabulum. Gonads tandem, postequatorial, intercecal. Testes roundish, smooth, almost in contact with each other; anterior testis 0.21 long by 0.2 wide; posterior testis 0.2 long by 0.2 wide. Cirrus sac extending posterior to acetabulum about halfway to ovary (in contact with ovary in immature specimens); cirrus in anterior 1/6 sac; internal seminal vesicle surrounded by prostate cells. Ovary smooth, roundish, median, slightly overlapping anterior testis; 0.15 long by 0.13 wide. Seminal receptacle club-shaped, dextral and anterior to ovary. Vitellaria extending laterally from level of anterior end of ovary to posterior end of body, overlapping ceca and potrions of testes, filling posttesticular space. Uterus preovarian. Eggs (collapsed) 53 by 24 microns. Excretory pore terminal, excretory vesicle saccular, extending to level of ovary.

Discussion.—There are 38 species in the genus *Podocotyle* Dujardin, 1845. Of these only 6 possess a smooth ovary and cirrus sac extending posteriorly past the acetabulum; these are: *P. epinepheli* Yamaguti, 1942; *P. gracilis* Yamaguti, 1952; *P. mecopera* Manter, 1940; *P. pedicillatum* (Stossich, 1887) Stossich, 1898; *P. petallophallus* (Yamaguti, 1934) Park, 1937, and *P. serrani* Yamaguti, 1952.

P. mycteropercae differs from *P. gracilis* and *P. pedicillatum* by possessing vitellaria which do not reach the acetabulum, and an almost median genital pore as compared with vitellaria reaching acetabulum and a definitely sinistral genital pore. *P. mycteropercae* differs from *P. petallophallus* by possessing a smooth cirrus, short stalked acetabulum and vitellaria ending at the level of the anterior edge of the ovary, as compared with a cirrus with petaloid appendages, a longer stalked acetabulum and vitellaria extending anteriorly far beyond level of ovary. *P. mycteropercae* differs from *P. epinepheli* and *P. mecopera* in sucker ratio (1:1.83), an almost straight seminal vesicle, and genital pore almost median and between cecal bifurcation and acetabulum, as compared with sucker ratio of about 1:2.3, a convoluted internal seminal vesicle, and genital pore on outer side of cecum at level of cecal bifurcation. *P. mycteropercae* differs from *P. serrani* in that the vitellaria do not extend anteriorly much past the ovary, a more posterior acetabulum, almost straight cirrus sac extending only a short distance posterior to acetabulum, genital pore almost median on inner aspect, as compared with vitellaria clearly extending far beyond ovary, more anterior acetabulum, sigmoid-shaped cirrus sac extending for at least half its length posteriorly beyond acetabulum, and genital pore to the left of cecum.

Pachycreadium **lerneri,** sp. nov.[16]

(Figure 50)

Host.—*Gerres cinereus* (Walbaum), *mojarra.*

Location.—Pyloric cecum.

Locality.—Off Lerner Laboratory Pier, Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38872.

Diagnosis.—Body robust, elongate; cuticle unspined and thick; broadly rounded at posterior end; 1.406 long by 0.646 wide at acetabular level. Forebody 0.482 long. Hindbody 0.637 long. Oral sucker subterminal; 0.161 long by 0.141 wide. Acetabulum preequatorial; 0.26 long by 0.328 wide. Sucker ratio 1:2.33. Prepharynx absent. Pharynx 0.1 long by 0.074 wide. Esophagus approximately 1/2 length of pharynx. Ceca ending blindly near posterior end of body. Genital pore slightly sinistral, between cecal bifurcation and pharynx. Gonads postequatorial, intercecal. Testes diagonal, sinistral testis anteriormost, smooth, twice longer than wide, 0.228 by 0.114 wide; dextral testis 0.228 long by 0.1 wide. Cirrus sac median, overlaping anterior 1/4 of acetabulum; cirrus in anterior 1/5 sac; internal seminal vesicle in posterior 4/5 sac. Ovary to right of midline, overlapping dextral testis slightly, smooth, globular, 0.134 long by 0.101 wide. Seminal receptacle not observed. Vitellaria extending from level of genital pore to posterior end of body, dorsal and ventral to ceca. Uterus from mid-ovarian level to genital pore. Collapsed eggs 56 to 69 by 32 to 40 microns; one egg with an antiopercular filament 21 microns long; other eggs without filament. Excretory pore ventral, at level of ends of ceca; anterior extent of excretory bladder not observed.

Discussion.—Manter (1954) erected the genus *Pachycreadium* for *Plagioporus gas-*

[16] The name *lerneri* is in honor of Mr. Michael Lerner in appreciation for his aid in this study.

trocotylum Manter, 1940. Aside from *P. gastrocotylum* (Manter, 1940) Manter, 1954 (type species) the genus contains one other species, *Pachycreadium crassigulum* (Linton, 1910) Manter, 1954, (syn: *Plagioporus crassigulus* (Linton, 1934) Price, 1934). *P. lerneri* differs from *P. crassigulum* by possessing a longer hindbody and more unequal sucker ratio. *P. lerneri* appears to be most closely related to *P. gastrocotylum* differing in sucker ratio (1:2.33) as compared with 1:2), smaller pharynx, vitellaria not confluent anterior to the acetabulum, and testes longer than wide rather than wider than long.

P. gastrocotylum is from *Calamus brachysomus* in the Galapagos Islands; *P. crassigulum* from *Calamus* and other hosts is known from Tortugas, Florida.

Pseudopecoelus barkeri Hanson, 1950

Host.—*Holocentrus ascensionis* (Osbeck), squirrelfish.

Location.—Pyloric cecum.

Locality.—Lerner Fish Pens, Bimini, B.W.I. [new locality record]; formerly known from the same host at Bermuda.

Hamacreadium mutabile Linton, 1910

Hosts.—*Epinephelus striatus* (Bloch), Nassau grouper [new host record]; *Haemulon sciurus* (Shaw), bluestriped grunt [new host record]; *Lutjanus synagris* (Linn.), lane snapper; *Petrometopon cruentatus* (Lacépède), graysby [new host record].

Location.—Pyloric ceca of *E. striatus, H. sciurus* and *P. cruentatus*, and pyloric ceca (immature) and whole length of intestine except rectum in *L. synagris.*

Locality.—*E. striatus* from Lerner Fish Pens, *H. sciurus* from N. shore N. Bimini; *L. synagris*, N. shore N. Bimini; and *P. cruentatus* from "Bimini vicinity", B.W.I.

Discussion.—I have studied the genital pore position of 23 specimens of *M. mutabile* from *Lutjanus griseus* from Tortugas (Manter Collection) and *Lutjanus synagris* from Bimini and find that 56.6 percent possess a sinistral genital pore and the rest, 43.5 percent, possess a median genital pore. Nagaty (1941) studied 34 specimens of this species and found a sinistral genital pore in 21, median genital pore 9, while 4 possessed a dextral genital pore.

This widely distributed trematode is found in many species of fishes.

Opecoelus sphaericus Ozaki, 1925
(Figure 51)

Host.—*Scorpaena mystes* Jordan & Starks, lapon [new host record].

Location.—Intestine.

Locality.—Taboga Island, Panama Pacific [new locality record].

Discussion.—The one specimen collected was cut halfway through the body at a point posterior to the acetabular stalk, between the ovary and anterior testis. The cut may have been made accidentally in opening the host intestine for examination. However, the tissue around the cut appeared regenerated in part and the accident may have occurred under natural conditions. The specimen differs from Ozaki's (1925) original description of *O. sphaericus* in having a smooth ovary; in *O. sphaericus* the ovary is slightly trilobed. The ovary could be viewed only from the side in my specimen; perhaps it would appear trilobed were it viewed from the ventral side. Other small differences such as vitelline distribution were considered negligible.

Pseudopecoeloides equesi Manter, 1947
(Figure 52)

Host.—*Stellifer* sp. [new host record].

Location.—Intestine.

Locality.—Bella Vista, Panama City, Panama.

Discussion.—The paratype specimens of *P. equesi* show the posterior testis to be larger than the anterior testis but this difference is not considered important enough to warrant two species although it may represent geographical variation. *P. equesi* has been reported heretofore only from *Eques lanceolatus* and *Eques acuminatus* at Tortugas, Florida. It is another example of a species occurring in related hosts in the two oceans.

K. *Family CRYPTOGONIMIDAE Ciurea, 1933*

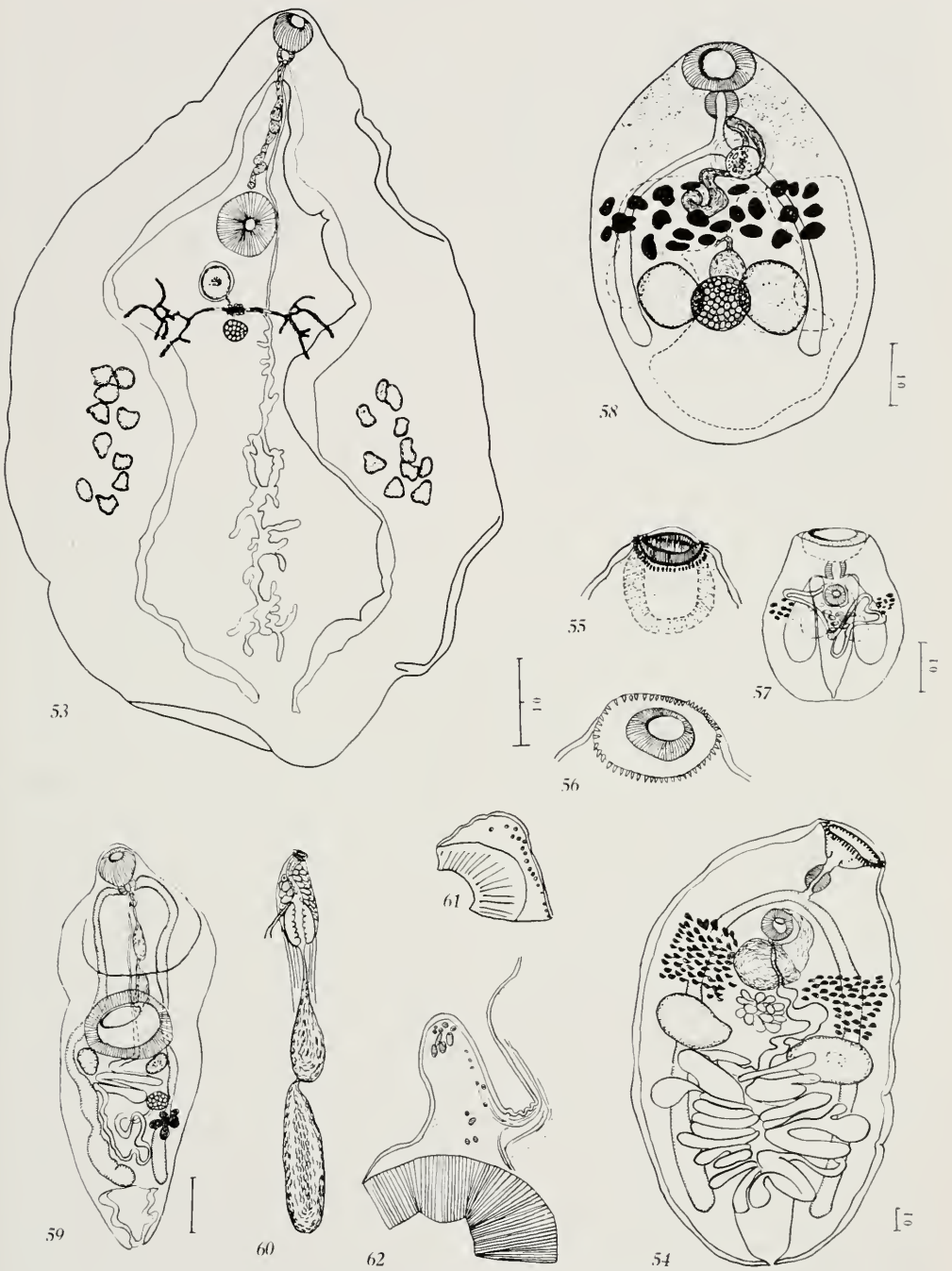
Paracryptogonimus americanus Manter 1940
(Figures 54-56)

Host.—*Lutjanus novemfasciatus* (Gill), pargo.

Location.—Pyloric ceca.

Locality.—Taboga Island, Gulf of Panama.

Discussion.—This species was reported from *Lutjanus novemfasciatus* "or *L. cyanop-*



Figures 53-62. **53.** *Nagmia pacifica* (Caballero), ventral view. **54.** *Paracryptogonimus americanus* Manter, ventral view. **55.** *P. americanus*, ventral view, oral sucker in normal position. **56.** *P. americanus*, ventral view, oral sucker expanded. **57.** *Metadena crassulata* Linton, ventral view. **58.** *Gonacanthella lutjani*, gen. nov., sp. nov., ventral view. **59.** *Sterrhurus taboganus*, sp. nov., ventral view. **60.** *S. taboganus*, terminal genital structures. **61.** *S. taboganus*, sagittal section through preoral lobe showing musculature. **62.** *S. taboganus*, sagittal section showing musculature of preacetabular pit.

terus" from Mexico and Panama, by Manter (1940).

The original description of *P. americanus* stated only that the acetabulum is usually about 2/3 width of oral sucker. Twelve specimens of *P. americanus* in my collection had a sucker ratio from 1:0.54 to 1.0. The gland cells of the forebody of *P. americanus* were studied as follows: specimens fixed in A.F.A. and preserved in 70% ethanol were sectioned (10 microns) and stained with 0.05% Toluidin-Blue in citric acid (pH 3.5) buffer. The sections were observed in water mounts and later dehydrated and mounted in balsam. The Toluidin-Blue staining indicated that these gland cells are probably not mucus producing. Since the glands are near the pharynx, they may produce some enzyme.

Body shape of *P. americanus* is extremely variable; specimens vary from elongate to almost completely round in outline.

Figures 55 and 56 show that the anterior end of the body may be retracted and the oral sucker may be flared out until the oral spines appear to be on the body surface rather than on the oral sucker. Careful focusing revealed that the spines were actually on the oral sucker. Once the spines are attached to the host tissue, the body surface which surrounds the spines may act as an additional retainer in keeping the host tissues attached to the spines. This arrangement would facilitate protrusion of the pharynx through the sucker, the anterior gland cells of the pharynx possibly having a lytic action on the host tissue.

Metadena crassulata Linton, 1910
(Figure 57)

Host.—*Lutjanus analis* (Cuv. & Val.), muttonfish.

Location.—1/4 intestine.

Locality.—Lerner fish pens, N. Bimini, B.W.I. [new locality record].

Metadena globosa (Linton, 1910) Price, 1940

Host.—*Ocyurus chrysurus* (Bloch), yellowtail [new host record].

Location.—Pyloric ceca and 1/4 intestine.

Locality.—Close to Cat Cay, B.W.I. [new locality record].

Siphodera vinaledwardsi (Linton, 1899) Linton, 1910

Host.—*Lutjanus synagris* (Linn.), spot snapper [new host record].

Location.—Pyloric ceca and mainly in intestine excepting rectum.

Locality.—Lerner fish pens and N. shore, N. Bimini, B.W.I. [new locality record].

Gonacanthella lutjani. gen. nov., sp. nov.[17]
(Figure 58)

Host.—*Lutjanus jordani*(?) Gilbert, pargo hilguero.

Location.—Pyloric ceca.

Locality.—Taboga Island, Gulf of Panama.

Holotype.—U.S.N.M. Helm. Coll. No. 38873.

Diagnosis (based on two specimens, measurements on one favorable specimen).—Body 0.630 long by 0.429 wide; ellipsoidal in outline; spined to posterior end; with numerous gland cells in parenchyma. Oral sucker 0.074 long by 0.040 wide; terminal and retractile. Acetabulum 0.030 long by 0.040 wide, in anterior 1/3 body, recessed into body. Prepharynx absent. Pharynx 0.035 long by 0.043 wide. Esophagus as long as pharynx. Cecal bifurcation immediately preacetabular. Ceca extending to posterior 3/4 body; ending blindly. Gonads immediately postequatorial, side by side and intercecal. Testes globular, separated from each other by ovary and seminal receptacle; dextral testis 0.107 long by 0.107 wide; sinistral testis 0.121 long by 0.114 wide. Gonotyl immediately preacetabular; protruding from body; bulbular, 0.067 long by 0.067 wide, provided with spines 16 microns long by 3 microns wide which surround gonotyl in three rows. Seminal vesicle forming a sigmoidal-like curve between ovary and gonotyl, extending anteriorly to pharynx, then making a sharp turn posteriorly to insert dorsally into gonotyl. Ovary 0.072 long by 0.096 wide; globular; intertesticular, slightly overlapping both testes ventrally. Seminal receptacle pyriform, bent sharply at its narrow anterior end, half its posterior length between testes, overlapping anterior 1/5 ovary dorsally. Vitellaria of large follicles dorsal to ceca, extend-

[17] The name *Gonacanthella* indicates the spines on the gonotyl; and *lutjani* indicates the host genus *Lutjanus*.

ing across body between gonotyl and testes. Uterus filling most of hindbody to acetabulum in one specimen and to posterior level of pharynx in another. Eggs 16 to 23 by 11 to 15 microns. Excretory vesicle obscured by numerous eggs in uterus.

Generic diagnosis of Gonacanthella.—Cryptogonimidae; body elliptical in outline, spined to posterior end. Forebody with numerous gland cells in parenchyma. Oral sucker terminal and retractile. Acetabulum in anterior 1/3 body, recessed into body. Pharynx spherical. Esophagus present. Ceca extending slightly posterior to testes. Gonads postequatorial, intercecal, side by side. Testes globular, separated from each other by ovary. Gonotyl immediately preacetabular, protrusible, globular in shape, spined. Seminal vesicle extending from between ovary and gonotyl to region of pharynx, bending sharply backward to insert into gonotyl dorsally. Ovary round, between testes. Vitellaria follicular, extending across the body between gonotyl and testes. Seminal receptacle median, between testes. Uterus filling most of hindbody. Eggs operculated, yellow, thin-shelled. Excretory vesicle not observed. Type species: *Gonacanthella lutjani.*

Discussion.—The family Cryptogonimidae Ciurea, 1933 contains at least 21 genera. *Gonacanthella* is most closely related to *Metadena* Linton, 1910, differing only by possessing a spined gonotyl as compared with spines lacking on gonotyl; and smooth instead of follicular or deeply lobed ovary.

The genus *Proneochasmus* Szidat, 1954 is actually a synonym of *Paraspina* Pearse, 1920, agreeing in all important details. Both genera are known only from pimelodid catfishes of South America. *Proneochasmus argentinensis* Szidat, 1954 becomes *Paraspina argentinensis* (Szidat, 1954) new comb. *Paraspina bagre* Pearse, 1920, type and only other species, differs from *Paraspina argentinensis* in egg size (16 by 18 microns as compared with 30 by 13 microns) and in possessing 20 instead of 26 peribuccal spines.

L. *Family FELLODISTOMATIDAE Nicoll, 1935*

Proctoeces subtenue (Linton, 1907) Hanson, 1950

Host.—*Calamus bajonado* (Bloch & Schnieder), jolt-head porgy.

Location.—Intestine.

Locality.—Lerner fish pens, N. Bimini, B.W.I. [new locality record].

Discussion.—*P. subtenue* was reported from *Calamus* at Bermuda by Linton (1907) and Hanson (1950) and from *Calamus* spp. at Tortugas by Manter (1947) under the name of *P. erythraeus* Odhner, 1911. Odhner described his material from *Julis lunaris* and *Chrysophrys bifasciatus* in the Red Sea. Hanson considered *P. erythraeus* a synonym of *P. subtenue,* which is found almost exclusively in the family Sparidae from Bermuda, Tortugas, Fla., Bimini, B.W.I. and the Red Sea. *Julis lunaris* is a Labrid fish. *P. subtenue* is also reported from New Zealand (Manter, 1954) from *Latridopsis ciliaris,* family Latridae.

Antorchis urna (Linton, 1910) Linton, 1911

Host.—*Pomacanthus aureus* (Bloch), black angelfish.

Location.—Pyloric ceca and entire length of intestine but mainly in pyloric ceca and 1/4 intestine.

Locality.—Lerner fish pens and N. shore N. Bimini, B.W.I. [new locality record]; known also at Tortugas.

Bacciger harengulae Yamaguti, 1938

Host.—*Harengula clupeola* (Cuvier), big-eyed sardine.

Location.—Pyloric ceca.

Locality.—Off Lerner Laboratory pier, N. Bimini, B.W.I. [new locality record]; other localities are Tortugas, Florida, and Japan.

Discussion.—There were usually two *B. harengulae* per cecum. The worms were usually located in the middle of the cecum and were separated from each other by at least one body length. The worms were easily observed *in situ* as the host's ceca were almost transparent.

Tergestia pectinata (Linton, 1905) Manter, 1940

Hosts.—*Caranx crysos* (Mitchill), hard-tailed jack; *Caranx latus* (Agassiz), horse-eyed jack; *Caranx ruber* (Bloch), skip jack; *Selar crumenopthalmus* (Bloch), goggle eyed scad.

Location.—Rectum of *C. crysos;* mid-intestine of *C. ruber* and *S. crumenopthalmus;* and 1/4 and mid-intestine of *C. latus.*

Locality.—*C. crysos*, from N. shore, N. Bimini; *C. latus* from Lerner fish pens, N. Bimini; *C. ruber* from W. side of N. Bimini; and *S. crumenopthalmus* from off Lerner Laboratory pier, N. Bimini, B.W.I. [new locality record]; known also from Woods Hole, Massachusetts; Beaufort, North Carolina; and Tortugas.

M. *Family MONORCHIIDAE Odhner, 1911*

Genolopa ampullacea Linton 1910

Hosts.—*Haemulon album* Cuv. & Val., margate-fish; *Haemulon parra* (Desmarest), sailor's choice [new most record]; *Haemulon plumieri* (Lacépède), white grunt; *Haemulon sciurus* (Shaw), blue-striped grunt.

Location.—Pyloric ceca.

Locality.—*H. album* and *H. sciurus* from Lerner fish pens, N. Bimini; *H. sciurus* from N. shore, N. Bimini; *H. parra* and *H. plumieri* from 1/2 mi. S. of S. Bimini.

Proctotrema truncatum (Linton, 1910) Manter, 1940

Hosts.—*Caranx ruber* (Bloch), skip-jack [new host record]; *Haemulon parra* (Desmarest), sailor's choice; *Haemulon plumieri* (Lacépède), white grunt; *Haemulon sciurus* (Shaw), blue-striped grunt.

Location.—Pyloric ceca.

Locality.—*C. ruber* from W. shore of N. Bimini; *H. parra* and *H. plumieri* from 1/2 mi. S. of S. Bimini; and *H. sciurus* from Lerner fish pens and N. shore, N. Bimini, B.W.I. [new locality records].

N. *Family ZOOGONIDAE Odhner, 1911*

Diplangus paxillus Linton, 1910

Hosts.—*Haemulon album* Cuv. & Val., margatefish; *Haemulon parra* (Desmarest), sailor's choice; *Haemulon plumieri* (Lacépède), white grunt; *Haemulon sciurus* (Shaw), blue-striped grunt.

Location.—Predominantly in 2/3 intestine but sometimes (2 cases) in pyloric ceca and then always both in ceca and in 2/3 intestine.

Locality.—Lerner Fish Pens, Bimini, B.W.I.

Steganoderma atherinae (Price, 1934) Yamaguti, 1953

Host.—*Hepsetia stipes* (Muller & Troschel), hardhead, silverside [new host record].

Location.—1/4 intestine and mid-intestine (1 specimen in 1 host specimen).

Locality.—Opposite Lerner Laboratory Pier, Bimini, B.W.I.

Discussion.—The Bimini report is the northernmost record for *S. atherinae* which was described from the Dominican Republic. Manter (1947) examined 66 specimens of *Hepsetia stipes* in Tortugas, Florida, but did not find *S. atherinae*.

O. *Family BIVESICULIDAE Yamaguti, 1939*

Bivesicula hepsetiae Manter, 1947

Host.—*Hepsetia stipes* (Muller & Troschler), silverside.

Location.—Mid-intestine.

Locality.—Off Lerner Laboratory Pier, Bimini, B.W.I.

P. *Family GORGODERIDAE Looss, 1901*

Nagmia pacifica (Caballero, 1945) Markell, 1953

Host.—*Carcharhinus natator* Meek & Hildebrand, black-tipped shark [new host record].

Location.—Coelom and intestinal mesenteries.

Locality.—Opposite mouth of Chiman River, near Pelado Island; Cocos Point, Isla del Rey and Playa Grande, San Jose Island, Archipielago de las Perlas; and Piñas Bay; all localities in the Gulf of Panama.

Discussion.—Caballero (1945) described *Petalodistomum pacificum* from 20 specimens taken from the coelom of an unidentified shark from the coast of Manzanillo, Mexico. Markell (1953) transferred *P. pacificum* to the genus *Nagmia* and the name became *Nagmia pacifica* (Caballero, 1945), Markell, 1953. Markell differentiated *Nagmia* from *Petalodistomum* Johnston, 1934 on the basis of whether or not there is branching of the efferent ducts of the testes such as is found in *Probolitrema* Looss, 1902 and in *Nagmia* Nagaty, 1930, but not in *Petalodistomum*. (Dollfus) 1937, Johnston (1934), Caballero (1945) and Caballero, et. al. (1956) considered *Nagmia* a synonym of *Petalodistomum*. When more species are known, the possible generic value of the vasa efferentia can be judged better.

N. pacifica is highly host-specific. In one night's collection several species of sharks over five feet in length were exam-

ined for this parasite. Only *Carcharhinus natator* harbored *N. pacifica.* Other similar collections in other parts of the Gulf of Panama and south west of Piñas Bay did not yield *N. pacifica* from any shark-like fish other than *Carcharhinus natator.* I have also studied three specimens of *Nagmia pacifica* collected by Miss Margarita Bravo Hollis at Punta Mita, Puerto Vallarta, Jalisco, Mexico, from an unidentified shark. Caballero's (1945) specimens are 9.355 to 14.647 mm. long. My Panama specimens were 6 to 15 mm long and one of Miss Bravo's specimens was 16.5 mm long. A specimen 6 mm long had eggs in the uterus. Caballero recorded a sucker ratio of 1:1.25 to 1.86 although his figure shows a sucker ratio of 1:1.12. Sucker ratios of specimens from my collection are from 1:1.09 to 2.34 (average about 1:1.44). Eggs of *N. pacificum* were described as 59 to 63 by 36 to 38 microns. Eggs from specimens in my collection measured 54 to 67 by 27 to 40 microns. Acetabulum position varies from anterior 1/4 to 1/3 of body, agreeing with Caballero's description "hacia delante del ecuador del cuerpo, por delante del ovario." (His plate shows the acetabulum in the anterior 1/4 body.) Recently Caballero, Barroeta, & Grocott (1956) reported *N. pacifica* from *Carcharias* in Panama. These authors apparently collected one specimen because they redescribed the species from one specimen and stated that the specimens from Mexico are larger in size than those from Panama and Alta California, U.S.A. As has been indicated above, *N. pacifica* appears to be host-specific to *Carcharhinus natator* in the Gulf of Panama, large numbers always being found in this shark. The record of a specimen of *N. pacifica* from *Carcharias* sp. in the Gulf of Panama may represent an accidental infection in this host or a host misidentification.

Q. *Family HEMIURIDAE Lühe, 1901*

Ectenurus virgulus Linton, 1910

Hosts.—Harengula clupeola (Cuvier), big-eyed sardine; *Selar crumenopthalmus* (Bloch), goggle-eyed scad.

Location.—Stomach.

Locality.—Off Lerner Laboratory pier, N. Bimini, B.W.I. [new locality record].

Brachadena pyriformis Linton, 1910

Hosts.—Haemulon album Cuv. and Val., margate fish; *Haemulon plumieri* (Lacépède), white grunt; *Haemulon sciurus* (Shaw), blue-striped grunt; *Haemulon parra* (Desmarest), sailor's choice; *Malacanthus plumieri* (Bloch), sandfish.

Location.—Stomach.

Locality.—H. album and *H. sciurus* from Lerner fish pens, N. Bimini; *H. parra, H. plumieri,* from 1/2 mi. S. of S. Bimini; and *M. plumieri,* from between Cat Cay and Bimini, B.W.I. [new locality records].

Discussion.—This trematode is known from numerous hosts at Tortugas, Florida, and Beaufort, North Carolina. It also occurs at La Jolla, California.

Leurodera decora Linton, 1910

Hosts.—Haemulon album Cuv. and Val., margate fish; *Haemulon plumieri* (Lacépède), margate fish; *Haemulon sciurus* (Shaw), blue-striped grunt; *Haemulon parra* (Desmarest), sailor's choice.

Location.—Stomach.

Locality.—H. sciurus and *H. album* from Lerner fish pens and N. shore N. Bimini; *H. plumieri* and *H. parra,* from 1/2 mi. S. of S. Bimini, B.W.I. [new locality record]; known from Tortugas.

Hysterolecitha rosea Linton, 1910

Host.—Acanthurus caeruleus Bloch and Schneider, blue tang.

Location.—Stomach.

Locality.—Off Lerner Laboratory pier, N. Bimini, B.W.I. [new locality record]; known from Tortugas.

Dinurus longisinus Looss, 1907

Host.—Coryphaena hippurus Linn., dolphin.

Location.—Stomach.

Locality.—Two hosts from 12 mi. N.W. San Jose Island, Archipielago de las Perlas, Panama Pacific; and 1 host from the Lerner fish pens, N. Bimini, B.W.I. [new locality record].

Discussion.—D. longisinus is a common parasite of dolphins from the Panamanian Pacific. Manter (1947) reported *D. longisinus* from 2 of 6 hosts in Tortugas, Florida. It also occurs in Japan and in the Red Sea, and is probably almost world wide in distribution.

Dinurus tornatus (Rud., 1895) Looss, 1907

Host.—Coryphaena hippurus Linn., dolphin.

Location.—Stomach.

Locality.—One host from Lerner fish pens, N. Bimini, B.W.I. [new locality record].

Discussion.—This species was not collected by me in Panama, but was found among specimens of *D. longisinus* collected and reported by Manter (1940a). *D. tornatus* may be separated from *D. longisinus* in that the cuticular annulations begin dorsally about level with the posterior border of the acetabulum, and the hermaphroditic duct extends past posterior border of acetabulum. *D. longisinus* differs by having transverse annulations of the soma cuticula beginning dorsal to oral sucker and the hermaphroditic duct never extends posterior to the acetabulum. Approximately 200 specimens of *D. longisinus* from five hosts in Panama Bay indicate that these are constant characteristics of this species. *D. tornatus* has been reported from the Red Sea, Massachusetts, Tortugas, and the South Atlantic.

Opisthadena dimidia Linton, 1910

Hosts.—*Kyphosus elegans* (Peters), chopa [new host record]; *Kyphosus sectatrix* (Linn.), Bermuda chub.

Location.—Stomach.

Locality.—*K. elegans* from North Restinga Beach, Taboga Island, Panama Pacific; and *K. sectatrix* from Bimini Vicinity, B.W.I. [new locality records].

Discussion.—*O. dimidia* was reported from *Kyphosus incisor* (Cuv. & Val.) and *Kyphosus sectatrix* (Linn.) from Tortugas, Florida by Manter (1947). The occurrence of *O. dimidia* from the Pacific Ocean is the first on record for this species. *O. dimidia* may have been a parasite of *Kyphosus* spp. when the two oceans were continuous during the last continental gap.

Tubulovesicula lindbergi (Layman, 1930) Yamaguti, 1934

Hosts.—Unidentified eel and *Synodus* sp.

Location.—Stomach.

Locality.—Off mouth of Chiman River near Pelado Island, Panama Bay, Panama.

Discussion.—Manter (1947) discussed at some length the status of the species of the genus *Tubulovesicula.* He considered *T. californica* Park, 1936; *T. pseudorhombi* Yamaguti, 1938; and *T. muraenasocis* Yamaguti, 1934 synonyms of *T. spari* Yamaguti, 1934. *T. madurensis* Nigrelli, 1940 was considered a synonym of *T. lindbergi* (Layman, 1930) Yamaguti, 1934. Manter later (1954) considered the following species as valid: *T. lindbergi* (Layman, 1930) Yamaguti, 1934; *T. pinguis* (Linton, 1940) Manter, 1947; *T. angusticauda* (Nicoll, 1915); *T. magnacetabulum* Yamaguti, 1939; *T. anguillae* Yamaguti, 1934, and *T. spari* Yamaguti, 1934. Nagaty (1956) described another species, *T. serrani.*

A study of the Panama specimens leads me to conclude that not only are *T. californica, T. pseudorhombi,* and *T. muraenasocis* synonyms of *T. spari,* but the latter in turn appears to be a synonym of *T. lindbergi,* as does *T. anguillae.* The only apparent difference between *T. lindbergi* and *T. spari* is egg size and this character is rather variable in *Tubulovesicula.* Manter (1954) found the only difference between *T. spari* and *T. anguillae* to be the length of the ecsoma. In my material from Panamanian fishes, the ecsoma varied from shorter than body length to as much as three times the body length, probably depending upon contraction and flattening pressure during fixation. Since *T. spari* appears to be a synonym of *T. lindbergi* the latter becomes the type species of the genus. *T. serrani* Nagaty, 1956, which was described from one specimen, also appears to be a synonym of *T. lindbergi.*

I believe only four species of *Tubulovesicula* are valid: *T. lindbergi, T. angusticauda. T. pinguis* and *T. magnacetabulum.* The species may be separated by the following key which is modified from Manter (1954):

1. Pars prostatica extending posteriorly past anterior ⅓ of acetabulum 2
   Pars prostatica not extending posterior to anterior edge of acetabulum ..... *T. angusticauda*
2. Acetabulum 3 times width of oral sucker ..... *T. magnacetabulum*
   Acetabulum less than 3 times width of oral sucker 3
3. Prostatic gland interrupted opposite acetabulum ..... *T. pinguis*
   Prostatic gland not interrupted opposite acetabulum ..... *T. lindbergi*

Parahemiurus merus (Linton, 1910) Woolcock, 1935

Host.—*Harengula clupeola* (Cuvier), big eyed sardine.

Location.—Stomach.

Locality.—Off Lerner Laboratory Pier, N. Bimini, B.W.I. [new locality record]; known from Tortugas, Florida and from coast of Ecuador.

Lecithochirium microstomum Chandler, 1935

Host.—*Sarda velox* Meek & Hildebrand, bonito.

Location.—Stomach.

Locality—Morro Sentinela, Piñas Bay, Panama Pacific.

Sterrhurus **taboganus,** sp. nov.[18]
(Figures 59-62)

Host.—*Gymnothorax dovii* (Gunther), morena.

Location.—Stomach.

Locality.—Taboga, Panama Pacific.

Holotype.—U.S.N.M. Helm. Coll. No. 38874.

Diagnosis.—*Sterrhurus* (measurements on six favorable specimens); body 3.610 to 4.360 long by 1.159 to 1.387 wide; maximum width between acetabulum and oral sucker. Cuticle smooth. Forebody 1.045 to 1.425 long; with a deep concavity of which the posterior rim is provided with a heavy bundle of circular muscle fibers (fig. 62); lateral borders of concavity usually extend anteriorly from posterior rim, parallel with edges of acetabulum for about 1/2 to 3/4 distance between acetabulum and oral sucker. Hindbody 1,520 to 2.128 long. Ecsoma usually retracted but may be extended a distance of 0.133. Preoral lobe present. Oral sucker 0.266 to 0.361 long by 0.361 to 0.418 wide; subterminal; lacking any type of projection into its lumen. Acetabulum 0.655 to 0.912 long by 0.665 to 0.703 wide; preequatorial or equatorial; aperture ovoid, slightly transverse or longitudinal. Sucker ratio 1:1.68 to 1.95. Prepharynx absent. Pharynx 0.114 to 0.152 long by 0.095 to 0.133 wide. Esophagus very short or absent. Ceca first transverse from pharynx then bending sharply towards posterior end of body at pharyngeal level, continuing a sinuous course on each side of body ending at the base of the retracted ecsoma. Testes 0.152 to 0.266 long by 0.171 to 0.285 wide. symmetrical one on each side of body immediately posterior to acetabulum, overlapping ceca or not; never extracecal. Genital pore median, opposite posterior half of pharynx, followed by a genital atrium and a short muscular hermaphroditic duct which is surrounded by prostatic cells enclosed in a sinus sac. Prostatic vesicle connects with hermaphroditic duct and is also completely enclosed in the sinus sac. Metraterm enters the sinus sac and joins the male duct immediately anterior to prostatic vesicle. Prostatic cells surround the bipartite, external seminal vesicle near its junction with the sinus sac. Seminal vesicle extends posteriorly to overlap anterior half of acetabulum. Ovary 0.152 to 0.247 long by 0.152 to 0.285 wide, median or sinistral sometimes overlapping left cecum. Uterus intercecal or slightly overlapping ceca, mostly between testes and ecsoma, descending posterior to ovary and ascending to join hermaphroditic duct, not entering ecsoma. Vitelline glands lobed, lobes as long as wide, immediately posterior or slightly overlapping ovary, median or sinistral, left gland with two to four digitform lobes, right gland with one to three lobes. Eggs collapsed, lacking projections of any kind, thin-shelled, 16 to 22 by 8 to 10 microns.

Discussion.—Numerous species have been named, added and deleted in the genus *Sterrhurus* Looss, 1907.

Sterrhurus taboganus differs from all other species by possessing a large bundle of semi-circular muscle fibers along the posterior rim of the concavity (fig. 62). Such muscular fibers of the concavity have not been described for any other species of *Sterrhurus*. A forebody concavity has been described or figured for at least S. *floridensis, S. grandiporus, S. imocavus, S. magnus,* and *S. musculus*. In most of these species the concavity seems to be formed by contraction of the forebody and thus may be temporary. The concavity of *S. taboganus* appears to be permanent. Of approximately 26 specimens of *S. taboganus* examined, all showed this concavity clearly. In *S. taboganus* there are also some longitudinal muscular fibers which connect the base of the concavity with the acetabulum (fig. 62). These muscle fibers apparently are for further deepening the concavity. These two sets of muscles would allow the concavity to act as an additional holdfast organ. In fact, when the stomach of the host was opened and laid flat for examination, most of the

[18] The name *taboganus* is for the type locality.

trematode specimens exhibited an angular posture of about from 15 to 30 degrees with the plane of the intestine.

S. taboganus appears to be most similar to *S. musculus*. *S. musculus* differs from *S. taboganus* as follows: Body size 1.0 to 1.5 long as compared with 3.572 to 4.370 long in *S. taboganus*. In *S. musculus* the body is more rounded posteriorly, the maximum width being at midbody or behind the acetabulum as compared with forebody widest in *S. taboganus*. The wall of the hermaphroditic duct is cuticular in *S. musculus* and muscular in *S. taboganus*.

Looss (1907) named the genus *Sterrhurus* for the species *S. musculus* (type species); *S. grandiporus* (Rudolphi, 1819) Looss, 1907, *S. imocavus* Looss, 1907; and *S. fusiformis* (Lühe, 1901) Looss, 1907. Since that time, there has been much confusion between *Lecithochirium* Lühe, 1906, *Sterrhurus* Looss, 1907, and related genera.

The Russian parasitologists (Skrjabin and Guschanskaja, 1955) proposed entirely new criteria for genera of this group of hemiurids. They believe that details of the "hermaphroditic bursa" (*i.e.*, sinus sac) and ducts within it should be the chief basis of genera. Many transfers of species were made. Pending appraisal of such new criteria by other parasitologists, earlier concepts of these genera are followed here.

Sterrhurus floridensis Manter, 1934

Hosts.—*Abudefduf saxatilis* (Linn.), sergeant-major [new host record[; *Conger conger* (Linn.), conger eel [new host record]; *Holocentrus ascensionis* (Osbeck), squirrel fish; *Labrisomus nuchipinnis* Quoy & Gaimard, hairy blenny [new host record]; *Malacanthus plumieri* (Bloch), sand eel [new host record]; *Ocyurus chrysurus* (Bloch), yellowtail; *Ogcocephalus vespertilio* (Linn.), batfish [new host record]; *Harengula clupeola* (Cuvier), big-eyed sardine [new host record]; *Scorpaena plumieri* Bloch, scorpion fish.

Location.—Stomach of all hosts.

Locality.—All hosts are from near N. Bimini, (*C. conger* from 120 fathoms, W. side of N. Bimini), except for two specimens of each *H. ascensionis*, *M. plumieri* and one specimen of *O. chrysurus* from near Cat Cay, B.W.I.

Discussion.—Manter (1934, 1947) noted the pronounced lack of host specificity of *S. floridensis*. Sparks (1957) reported *S. floridensis* from several fishes of the Nassau vicinity, B.W.I.

Hirudinella clavata (Menzies, 1791) Blainville, 1828

Host.—*Sarda velox* Meek & Hildebrand, bonito [new host record].

Location.—Stomach.

Locality.—Morro Sentinela, Piñas Bay, Panama Pacific.

Hirudinella marina (Garcin, 1730)

Host.—*Acanthocybium solandri* (Cuv. & Val.), wahoo.

Location.—Stomach.

Locality.—15 miles S.E. Taboguilla Island, Gulf of Panama.

R. *Family PROSOGONOTREMATIDAE Vigueras, 1940*

Prosogonotrema bilabiatum Perez Vigueras, 1940

Host.—*Ocyurus chrysurus* (Bloch), yellowtail.

Location.—Stomach.

Locality.—Near Cat Cay, B.W.I. [new locality record].

Discussion.—Manter (1947) examined 47 *O. chrysurus* from Tortugas, Florida, but did not find *P. bilabiatum*. This species has been reported only from *O. chrysurus* in Cuba by Perez Vigueras (1940). The family Prosogonotrematidae is of doubtful validity. At most it probably deserves subfamily status within the Hemiuridae.

S. *Family ACCACOELIDAE Looss, 1912*

Tetrochetus coryphaenae Yamaguti, 1934

Host.—*Coryphaena hippurus* Linn., dolphin.

Location.—Rectum.

Locality.—Lerner Fish Pens, Bimini, B.W.I., and from 12 mi. N.W. San Jose Island, Archipielago de las Perlas, Panama Pacific [new locality records].

Discussion.—This species was described from *Coryphaena hippurus* in Japan by Yamaguti (1934) and reported from that host in Tortugas, Florida by Manter (1947). *Coryphaena hippurus* is widely distributed and it is not surprising that its parasites are well established in at least Japan, the tropical American Pacific, the Gulf of Mexico, and neighboring areas.

III. Measurements of pH of the Stomach and Intestine of Fish Hosts

The ecology of adult helminths of fish has been little studied. My studies at Bimini included some effort to observe certain details of host-parasite relationships. Some of these details are included in the preceding papers. For example, each fish was examined separately, and the exact location and numbers of trematodes present were noted, as well as the number of uninfected hosts. Most species of trematodes occur in a fairly definite region of the digestive tract. If two or more species occur simultaneously, they usually, but not always, live in separated portions of the tract.

Since trematodes are usually at least partly immersed by intestinal fluids, the writer thought their different locations may be due to differences in pH of the intestinal content. pH measurements were made with a Beckman pH meter after stunning the fish. The entire operation took less than three minutes after some practice. Measurements were made at the following points: stomach, pyloric ceca, plyoric junction of the stomach and intestine, 1/3 intestine, 1/2 intestine, 3/4 intestine, 4/4 intestine (middle of rectum).

Most complete measurements were made on 10 specimens of *Haemulon sciurus* (Table 1). A surprising variation in pH occurs from time to time in the same organ. The range in the stomach was 3.0 to 7.7. Hemiurid trematodes occurred in these stomachs, hence are able to withstand such a range. Stomachs containing food were acid (3.0 to 6.9); those of specimens starved for five days were alkaline (7.3 to 7.7).

The pH of the pyloric ceca varied from 5.0 to 7.8, a range endured by living trematodes there. The pH of the intestine varied from 5.3 to 8.2, the more acid readings being from specimens which had recently fed. In all four fishes which had not fed for five days, the intestine was alkaline. The content of the intestine seems to affect the pH. Large bolli of crustacean remains, probably containing some gastric fluid, resulted in acidic spots in the intestine. While the acid conditions in the intestine are probably localized and temporary, the parasites are exposed to them at least briefly. There is a large probably rather rapid shift in pH along the intestine, depending chiefly on recency of feeding and type of food. The environment of an intestinal parasite is not as monotonous as might be assumed. Read (1950) working with warm-blooded vertebrates stated: "considerable evidence has accumulated to show that there is a certain constancy of pH in various sections of the small intestine." My measurements of the pH of the intestine of fishes indicates it is less constant than that of warm-blooded vertebrates. In fact, trematodes of the digestive tract of marine fishes probably experience a greater variation in pH than do free-living marine animals. Sea water is naturally buffered and offers a more stable pH environment except perhaps very locally. Even if the substrate pH of a free living marine animal shifts periodically during the day, this shift in pH would not be as rapid as that caused by a large crustacean bollus passing through the intestine of a marine fish.

Table 1.

*pH measurements of 10 Haemulon sciurus. (—=no measurement possible; +=live trematodes were present; *=host starved for 5 days).*

Site of pH Reading	pH									
Specimen No.	1	2	3	4*	5*	6*	7*	8	9	10
Stomach	3.0+	6.7+	6.7	7.3+	7.7+	7.5+	7.5+	5.1+	4.6+	6.9
Pyloric Ceca	6.5+	7.0+	6.9+	7.3	7.2+	7.8+	7.4+	7.8+	7.2+	5.0+
Pyloric Jct.	6.7	7.2	7.4	7.2	7.5	7.6	7.6	8.1	6.8	7.5
1/3 Intestine	7.2+	7.8+	7.4	7.7+	7.9+	7.9+	7.0	8.0+	6.3	8.2
1/2 Intestine	7.2+	7.6+	8.2	8.2	7.9	7.9	8.2	8.2	7.2	8.0
3/4 Intestine	—+	—+	—	8.0	7.6	7.7	7.9	8.4	7.3	7.9
4/4 Intestine	6.9	7.6	7.8	7.5	7.5	7.6	7.2	7.7	7.4	7.5

IV. Exact Locations of Digenea in Their Hosts

Most collectors of parasites indicate only the organ infected, not the exact location in the organ. Laboratory facilities at Bimini usually permitted observation of the exact location of the parasites. The location within the intestine has been indicated in the descriptions above.

A particular species of trematode is almost always found only in a limited area of the intestine. Exceptions are usually either immature individuals or cases of unusually intense infection. Other exceptions may be due to movement after death of the host. Under natural conditions trematodes appear to have a rather localized location along the intestine. Consequently, several species may occur in a host, each occupying its own ecological site which may not appreciably overlap that of other species within the same intestine. On the other hand, specimens of as many as three different genera may occupy the same pyloric cecum; specimens of the genera *Monorchis, Proctorema,* and *Genolopa* (all Monorchiidae) have been observed in a single cecum of *Haemulon plumieri.* Specimens of *Proctotrema* and *Genolopa* observed in Bimini were practically in contact with one another; the tip of a needle could not be inserted between them.

Table 2 shows the localization in the digestive tract of three species of *Apocreadium* in species of *Balistes.* *A. balistis* and *A. coili* may occur widely separated in a single *B. capriscus;* or *A. coili* may occur with *A. uroproctoferm* in *B. vetula.* Even in the cases of single infections, the species of *Apocreadium* live in a particular part of the intestine. No triple infections were found but these are theoretically possible without overlapping.

Table 2.
The location of three species of Apocreadium within the digestive tract of Balistes capriscus and B. vetula.

Trematode Species	Location of Trematodes in Digestive Tract	Host Species
A. balistis	1/3 intestine	*B. capriscus*
A. coili	Rectum	*B. capriscus* *B. vetula*
A. uroproctoferum	2/3 intestine	*B. vetula*

Ecological isolation, so common among free living animals, is probably the rule among parasites. Speciation would be favored by this occupation of different parts of the intestine by different groups of trematodes. Stunkard (1957) suggested that the type of genetic origin of species occurring in bisexual animals may not apply to trematodes because of their hermaphroditism. However, cross fertilization is known to occur in some species of Digenea and may be more-or-less common. Area isolation within the intestine of a species of host might operate much as isolation of free-living animals by a valley, river, or mountain range.

In the case of related species or genera found intermingled in the same spot, two conditions are possible. Most likely the species would not cross-fertilize one another because of differences in the reproductive organs. For example, the morphology and spination of the cirrus and metraterm of *Monorchis, Proctotrema* and *Genolopa* found together in *Haemulon* could prevent copulation either mechanically or act as a recognition character between genera. The other possibility is that two very similar species might cross and result in hybrids. Price (1953) suspected that hybridization between *Fasciola hepatica* and *F. gigantica* eixsted in cattle in the southern United States. Very heavy infestations involving closely related species would favor such hybridization.

V. Geographical Distribution

The fauna of Bimini is typical of the Caribbean and West Indian region. The fishes and invertebrates generally are the same as occur at Tortugas, Cuba, and the West Indies. Much of this fauna extends to Bermuda. The trematodes of these regions, as expected, are also similar although they are distinct from the northern Atlantic coast of America and Europe.

Of the 62 species collected at Bimini, 48 (about 80 percent) are also known from Tortugas, Florida; 34.5 percent are known from Bermuda. Twelve of these species (about 20 percent) were also collected by me in the Gulf of Panama. In addition six species (*Hamacreadium mutabile, Heli-*

TABLE 3.

Parasite-host list, showing trematodes from the Gulf of Panama and Bimini, and their hosts. Hosts and trematodes marked (P) are from Panama, (B) are from Bimini.

FAMILY ACANTHOCOLPIDAE
- *Stephanostomum coryphaenae* Manter (B)
  - *Coryphaena hippurus* (B, P)
- *Stephanostomum dentatum* (Linton) (B)
  - *Mycteroperca v. venenosa*, (B)
- *Stephanostomum ditrematis* (Yamaguti) (B, P)
  - *Caranx latus*, (B)
  - *Elagatis bipinnulatus*, (P)
- *Stephanostomum hispidum* (Yamaguti) (P)
  - *Seriola mazatlana*, (P)
- *Stephanostomum minutum* (Looss) (B)
  - *Malacanthus plumieri*
- *Stephanostomum provitellosum* (this paper) (P)
  - *Balistes naufragium*
- *Stephanostomum pseudocaranxis* (this paper) (B)
  - *Holocentrus ascensionis*
- *Stephanostomum sentum* (Linton) (B, P)
  - *Calamus bajonado*, (B)
  - *Cynoscion albus*, (P)
  - *Malacanthus plumieri*, (B)
- *Tormopsolus orientalis* Yamaguti (P)
  - *Seriola mazatlana*, (P)

FAMILY ACCACOELIDAE
- *Tetrochetus coryphaenae* Yamaguti (B, P)
  - *Coryphaena hippurus*, (B, P)

FAMILY ASPIDOGASTRIDAE
- *Lobatostoma rigens* (Linton) (B)
  - *Calamus bajonado*, (B)

FAMILY BIVESTICULIDAE
- *Bivesicula hepsetia*—Manter (B)
  - *Hepsetia stipes*, (B)

FAMILY BUCEPHALIDAE
- *Bucephalus varicus* Manter (B, P)
  - *Caranx crysos*, (B)
  - *Caranx hippos*, (B)
  - *Caranx latus*, (B)
  - *Caranx ruber*, (B)
  - *Palometa media*, (P)
- *Bucephaloides arcuatus* (Linton) (B)
  - *Sphyraena barracuda*, (B)
- *Dollfustrema muranae* (this paper) (B)
  - *Gymnothorax vicinus*, (B)
- *Prosorhynchus gonoderus* Manter, (P)
  - *Epinephelus analogus*, (P)
- *Prosorhynchus ozakii* Manter (P)
  - *Epinephelus analogus*, (P)
- *Prosorhynchus pacificus* Manter (B)
  - *Mycteroperca v. venenosa*

FAMILY CRYPTOGONIMIDAE
- *Gonocanthella lutjani* (this paper) (P)
  - *Lutjanus jordani?*, (P)
- *Metadena crassulata* Linton (B)
  - *Lutjanus analis*, (B)
- *Metadena globosa* (Linton) (B)
  - *Ocyurus chrysurus*, (B)
- *Paracryptogonimus americanus* Manter (P)
  - *Lutjanus novemfasciatus*, (P)
- *Siphodera vinaledwardsi* (Linton) (B)
  - *Lutjanus synagris*, (B)

FAMILY FELLODISTOMATIDAE
- *Antorchis urna* (Linton) (B)
  - *Pomacanthus aureus*, (B)
- *Bacciger harengulae* Yamaguti (B)
  - *Harengula clupeola*, (B)
- *Proctoeces subtenue* (Linton) (B)
  - *Calamus bajonado*, (B)
- *Tergestia pectinata* (Linton) (B)
  - *Caranx crysos*, (B)
  - *Caranx latus*, (B)
  - *Caranx ruber*, (B)
  - *Selar crumenopthalmus*, (B)

FAMILY GORGODERIDAE
- *Naymia pacifica* (Caballero) (P)
  - *Carcharhinus natator*, (P)

FAMILY HAPLOSPLANCHIDAE
- *Haplosplanchnus acutus* (Linton) (B, P
  - *Thyrinops pachylepis*, (P)
  - *Tylosurus rhaphidoma*, (B)

FAMILY HEMIURIDAE
- *Brachadena pyriformis* Linton (B)
  - *Haemulon album*, (B)
  - *Haemulon parra*, (B)
  - *Haemulon plumieri*, (B)
  - *Haemulon sciurus*, (B)
  - *Malacanthus plumieri*, (B)
- *Dinurus longisinus* Looss (B, P)
  - *Coryphaena hippurus* (B, P)
- *Dinurus tornatus* (Rudolphi) (B, P)
  - *Coryphaena hippurus*, (B, P)
- *Ectenurus virgulus* Linton (B)
  - *Harengula clupeola*, (B)
  - *Selar crumenopthalmus*, (B)
- *Hirudinella clavata* (Meuzies) (P)
  - *Sarda velox*, (P)
- *Hirudinella marina* (Blainville) (P)
  - *Acanthocybium solandrum*, (P)
- *Hysterolecitha rosea* Linton (B)
  - *Acanthurus coeruleus*, (B)
- *Lecithochirium microstomum* Chandler (P)
  - *Sarda velox*, (P)
- *Leurodera decora* Linton (B)
  - *Haemulon album*, (B)
  - *Haemulon parra*, (B)
  - *Haemulon plumieri*, (B)
  - *Haemulon sciurus*, (B)
- *Opisthadena dimidia* Linton (B, P)
  - *Kyphosus elegans*, (P)
  - *Kyphosus sectatrix*, (B)
- *Parahemiurus merus* (Linton) (B)
  - *Harengula clupeola*, (B)
- *Sterrhurus floridensis* Manter (B)
  - *Abudefduf saxatilis*, (B)
  - *Conger conger*, (B)
  - *Holocentrus ascensionis*, (B)
  - *Labrisomus nuchipinnis*, (B)
  - *Malacanthus plumieri*, (B)
  - *Ocyurus chrysurus*, (B)
  - *Ogcocephalus vespertilio*, (B)
  - *Harengula clupeola*, (B)
  - *Scorpaena plumieri*, (B)
- *Sterrhurus tobagoanus* (this paper) (P)
  - *Gymnothorax dovii*, (P)
- *Tubulovesicula lindbergi* (Layman) (P)
  - Eel, unidentified, (P)
  - *Synodus* sp., (P)

FAMILY LEPOCREADIIDAE
- *Apocreadium balistis* Manter (B)
  - *Balistes capriscus*, (B)
- *Apocreadium bravoi* (this paper) (P)
  - *Balistes naufragium*, (P)
- *Apocreadium coili* (this paper) (B)
  - *Balistes capriscus*, (B)
  - *Balistes vetula*, (B)
- *Apocreadium longisinosum* Manter (P)
  - *Sphoeroides annulatus*, (P)
- *Apocreadium angustum* (this paper) (B)
  - *Lactophrys trigonus*, (B)
- *Apocreadium uroproctoferum* (this paper) (B)
  - *Balistes vetula*, (B)
- *Cablcia trigoni* (this paper) (B)
  - *Lactophrys trigonus*, (B)
- *Crassicutis marina* Manter (B)
  - *Gerres cinereus*, (B)
- *Dermadena lactophrysi* Manter (B)
  - *Lactophrys tricornis*, (B)
  - *Lactophrys trigonus*, (B)
- *Diploproctodaeum plicitum* (Linton) (P)
  - *Diodon hystrix*, (P)
  - *Sphoeroides annulatus*, (P)
- *Diploproctodaeum haustrum* (McCallum) (B)
  - *Ceratacanthus scripta*, (B)
- *Enenterum aureum Linton* (B, P)
  - *Kyphosus elegans*, (P)
  - *Kyphosus sectatrix*, (B)
- *Homalometron elongatum* Manter (B, P)
  - *Eucinostomus californiensis*, (P)
  - *Gerres cinereus*, (B)
- *Jeancadenatia brumpti* Dollfus (B)
  - *Kyphosus sectatrix*, (B)
- *Lepidapedon parepinephcli* (this paper) (B)
  - *Epinephelus tigris*, (B)
- *Lepidapedon truncatum* (this paper) (B)
  - *Holocentrus ascensionis*, (B)
- *Lepocreadium trulla* (Linton) (B)
  - *Lutjanus buccanella*, (B)
  - *Ocyurus chrysurus*, (B)
- *Pseudocreadium bimiensis* (this paper) (B)
  - *Balistes capriscus*, (B)
- *Pseudocreadium lamelliforme* (Linton) (B)

TABLE 3.—(Continued)

Balistes vetula, (B)
Lactophrys bicaudalis, (B)
Pseudocreadium scaphosomum Manter (P)
Balistes naufragium, (P)
Balistes vetes, (P)
Ceratacanthus scripta, (B)

FAMILY MEGAPERIDAE
Megapera gyrina (Linton) (B)
Lactophrys bicaudalis, (B)
Lactophrys tricornis, (B)
Thysanopharynx elongatus Manter (B)
Lactophrys tricornis, (B)

FAMILY MONORCHIIDAE
Genolopa ampullacea Linton (B)
Haemulon album, (B)
Haemulon parra, (B)
Haemulon plumieri, (B)
Haemulon sciurus, (B)
Proctotrema truncatum (Linton) (B)
Caranx ruber, (B)
Haemulon parra, (B)
Haemulon plumieri, (B)
Haemulon sciurus, (B)

FAMILY OPECOELIDAE
Hamacreadium mutabile Linton (B)
Epinephelus striatus, (B)
Haemulon sciurus, (B)
Lutjanus synagris, (B)
Petrometopon cruentatus, (B)
Helicometra excelsa Linton (B)
Gymnothorax vicinus, (B)
Haemulon sciurus, (B)
Helicometra torta Linton (B)
Epinephelus striatus, (B)
Helicometrina nimia Linton (B, P)
Haemulon album, (B)
Haemulon sciurus, (B)
Lutjanus synagris, (B)
Epinephelus analogus (P)
Neoneotoporus yamagutii Manter (B)
Sclar crumenophthalmus, (B)
Opecoelus sphaericus Ozaki (P)
Scorpaena mystes, (P)
Pachycreadium lerneri (this paper) (B)
Gerres cinereus, (B)
Podocotyle myctophocae (this paper) (B)
Myctophocea falcata, (B)
Pseudopecoeloides gracilis Manter (B)
Apogon binotatus, (B)
Sclar crumenophthalmus, (B)
Pseudopecoelus barkeri Hanson (B)
Holocentrus ascensionis, (B)
Pseudopecoelus equesi Manter (P)
Stellifer sp., (P)
Stenopera equilata Manter (B)
Holocentrus ascensionis, (B)

FAMILY PARAMPHISTOMATIDAE
Cleptodiscus reticulatus Linton (B)
Pomacanthus aureus, (B)
Cleptodiscus kyphosi Sogandares (B)
Kyphosus sectatrix, (B)

FAMILY PRONOCEPHALIDAE
Barisomum erubescens Linton (B)
Pomacanthus aureus, (B)

FAMILY PROSOGONOTREMATIDAE
Prosogonotrema bilabiatum Perez-Vigueras (B)
Ocyurus chrysurus, (B)

FAMILY WARETREMATIDAE
Megasolena kyphosi (this paper) (P)
Kyphosus analogus, (P)
Myodera magna (this paper) (P)
Kyphosus elegans, (P)

FAMILY ZOOGONIDAE
Diplangus paxillus Linton (B)
Haemulon album, (B)
Haemulon parra, (B)
Haemulon plumieri, (B)
Haemulon sciurus, (B)
Steganoderma (L.) atherinae (Price) (B)
Hepsetia stipes, (B)

cometra torta, Metadena globosa, Parahemiurus merus, Proctotrema truncatum, and *Siphodera vinaledwardsi*) are previously known from the tropical American Pacific, a total of 18 species. In other words, based on presently known collections, the Bimini trematodes are much the same as those at Tortugas; and are more like those of the American Pacific than like those of Bermuda. Manter (1940a, 1947, 1955) noted this similarity of Atlantic and Pacific Trematodes. He found 28 (19.1 percent) of 147 shallow water species at Tortugas also occuring at Bermuda; 21 of the 28 in the same species of hosts. Twenty-six shallow water species (17.6 percent) occurred in the Pacific but with two exceptions in different species of host. He interpreted this approximately equivalent position of Bermuda and the warm Pacific as reflecting the former continuity of the two oceans together with the greater persistence of parasite species as compared with hosts. My collections in the Gulf of Panama increase by five the number of Atlantic species also known from the Pacific. Manter (1955) noted a total of 32 species known from Tortugas, or probably occurring there, and also known from the American Pacific, as compared with 28 species also known from Bermuda. Bravo-Hollis (1954, 1956) added *Siphodera vinaledwardsi, Proctotrema truncatum, Metadena globosa,* and *Haplosphlanchnus sparisomae.* My collections add the following to this list: *Stephanostomum sentum, Opisthadena dimidia, Enenterum aureum, Homalometron elongatum,* and *Dinurus tornatus.* Thus, at present 41 species are common to fishes of the American Atlantic and American Pacific. Present collections still indicate a stronger similarity of Caribbean trematodes to the Pacific region than to Bermuda.

The proximity of Bimini to Tortugas and the West Indies does not mean these regions have identical trematodes faunas. Even when many more collections are made some species will probably be found to have local distributions. Several species common at Tortugas and whose host species occur at Bimini were not found in my collections; for example, *Stephanostomum casum* and *Sterrhurus fusiformis.* Furthermore, some 12 species (20 percent) at Bimini are not yet known from Tortugas. However, fewer col-

lections have been made at Bermuda.

Table 3 lists the Digenea collected by me at Bimini and in the Gulf of Panama with indication of the locality. These species are arranged alphabetically according to family.

Table 4 lists the hosts examined at Bimini and in the Gulf of Panama, and the Digenea found. The hosts are arranged alphabetically without regard to family.

Table 5 lists the Digenea in my collections which are also known from Bermuda; Tortugas, Florida; Nassau, B.W.I.; and the Gulf of Panama. This list does not include all species known from the Caribbean region and in these other regions.

TABLE 4.

Alphabetical list of fishes from the Gulf of Panama (P) and Bimini, B.W.I. (B) indicating trematodes found. Numbers of specimens listed after each fish and trematodes.

Abudefduf saxatilis, (Pomacentridae), 3 B
  Sterrhurus floridensis, (Hemiuridae), 1, in 1 of 3 B
Acanthocybium solandrum, (Acanthocybiidae), 1 P
  Hirudinella marina, (Hemiuridae), 2, in 1 P
Acanthurus bahianus, (Acanthuridae), 1 B
  Negative
Acanthurus crestonis, (Acanthuridae), 1 P
  Negative
Acanthurus coeruleus, (Acanthuridae), 4 B
  Hysterolecitha rosea, (Hemiuridae), 2, in 1 of 4 B
Albula vulpes, (Albulidae), 2 P, 1 B
  Negative
Alectis crinitus, (Carangidae), 1 B
  Negative
Anchovia sp., (Engraulidae), 1 P
  Negative
Anisotremus taeniatus, (Pomadasyidae), 1 P
  Negative
Apogon binotatus, (Cheilodipteridae), 3 B
  Pseudopecoeloides gracilis, (Opecoelidae), 1, in 1 of 3 B
Apogonichthys stellatus, (Cheilodipteridae), 2 B
  Negative
Artos macropthalma, (Gobiesocidae), 1 B
  Negative
Aulostomus maculatus, (Aulostomidae), 1 B
  Negative
Balistes capriscus, (Balistidae), 4 B
  Apocreadium balistes, (Lepocreadiidae), 1, in 1 of 4 B
  Apocreadium coili, (Lepocreadiidae), 5, in 1 of 4 B
  Pseudocreadium biminensis, (Lepocreadiidae), 1, 2, in 2 of 4 B
Balistes naufragium, (Balistidae), 2 P
  Apocreadium bravoi, (Lepocreadiidae), 8, in 1 of 2 B
  Pseudocreadium scaphosomum, (Lepocreadiidae), 30+, in 1 of 2 B
  Stephanostomum provitellosum, (Acanthocolpidae), 20, in 1 of 2 B
Balistes vetula, (Balistidae), 2 P
  Pseudocreadium scaphosomum, (Lepocreadiidae), 30+, in 1 of 2 P
Balistes vetula, (Balistidae), 7 B
  Apocreadium coili, (Lepocreadiidae), 3, 1, in 2 of 7 B
  Apocreadium uroproctoferum, (Lepocreadiidae), 18, in 1 of 7 B
  Pseudocreadium lamelliforme, (Lepocreadiidae), 1, 1, in 2 of 2 of 7 B
Bathygobius soporator, (Gobiidae), 1 B
  Negative
Brachygenys chrysargyrus, (Pomadasyidae), 1 B
  Negative
Calamus bajonado, (Sparidae), 4 B
  Lobatostoma ringens, (Aspidogastridae), 1, in 1 of 4 B
  Proctoeces subtenue, (Fellodistomatidae), 1, in 1 of 4 B
  Stephanostomum sentum, (Acanthocolpidae), 12, in 1 of 4 B
Cantherines pullus, (Monacanthidae), 3 B
  Negative
Canthigaster rostratus, (Canthigastridae), 3 B
  Negative
Caranx crysos, (Carangidae), 2 B
  Bucephalus varicus, (Bucephalidae), 300+, in 1 of 2 B
  Tergestia pectinata, (Fellodistomatidae), 4 in 1 of 2 B
Caranx hippos, (Carangidae), 1 B, 2 P
  Negative
Caranx latus, (Carangidae), 4 B
  Bucephalus varicus, (Bucephalidae), 12, 30, 75, 300+, in 4 of 4 B
  Stephanostomum ditrematis, (Acanthocolpidae), 2, 3, 5, in 3 of 4 B
  Tergestia pectinata, (Fellodistomatidae), 1, 6, 1, in 3 of 4 B
Caranx lugubris, (Carangidae), 1 B
  Negative
Caranx marginatus, (Carangidae), 1 P
  Negative
Caranx ruber, (Carangidae), 4 B
  Bucephalus varicus, (Bucephalidae), 1, in 1 of 4 B
  Tergestia pectinata, (Fellodistomatidae), 1, in 1 of 4 B
Carapus bermudensis, (Carapidae), 1 B
  Negative
Carcharhinus acronotus, (Carcharhinidae), 1 B
  Negative
Carcharhinus cerdale, (Carcharhinidae), 1 P
  Negative
Carcharhinus natator, (Carcharhinidae), 8 P
  Nagmia pacifica, (*Gorgoderidae*, 100+, 100+, 100+, 100+, 100+, 100+, 100+, 100+, in 8 of 8 P
Carcharhinus obscurus, (Caracharhinidae), 2 B
  Negative
Centropomus undecimalis, (Centropomidae), 1 P
  Negative
Cephalopholis fulvus, (Serranidae), 1 B
  Negative
Ceratacanthus scripta, (Monacanthidae), 1 B
  Diploproctodacum haustrum (Lepocreadiidae), 32, in 1 of 1 B
Cestracion tiburo, (Cestraciontidae), 2 P
  Negative
Cestracion tudes, (Cestraciontidae), 1 P
  Negative
Chaetodipterus faber, (Epihippidae), 1 P
  Neagtive
Chaetodon humeralis, (Chaetodontidae), 2 P
  Negative
Clupeid (unidentified), (Clupeidae), 1 P
  Negative
Conger conger, (Congridae), 1 B
  Sterrhurus floridensis (Hemiuridae), 6, in 1 of 1 B
Coryphaena hippurus, (Coryphaenidae), 1 B, 2 P
  Dinurus longisinus, (Hemiuridae), 200+, in 1 of 1 B; 200+, 200+, in 2 of 2 P
  Dinurus tornatus, (Hemiuridae), not counted, in 1 of 1 B
  Stephanostomum coryphaenae, (Acanthocolpidae), 1 in 1 of 1 B
  Tetrochactus coryphaenae, (Accacoelidae), 4, in 1 of 1 B; 6, in 1 of 2 P
Coryphopterus glaucofraenum, (Gobiidae), 1 B
  Negative
Cynoscion albus, (Sciaenidae), 3 P
  Stephanostomum sentum, (Acanthocolpidae), 3, in 1 of 3 P
Cynoscion sp., (Sciaenidae), 1 P
  Negative
Dasyatis americana, (Dasyatidae), 1 B
  Negative
Diodon holocanthus, (Diodontidae), 1 P
  Negative
Diodon hystrix, (Diodontidae), 2 P; 1 B
  Diploproctodacum plicitum, (Lepocreadiidae), not counted, in 1 of 2 P; in 1 of 1 B
Echidna catenata, (Muraenidae), 1 B
  Negative

TABLE 4.—(Continued)

Eel (unidentified), 2 P
Tubulorcsicula lindbergi, (Hemiuridae), 5, in 1 of 2 P
Elagatis bipinnulatus, (Carangidae), 3 P
Stephanostomum ditrematis, (Acanthocolpidae), 6 in 1 of 3 P
Epinephelus analogus, (Serranidae), 6 P
Helicometrina nimia, (Opecoelidae), 1, in 1 of 6 P
Prosorhynchus gonoderus, (Bucephalidae), 1, in 1 of 6 P
Prosorhynchus ozakii, (Bucephalidae), 1, in 1 of 6 P
Epinephelus guttatus, (Serranidae), 1 P; 4 B Negative
Epinephelus labriformis, (Serranidae), 3 P Negative
Epinephelus morio, (Serranidae), 1 B Unidentified lepocreadiid trematodes
Epinephelus sp., (Serranidae), 1 P Negative
Epinephelus striatus, (Serranidae), 1 P; 6 B
Hamacreadium mutabile, (Opecoelidae), 1,1,4,8,5 in 5 of 6 B
Helicometra torta, (Opecoelidae), 1, in 1 of 6 B
Epinephelus tigris, (Serranidae), 1 B
Lepidapedon parepinephili, (Lepocreadiidae), 11, in 1 of 1 B
Eques acuminatus or *plucher*, (Sciaenidae), 1 B Unidentified hemiurid, 1, in 1 of 1 B
Eucinostomus californiensis, (Gerridae), 2 P
Homalometron elongatum, (Lepocreadiidae), 1, in 1 of 2 P
Eucinostomus spp., (*Gerridae*), 1 B; 5 P Negative
Eupeneus grandisquamis, (Mullidae), 6 P Negative
Felichthys pinnaculatus, (Siluridae), 1 P Negative
Fistularia corneta, (Fistulariidae), 5 P Negatve
Galeichthys seemani, (Siluridae), 8 P Negative
Galeocerdo arcticus, (Galeidae), 1 P Negative
Gerres cinereus, (Gerridae), 4 B
Crassicutis marina, (Lepocreadiidae), 1, in 1 of 4 B
Homalometron elongatum, (Lepocreadiidae), 4,5, in 2 of 4 B
Pachycreadium lerneri, (Lepocreadiidae), 1, in 1 of 4 B
Gerres sp., (Gerridae), 1 P Negative
Gnatholepis thompsoni, (Gobiidae), 1 B Negative
Gymnothorax dorii, (Muraenidae), 1 P
Sterrhurus fuhoganus, (Hemiuridae), 26, in 1 of 1
Gymnothorax moringa, (Muraenidae), 1 B Negative
Gymnothorax polygonius, (Muraenidae), 1 B Negative
Gymnothorax ricinus, (Muraenidae), 2 B
Dollfustrema muraenae, (Bucephalidae), 3,3, in 2 of 2 B
Helicometra excela, (Opecoelidae), 4, in 1 of 2
Gynglymostoma cirratum, (Gynglymostomidae), 1 B; 1 P Negative
Haemulon album, (Pomadasyidae), 5 B
Brachadena pyriformis, (Hemiuridae), 6,8, in 2 of 5 B
Diplangus paxillus, (Zoogonidae), 1, in 1 of 5 B
Genolopa ampullacea, (Monorchiidae), 9,10,12, in 3 of 5 B
Helicometrina nimia, (Opecoelidae), 2, in 1 of 5 B
Lecirodera decora, 30,7,8,7, in 4 of 5 B, . . .
Haemulon flavolineatum, (Pomadasyidae), 1 B Negative
Haemulon parra, (Pomadasyidae), 3 B
Brachadena pyriformis, (Hemiuridae), 19, in 1 of 3 B
Diplangus paxillus, (Zoogonidae), 1,4,3, in 3 of 3 B
Genolopa ampullacea, (Monorchiidae), 1 in 1 of 3 B
Lecirodera decora, (Hemiuridae), 17,19,3 in 3 of 3 B
Proctotrema truncatum, (Monorchiidae), 1, in 1 of 3 B
Haemulon plumieri, (Pomadasyidae), 3 B
Brachadena pyriformis, (Hemiuridae), 2, in 1 of 3 B
Diplangus paxillus, (Zoogonidae), 2, in 1 of 3 B
Genolopa ampullacea, (Monorchiidae), 30,70, in 2 of 3 B
Lecirodera decora, (Hemiuridae), 2,4, in 2 of 3 B
Proctotrema truncatum, (Monorchiidae), 2, in 1 of 3 B
Haemulon sciurus, (Pomadasyidae), 14 B
Brachadena pyriformis, (*Hemiuridae*), 1,3,6,2,5, in 5 of 14 B
Diplangus paxillus, (Zoogonidae), 3,2,4,3,10, in 5 of 14 B
Genolopa ampullacea, (Monorchiidae), 51,21,14, 14,4,4,79,35,25,15,5,10,12, in 13 of 14 B
Hamacreadium mutabile, (Opecoelidae), 1, in 1 of 14 B
Helicometra excela, (Opecoelidae), 2, in 1 of 14 B
Helicometrina nimia, (Opecoelidae), 1,2, in 2 of 14 B
Lecirodera decora, (*Hemiuridae*), 1,2,2,2,3,4,5, in 7 of 14 B
Proctotrema truncatum (Monorchiidae), 1,1,5, in 3 of 14 B
Haemulon steindachneri, (Pomadasyidae), 1 P Negative
Haemulon sp., (Pomadasyidae), 5 P Negative
Halichoerus biritatta, (Labridae), 2 B Negative
Halichoerus poeyi, (Labridae), 1 B Negative
Harengula clupeola, (Clupeidae), 6 B
Bacciger harengulae, (Fellodistomatidae), 40, in 1 of 6 B
Ectenurus virgulus, (Hemiuridae), 12, in 1 of 6 B
Parahemiurus merus, (Hemiuridae), 8,10,3, in 3 of 6 B
Hepsetia stipes, (Atherinidae), 16 B
Bivesicula hepsetia, (Bivesiculidae), 1, in 1 of 16 B
Steganoderma atherinae, (Zoogonidae), 2,1,1,1, in 4 of 16 B
Histrio histrio, (Antennariidae), 1 B Negative
Holocanthus ciliaris, (Chaetodontidae), 1 B Negative
Holocanthus isabelita, (Chaetodontidae), 1 B Negative
Holocentrus ascensionis, (Holocentridae), 4 B
Lepidapedon truncatum, (Lepocreadiidae), 5,1,1, in 3 of 4 B
Pseudopecoelus barkeri, (Opecoelidae), 1, in 1 of 4 B
Stenopera equilata, (Opecoelidae), 8,8, in 2 of 4 B
Stephanostomum pseudocarangi, (Acanthocolpidae), 2,1,1, in 3 of 4 B
Sterrhurus floridensis, (Hemiuridae), 4,5,6,6, in 4 of 4 B
Holocentrus suborbitalis, (Holocentridae), 1 P Negative
Holocentrus vexillarius, (Holocentridae), 1 B Negative
Hilshia furthii, (Clupeidae), 1 P Negative
Istiophorus greyi, (Istiophoridae), 3 P Negative
Isurus oxyrhynchus, (Lamnidae), 1 B Negative
Kyphosus analogus, (Kyphosidae), 2 P
Megasolena kyphosi, (Waretrematidae), 7, in 1 of 2 P
Kyphosus elegans, (Kyphosidae), 6 P
Enenterum aureum, (Lepocreadiidae), 5, in 1 of 6 P
Myodera magna, (Waretrematidae), 1, in 1 of 6 P
Opisthadena dimidia, (Hemiuridae), 2,2, in 2 of 6 P
Kyphosus sectatrix, (Kyphosidae), 4 B
Cleptodiscus kyphosi, (Paramphistomatidae), 14, in 1 of 4 B
Enenterum aureum, (Lepocreadiidae), 8,149, in 2 of 4 B
Jeancadeuatia brumpti, (Lepocreadiidae), 2, in 1 of 4 B

TABLE 4.—(Continued)

Opisthadena dimidia, (Hemiuridae), 88, in 1 of 4 B
Labrisomus nuchipinnis, (Blennidae), 4 B
Sterrhurus floridensis (Hemiuridae), 1, in 1 of 4 B
Lactophrys bicaudalis, (Ostraciidae), 1 B
Megapera gyrina, (Megaperidae), 1, in 1 of 1 B
Lactophrys tricornis, (Ostraciidae), 3 B
Dermadena lactophrysi, (Lepocreadiidae), 1, in 1 of 3 B
Megapera gyrina, (Megaperidae), 1, in 1 of 3 B
Thysanopharynx elongatus, (Megaperidae), 1, in 1 of 3 B
Lactophrys trigonus, (Ostraciidae), 3 B
Apocreadium angustum, (Lepocreadiidae), 1, in 1 of 3 B
Cableia trigoni, (Lepocreadiidae), 1, in 1 of 3 B
Dermadena lactophrysi, (Lepocreadiidae), 1, in 1 of 3 B
Larimus argentatus, (Sciaenidae), 2 P
Negative
Lutjanus analis, (Lutjanidae), 1 B
Metadena crassulata, (Cryptogonimidae), 2, in 1 of 1
Lutjanus apodus, (Lutjanidae), 2 B
Negative
Lutjanus buccanella, (Lutjanidae), 1 B
Lepocreadium trulla, (Lepocreadiidae), 1, in 1 of 1
Lutjanus griseus, (Lutjanidae), 1 B
Negative
Lutjanus guttatus, (Lutjanidae), 1 P
Negative
Lutjanus jordani, (Lutjanidae), 1 P
Gonacanthella lutjani, (Cryptogonimidae), 2, in 1 of 1 P
Lutjanus novemfasciatus, (Lutjanidae), 1 P
Paracryptogonimus americanus, (Cryptogonimidae), 100+, in 1 of 1 P
Lutjanus spp., (Lutjanidae), 4 P
Negative
Lutjanus synagris, (Lutjanidae), 5 B
Hamacreadium mutabile, (Opecoelidae), 3,1,127, 11,7, in 5 of 5 B
Helicometrina nimia, (Opecoelidae), 2,3, in 2 of 5 B
Siphodera vinaledwardsi, (Cryptogonimidae), 3,49,4,21,78, in 5 of 5 B
Makaira marlina, (Istiophoridae), 2 P
Negative
Makaira nigricans, (Istiophoridae), 1 B
Negative
Makaira sp., (Silver Marlin), (Istiophoridae), 1 P
Negative
Microspathodon dorsalis, (Pomacentridae), 2 P
Negative
Malacanthus plumieri, (Malacanthidae), 8 B
Brachadena pyriformis, (Hemiuridae), 1, in 1 of 8 B
Stephanostomum minutum, (Acanthocolpidae), 1, in 1 of 8 B
Stephanostomum sentum, (Acanthocolpidae), 2, in 1 of 8 B
Sterrhurus floridensis, (Hemiuridae), 1,1, in 2 of 8 B
Malacoctenus aurolineatus, (Clinidae), 1 B
Negative
Malacoctenus macropus, (Clinidae), 1 B
Negative
Melichthys pisceus, (Balistidae), 5 B
Unidentified Lepocreadiid trematode, in 1 of 5 B
Monacanthus ciliatus, (Monacanthidae), 1 B
Negative
Mugil sp., (Mugilidae), 6 P
Unidentified haploporid trematode, 2 in 1 of 6 P
Mycteroperca falcata, (Serranidae), 1 B
Podocotyle mycteropercae, (Opecoelidae), 12, in 1 of 1 B
Mycteroperca r. venenosa, (Serranidae), 1 B
Prosorhynchus pacificus, (Bucephalidae), 28, in 1 of 1 B
Stephanostomum dentatum, (Acanthocolpidae), 2, in 1 of 1 B
Negaprion brevirostris, (Carcharhinidae), 2 B
Negative
Ocyurus chrysurus, (Lutjanidae), 3 B
Lepocreadium trulla, (*Lepocreadiidae*), 100+, 5,5, in 3 of 3 B
Metadena globosa, (Cryptogonimidae), 21, in 1 of 3 B
Prosogonotrema bilabiatum, (Prosogonotrematidae), 1, in 1 of 3 B
Sterrhurus floridensis, (Hemiuridae), 1, in 1 of 3 B
Ogcocephalus respertilio, (Ogcocephalidae), 2 B
Sterrhurus floridensis, (Hemiuridae), 6,6, in 2 of 2 B
Opsanus ? sp., (Batrachoididae), 3 P
Negative
Palometa media, (Carangidae), 1 P
Bucephalus varicus, (Bucephalidae), 10, in 1 of 1 P
Petromctopon cruentatus, (Serranidae), 1 B
Hamacreadium mutabile, (Opecoelidae), 1, in 1 of 1 B
Pomacanthus aureus, (Holacanthidae), 6 B
Antorchis urna, (Fellodistomatidae), 14,15,16, 7,29, in 5 of 6 B
Barisomum crubescens, (Pronocephalidae), 1, in 1 of 6
Cleptodiscus reticulatus, (Paramphistomatidae), 5,6,10,67,98, in 5 of 6 B
Pomacentrus leucostictus, (Pomacentridae), 2 B
Negative
Pomacentrus oralis, (Pomacentridae), 1 B
Negative
Polynemus approximans, (Polynemidae), 1 P
Negative
Polynemus opercularis, (Polynemidae), 1 P
Negative
Prionodes tigrinus, (Serranidae), 1 B
Negative
Prionotus sp., (Triglidae), 6 P
Negative
Pseues sp., (Nomeidae), 1 B
Negative
Remora remora, (Echeneidae), 6 P
Negative
Rhinobatus leucorhynchus, (Rhinobatidae), 2 P
Negative
Rypticus saponaceous, (Serranidae), 1 B
Negative
Rypticus saponaceous bicolor, (Serranidae), 1 P
Negative
Sarda chilensis, (Thunnidae), 1 P
Negative
Sarda velox, (Thunnidae), 6 P
Hirudinella clarata, (Hemiuridae), 1, in 1 of 6 P
Lecithochirium microstomum, (Hemiuridae), 2,2,2, in 3 of 6 P
Sardinella stolifera, (Clupeidae), 1 P
Negative
Scarlychthys atlanticus, (Blennidae), 1 B
Negative
Scalarichthys textilis, (Blennidae), 1 B
Negative
Scarus croicensis, (Scaridae), 1 B
Negative
Scarus punctulatus, (Scaridae), 1 B
Negative
Scomberomorus maculatus, (Cybiidae), 1 B
Negative
Scomberomorus sierra, (Cybiidae), P
Negative
Scorpaena mystes, (Scorpaenidae), 1 P
Opecoclus sphaericus, (Opecoelidae), 1, in 1 of 1 P
Scorpaena plumieri, (Scorpaenidae), 2 B
Sterrhurus floridensis, (Hemiuridae), 5, in 1 of 2 B
Selar crumenopthalmus, (Carangidae), 1 B
Ectenurus virgulus, (Hemiuridae), 4, in 1 of 1 B
Xenolopodorus yamagutii, (Opecoelidae), 1, in 1 of 1 B
Pseudopecorloides gracilis, (Opecoelidae), 4, in 1 of 1 B
Tergestia pectinata, (Fellodistomatidae), 2, in 1 of 1 B
Selene brevoorti, (Carangidae), 1 P
Negative
Seriola dorsalis, (Carangidae), 1 P
Negative
Seriola mazatlana, (Carangidae), 5 P
Stephanostomum hispidum, (Acanthocolpidae), not counted, in 3 of 5 P
Tormopsolus orientalis, (Acanthocolpidae), 1, in 1 of 5 P
Sparisoma flavescens, (Scaridae), 1 B
Negative
Sphoeroides annulatus, (Tetraodontidae), 9 P
Apocreadium longisinosum, (Lepocreadiidae), about 6,6,6,6,6,6, in 6 of 9 P

TABLE 4.—(Continued)

Diploproctodaeum plicitum, (Lepocreadiidae), not counted, in 6 of 9 P
Sphoeroides marmoratus, (Tetraodontidae), 2 P Negative
Sphoeroides testudineus, (Tetraodontidae), 1 B Negative
Sphoeroides sp. (immature), (Tetraodontidae), 1 P Negative
Sphyraena barracuda, (Sphyraenidae), 3 B
Bucephaloides arcuatus, (Bucephalidae), 100+, 100+, 1 in 3 of 3 B
Sphyraena cusis, (Sphyraenidae), 2 P
Unidentified bucephalid, (Bucephalidae), 1, in 1 of 2 P
Stellifer sp., (Sciaenidae), 1 P Negative
Stellifer sp., (Sciaenidae), 1 P
Pseudopecoeloides equesi, (Opecoelidae), 7, in 1 of 1
Syngnathus rosseau, (Syngnathidae), 1 B Negative
Synodus sp., (Synodontidae), 5 P
Tubulovesicula lindbergi, (Hemiuridae), 9, in 1 of 5
Tetraodon hispidus, (Tetraodontidae), 3 P Negative
Thalassoma bifasciatum, (Labridae), 1 B Negative
Thyrinops pachylepis, (Atherinidae), 3 P
Haplosplanchnus acutus, (Haplosplanchnidae), 1 in 1 of 3 P
Trachinocephalus myops, (Synodontidae), 1 B Negative
Trachinotus falcatus, (Carangidae), 1 B Negative
Trachinotus glaucus, (Carangidae), 2 B
Unidentified lepocreadid trematodes, not counted, in 2 of 2 B
Trichiurus lepturus, (Trichiuridae), 2 P Negative
Tylosurus raphidoma, (Belonidae), 7 B
Haplosplanchnus acutus, (Haplosplanchnidae), 1,3, in 2 of 7 B
Tylosurus pacificus, (Belonidae), 1 P Negative
Tylosurus stolzmanni, (Belonidae), 1 P Negative
Upeneus maculatus, (Mullidae), 1 B Negative
Urobatis jamaicensis, (Dasyatidae), 2 B Negative
Urotrygon asterias, (Dasyatidae), 1 P Negative
Vomer declivifrons, (Carangidae), 6 P Negative
Xyrichthys psittacus, (Labridae), 1 B Negative

TABLE 5.

Bimini trematodes also known from Bermuda; Tortugas, Fla.; Nassau, B.W.I.; and the Gulf of Panama.

Trematode	Bermuda	Tortugas	Nassau	Panama
Antorchis urna	—	+	—	—
Apocreadium balistis	—	+	—	—
Baeciger harengulae	—	+	—	—
Barisomum crubescens	+	+	—	—
Bivesicula hepsetia	—	+	—	—
Brachadena pyriformis	—	+	+	—
Bucephalus varicus	—	+	—	+
Cleptodiscus reticulatus	—	+	—	—
Crassicutis marina	—	+	—	—
Dermadena lactophrysi	+	+	—	—
Dinurus longisinus	—	+	—	+
Dinurus lornatus	—	+	—	+
Diplangus pariilus	—	+	—	—
Diploproctodaeum plicitum	—	+	—	+
Ectenurus virgulus	—	+	+	—
Enenterum aureum	—	+	—	+
Genolopa ampullacea	+	+	+	—
Hamacreadium mutabile	—	+	+	—
Haplosplanchnus acutus	+	+	—	+
Helicometra excela	—	+	+	—
Helicometra torta	—	+	—	—
Helicometrina nimia	—	+	+	+
Homalometron clongatum	—	+	—	+
Hysterolecitha rosea	—	+	—	—
Lepocreadium trulla	+	+	+	—
Leurodera decora	—	+	—	—
Lobatostoma ringens	+	+	—	—
Megapera gyrina	+	+	—	—
Metadena crassulata	—	+	—	—
Metadena globosa	—	+	—	—
Neonotoporus yamagutii	—	+	—	—
Opisthadena dimidia	—	+	—	+
Parahemiurus merus	—	+	—	+
Proctoces subtenue	+	+	—	—
Proctotrema truncatum	—	+	—	—
Prosorhynchus pacificus	+	+	—	—
Pseudocreadium lamelliforme	+	+	—	—
Pseudopecoeloides gracilis	—	+	+	—
Pseudopecoelus barkeri	+	—	—	—
Rhagorchis odhneri	—	+	—	—
Siphodera vinaledwardsi	+	+	+	—
Stenopera equilata	—	+	+	—
Stephanostomum coryphaenae	—	+	—	—
Stephanostomum dentatum	+	+	—	—
Stephanostomum ditremalis	—	+	—	+
Stephanostomum scutum	—	+	—	+
Sterrhurus floridensis	—	+	+	—
Tergestia pectinata	—	+	+	—
Tetrochactus coryphaenae	—	+	—	+
Thysanophoryna clongatus	—	+	—	—

VI. SUMMARY

1. During the summers of 1956 and 1957 the writer collected trematodes from fishes in the Gulf of Panama (1956) and at Bimini, British West Indies (1957). In

Panama, 234 specimens of 121 species of fishes were individually examined; at Bimini, 250 specimens of 109 species. Totals were 484 specimens of 209 species.

2. Trematodes were found in 19 percent of the species of fishes in the Gulf of Panama; in 56 percent of the species of fishes at Bimini. A total of 88 species of digenetic trematodes were collected and studied. Of these, 62 were at Bimini; 31 in the Gulf of Panama; 5 species occurred in both regions.

3. Two new genera are named: *Cableia* (Lepocreadiidae) and *Gonacanthella* (Cryptogonimidae).

4. Seventeen new species, distributed in 7 families are named. These are Acanthocolpidae: *Stephanostomum provitellosum, Stephanostomum pseudocarangis;* Bucephalidae: *Dollfustrema muraenae;* Cryptogonimidae: *Gonacanthella lutjani;* Hemiuridae: *Sterrhurus taboganus;* Lepocreadiidae: *Apocreadium bravoi, Apocreadium coili, Apocreadium angustum, Apocreadium uroproctoferum. Cableia trigoni, Lepidapedon parepinepheli, Lepidapedon truncatum, Pseudocreadium biminensis;* Opecoelidae: *Pachycreadium lerneri, Podocotyle mycteropercae;* Waretrematidae: *Megasolena kyphosi, Myodera magna.*

5. The names of ten species and one genus are considered synonyms. These are *Bianium lecanocephalum* Perez-Vigueras, 1955, synonym of *D. haustrum* (McCallum, 1918) La Rue, 1926; *Proneochasmus* Szidat, 1954, synonym of *Paraspina* Pearse, 1920; *Pseudocreadium myohelicatum* Bravo & Manter, 1951, synonym of *P. scaphosomum* Manter, 1940; *Stephanostomum cubanus* Perez-Vigueras, 1955 and *S. manteri* Perez-Vigueras, 1955, synonyms of *S. ditrematis* (Yamaguti, 1939) Manter, 1947; *Stephanostomum mediovitellarium* Perez-Vigueras, 1955, and *S. lopezneyrai* Perez-Vigueras, 1955, synonyms of *S. sentum* (Linton, 1910) Manter, 1947; *Stephanostomum admicrostephanum* Perez-Vigueras, 1955, synonym of *S. microstephanus* Manter, 1934; *Tubulovesicula anguillae* Yamaguti, 1934; *T. spari* Yamaguti, 1934 and *T. serrani* Nagaty, 1956; synonyms of *T. lindbergi* (Layman, 1930) Yamaguti, 1934.

6. Twenty-nine new host records are noted.

7. Some observations regarding the ecology of these parasites within the host included the exact location of the trematodes in the digestive tract, and, in some cases, measurement of the pH of these locations. The pH was surprisingly inconstant even in the same region of different individuals depending chiefly on recency of feeding.

8. The Digenea of Bimini are very similar to those known from Tortugas, Florida and from Bermuda. However, the known resemblance of those of Tortugas to the American Pacific is increased by five species found in both oceans, making an impressive total of 41 species.

9. A list of Digenea and their hosts, as well as a list of hosts found infected, are included.

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Abstract

Collections of digentic trematodes of marine fishes from the Gulf of Panama and Bimini, British West Indies, were made during the summers of 1956 and 1957 respectively. A total of 234 specimens of 121 species of fishes were examined in the Gulf of Panama, and 250 specimens of 109 species in Bimini. Trematodes were found in about 19 percent of fish hosts in the Gulf of Pamama and in about 56 percent of fish hosts in Bimini. A total of 88 species of trematodes are reported. These trematdoes are distributed in 19 families. Two new trematode genera in the families Lepocreadiidae (*i.e., Cableia*), and Cryptogonimidae (*i.e., Gonacanthella*) are named. Seventeen new species of trematodes are described in the following families: *Acanthocolpidae*: *Stephanostomum provitellosum*, and *S. pseudocarangis;* Bucephalidae: *Dollfustrema muracnae;* Cryptogonimidae: *Gonacanthella lutjani;* Hemiuridae: *Sterrhurus taboganus;* Lepocreadiidae: *Pseudocreadium biminensis, Lepidapedon truncatum, L. parapinepheli, Cableia trigoni, Apocreadium coili, A. angustum, A. uroproctoferum*, and *A. bravoi;* Opocoelidae: *Podocotyle mycteropercae*, and *Pachycreadium lerneri;* Waretrematidae: *Myodera magna*, and *Megasolena kyphosi.* Ten species and two genera of trematodes are synonymized. Twenty-nine new host records are reported. Records regarding the ecology of these trematodes include, when possible, the exact location in their respective hosts. Results of observations of the gastro-intestinal tract of 10 specimens of 1 host species seem to indicae that recency of feeding is a factor determing the pH of any particular site in the digestive tract, especially the stomach, and that trematodes lived there in spite of large shifts in pH. Certain ecological factors possibly influencing speciation of trematodes are discussed. The known resemblance of Digenea from marine fishes from Tortugas, Florida, with the American Pacific is increased by 5 species, making a total of 41 species known from both oceans. Host parasite and parasite hosts lists are included in this report.