

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

H. W. Manter Laboratory Library Materials

7-15-1960

Digenetic Trematodes of Marine Fishes of Puerto Rico

Ather H. Siddiqi
Aligarh Muslim University

Raymond M. Cable
Purdue University

Follow this and additional works at: <https://digitalcommons.unl.edu/manterlibrary>



Part of the [Aquaculture and Fisheries Commons](#), [Marine Biology Commons](#), and the [Parasitology Commons](#)

Siddiqi, Ather H. and Cable, Raymond M., "Digenetic Trematodes of Marine Fishes of Puerto Rico" (1960).
H. W. Manter Laboratory Library Materials. 26.
<https://digitalcommons.unl.edu/manterlibrary/26>

This Article is brought to you for free and open access by DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in H. W. Manter Laboratory Library Materials by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

THE NEW YORK ACADEMY OF SCIENCES

SCIENTIFIC SURVEY
OF
PORTO RICO and the VIRGIN ISLANDS

VOLUME XVII—Part 3

DIGENETIC TREMATODES OF MARINE FISHES OF PUERTO RICO

Ather H. Siddiqi and Raymond M. Cable



NEW YORK
PUBLISHED BY THE ACADEMY
July 15, 1960

Editor in Chief

OTTO V. ST. WHITELOCK

Managing Editor

FRANKLIN N. FURNESS

Associate Editor

PETER A. STURGEON

SCIENTIFIC SURVEY OF PORTO RICO AND THE
VIRGIN ISLANDS

This natural-history survey of Porto Rico and the Virgin Islands, conducted by The New York Academy of Sciences, was established in 1913 and carried out with the cooperation of the Porto Rican government. The results of this survey have appeared from time to time as investigations by specialists have been completed.

Copyright, 1960, by The New York Academy of Sciences

CONTENTS

	PAGE		PAGE
PREFACE.....	259	<i>Pseudohurleytrema eucinostomi</i>	284
INTRODUCTION.....	261	<i>Postmonorchis orthopristsis</i>	284
METHODS.....	262	Family Fellodistomatidae	
KEY TO SPECIES.....	263	<i>Tergestia laticollis</i>	284
DESCRIPTION AND DISCUSSION OF SPECIES.....	267	<i>Tergestia pectinata</i>	284
Family Aspidogastridae	267	<i>Antorchis holacanthi</i> n. sp.....	285
<i>Cotylogaster basiri</i> n. sp.....	267	<i>Antorchis urna</i>	285
Family Bucephalidae		<i>Megalomyzon robustum</i>	286
<i>Rhipidocotyle nagatyi</i>	268	<i>Infundibulostomum spinatum</i> n. g., n. sp.....	286
<i>Alcicornis carangis</i>	268	<i>Proctoeces neomagnorus</i> n. sp.....	287
<i>Prosorhynchus attenuatus</i> n. sp.....	268	<i>Proctoeces lintoni</i> n. sp.....	287
<i>Prosorhynchus atlanticus</i>	269	Family Acanthocolpidae	
<i>Prosorhynchus stunkardi</i> n. sp.....	269	<i>Stephanostomum coryphaeae</i>	288
<i>Bucephalopsis arcuatus</i>	270	<i>Stephanostomum dentatum</i>	288
Family Pronocephalidae		<i>Stephanostomum casum</i>	288
<i>Glyphicephalus candidulus</i> n. comb.....	270	<i>Stephanostomum sentum</i>	289
<i>Glyphicephalus mcintoshi</i> n. sp.....	270	<i>Maniera brachydera</i>	289
<i>Barisomum erubescens</i>	271	Family Haploporidae	
<i>Pseudobarisomum holacanthi</i> n. g., n. sp.....	271	<i>Allomegasolena spinosa</i> n. g., n. sp.....	290
Family Microscaphiidae		<i>Allomegasolena attenuata</i> n. g., n. sp.....	290
<i>Hexangitrema breviceca</i> n. sp.....	272	<i>Hapladena acanthuri</i> n. sp.....	291
<i>Hexangitrema pricei</i> n. sp.....	272	<i>Neomegasolena chaetodipteri</i> n. g., n. sp.....	292
<i>Hexangitrema pomacanthi</i>	273	Family Megaperidae	
Family Paramphistomatidae		<i>Megapera gyrina</i>	293
<i>Clepodiscus reticulatus</i>	273	<i>Megapera pseudura</i>	293
Family Haplospilanchnidae		<i>Thysanopharynx elongatus</i>	293
<i>Schikhhobalotrema manteri</i> n. sp.....	274	Family Opistholebetidae	
<i>Schikhhobalotrema acuta</i>	274	<i>Opistholebes diodontis</i>	294
<i>Schikhhobalotrema pomacentri</i>	275	<i>Pachycreadium gastrocotylum</i>	294
<i>Schikhhobalotrema obtusa</i>	275	<i>Pachycreadium crassigulum</i>	294
<i>Schikhhobalotrema adbrachyura</i> n. sp.....	275	Family Opecoelidae	
Family Zoogonidae		<i>Pinguitrema lobata</i> n. g., n. sp.....	295
<i>Neozoogonus longicecus</i> n. sp.....	276	<i>Hamacreadium lintoni</i> n. sp.....	295
<i>Neozoogonus malacanthi</i> n. sp.....	276	<i>Hamacreadium longisaccum</i> n. sp.....	296
<i>Steganoderma atherinae</i>	277	<i>Hamacreadium mutabile</i>	297
<i>Diplangus anoplosus</i> n. sp.....	277	<i>Pseudoplagioporus brevivitellus</i> n. sp.....	297
Family Bivesiculidae		<i>Helicometrina nimia</i>	298
<i>Bivesicula hepsetiae</i>	278	<i>Helicometrina trachinoli</i> n. sp.....	298
Family Microphallidae		<i>Helicometrina mirzai</i> n. sp.....	299
<i>Megalophallus diodontis</i> n. sp.....	278	<i>Helicometra equilata</i> n. comb.....	299
<i>Carneophallus lactophrysi</i> n. sp.....	279	<i>Helicometra lorka</i>	299
Family Cryptogonimidae		<i>Neohelicometra scorpaenae</i> n. g., n. sp.....	300
<i>Siphodera vinaldewarsi</i>	280	<i>Opecoeloides vitellosus</i>	301
<i>Paracryptogonimus neoamericanus</i> n. sp.....	280	<i>Opecoeloides elongatus</i>	301
<i>Paracryptogonimus centroponi</i> n. sp.....	281	<i>Opecoeloides sp.</i>	301
<i>Meladena adglobosa</i>	282	<i>Opecoeloides brachyleleus</i>	302
Family Gorgoderidae		<i>Opecoeloides sp.</i>	302
<i>Xystretrum solidum</i>	282	<i>Pseudopecoeloides equesi</i>	302
Family Monorchidae		<i>Pseudopecoelus barkeri</i>	303
<i>Genolopa longicaudata</i> n. sp.....	283	<i>Pseudopecoelus tortugae</i>	303
<i>Genolopa ampullacea</i>	283	<i>Horatrema crassum</i>	303
<i>Hurleytrematoides chaetodoni</i>	283	<i>Coitocoecum sp.</i>	303

	PAGE
Family Lepocreadiidae	
<i>Homalometron elongatum</i>	303
<i>Homalometron foliatum</i> n. sp.	303
<i>Neoa pocreadium</i> n. g.	304
<i>Neoa pocreadium angustum</i> n. comb.	305
<i>Neoa pocreadium coili</i> n. comb.	305
<i>Postporus epinepheli</i>	305
<i>A pocreadium balistes</i>	305
<i>A pocreadium mexicanum</i>	306
<i>Multitestis blennii</i>	306
<i>Multitestis inconstans</i>	306
<i>Lepocreadium trulla</i>	306
<i>Lepocreadium</i> sp.	306
<i>Neolepidapedon trachinoti</i> n. sp.	306
<i>Neolepidapedon epinepheli</i> n. sp.	307
<i>Neolepidapedon equilatatum</i> n. sp.	308
<i>Neolepidapedon mycteropercae</i> n. sp.	309
<i>Lepidapedon holocentri</i> n. sp.	309
<i>Myzoxenus lachnolaimi</i>	310
<i>Dermadena lactophrysi</i>	310
<i>Pseudocreadium</i> sp.	310
<i>Opechona</i> sp.	310
<i>Diploproctodaeum</i> sp.	311
Family Accacoelidae	
<i>Tetrochetus aluterae</i>	311
Family Hemiluridae	
<i>Bilectihaster ovalis</i> n. g., n. sp.	311
<i>Hysterolecitha rosea</i>	312
<i>Leurodera decora</i>	312
<i>Dichadena acuta</i>	312
<i>Theletrum fusiiforme</i>	313
<i>Neogenolinea opisthonemae</i> n. g., n. sp.	313
<i>Macradena acanthuri</i> n. sp.	313
<i>Aponurus elongatus</i> n. sp.	314
<i>Aponurus symmetrorchis</i> n. sp.	315
<i>Parectenurus chloroscombri</i> n. sp.	315
<i>Parahemiurus merus</i>	316
<i>Sterrhurus fusiformis</i>	316
<i>Sterrhurus floridensis</i>	316
<i>Sterrhurus monticellii</i>	316
<i>Sterrhurus microcercus</i>	317
<i>Lecithochirium parvum</i>	317
<i>Dinurus breviductus</i>	317
<i>Dinurus barbatus</i>	317
<i>Dinurus tornatus</i>	317
<i>Tubulovesicula lindbergi</i>	317
Family Hirudinellidae	
<i>Hirudinella ventricosa</i>	318
DISCUSSION	318
HOST-PARASITE LIST	323
REFERENCES	326
PLATES	328

PREFACE

This monograph reports the major part of an investigation begun by one of us (R.M.C.) in 1951, when he spent one year at the College of Agriculture and Mechanic Arts, University of Puerto Rico, Mayagüez, Puerto Rico, collecting and studying larval trematodes and the helminth parasites of shore birds and marine fishes. The work there was done under the auspices set forth in the Preface to Part 4, Volume 16, of this series; this part was facilitated especially by Virgilio Biaggi, N. T. Mattox, and Donald Erdman, who rendered invaluable assistance in the collection and identification of fishes. One trip to Mona Island was cut short when a shark attacked and seriously injured Juan Suarez, who took leave of his duties as Librarian of the College so that we could benefit from his skill as a spear-fisherman.

Living material was studied to the extent that time permitted, but this report is based largely on fixed and preserved specimens that were brought back to Purdue University, Lafayette, Ind. There, the first author (A.H.S.) submitted an analysis of over one half of the collection as a thesis for the Ph.D. degree in January, 1959. During 1957 and 1958, he was a David E. Ross Fellow of the Purdue Research Foundation, and completion of the investigation has been supported by Grant No. G-6125 from the National Science Foundation, Washington, D. C. Leave of absence from his position on the staff of Aligarh Muslim University, Aligarh, India, enabled him to participate in this study, and for that opportunity and encouragement in his work he is indebted to M. B. Mirza, Head of the Department of Zoology and to M. A. Basir of that department.

Purdue University, 1960.

ATHER H. SIDDIQI
RAYMOND M. CABLE

DIGENETIC TREMATODES OF MARINE FISHES OF PUERTO RICO

Ather H. Siddiqi and Raymond M. Cable

INTRODUCTION

The digenetic trematodes of marine fishes constitute a large group of parasites that have been studied intensively in only a few regions. The present investigation extends knowledge of that group to the Caribbean Sea, in particular, to the waters adjacent to Puerto Rico and Mona Island, where the trematodes previously have received no attention. During 1951 and 1952 more than 125 species were obtained from about 800 fishes representing more than 140 species in that region. Not included in this report are a few trematodes for which material was unsatisfactory because of immaturity or poor condition. Although this study is one of the more comprehensive of its type, it is certain that many species of digenetic trematodes remain to be found in the fishes of the Caribbean region.

A study of this kind has significance beyond mere knowledge of the parasites themselves. As Manter (1940a, 1947, 1955) has stressed, the distribution and host-parasite relationships of the digenetic trematodes have a significant bearing on geology, oceanography and isolation in time and space as a factor in evolution. Manter found, for example, that greater similarity existed between the digenetic trematodes of fishes in the Gulf of Mexico and in the tropical eastern Pacific Ocean than between either of those waters and at Beaufort, N. C., and farther north in the western Atlantic. That observation supports the view that the Gulf of Mexico was at one time confluent with the Pacific Ocean and separated from the Atlantic by a land barrier now represented by the Antilles chain of islands. The present study further supports that view and also provides evidence that deep water between relatively close land masses serves as a barrier to shallow-water fishes and, hence, is an isolating mechanism that has led to a considerable degree of independent speciation among their trematode parasites.

The first digenetic trematodes of marine fishes to be investigated were those of European waters, from which slightly more than 100 species have been reported thus far. Information concerning that group is summarized by Dawes (1956). The principal European investigators were Rudolphi, Stossich, Monticelli, Looss, Odhner, Lebour, and Nicoll. Fish trematodes of the Red Sea, which has its own characteristic fauna, have been investigated almost solely by Nagaty, who has reported about one half the number known for European waters in a series of papers from 1937 to the present.

The studies of Ozaki and Yamaguti chiefly are responsible for the recognition of more than 300 species of digenetic trematodes from marine fishes in Japanese waters. About one fourth that number is known from the Arabian Sea and the Indian Ocean, largely through the efforts of Srivastava, Chauhan, and Gupta.

In a series of papers dating from 1898 to 1940, Linton pioneered the in-

vestigation of marine trematodes in the western Atlantic, reporting about 75 species from the Woods Hole, Mass., region and many additional ones from Bermuda, Beaufort, N. C., and Tortugas, Fla. In that work he was followed by Manter with many publications dating from 1925 until the present and reporting additional species from Maine, the Gulf of Mexico, the Galapagos Islands and, especially, Tortugas, where almost 200 species are known. More recently Manter has extended his studies to the South Pacific so that, with scattered reports by investigators other than those cited above, more than 1000 species of digenetic trematodes have been described from marine fishes.

METHODS

Fishes were collected by all available methods including commercial nets, traps, spear-fishing, and the use of rotenone to obtain species inhabiting reefs and shallow water. In all cases specimens were examined as soon as possible to obtain parasites in good condition; those that were dead and had begun to show the well-known signs of disintegration were discarded. The fellodistomes in herbivorous fishes were especially troublesome in that respect. At the beginning of the study ice was used with the expectation that the parasites would live much longer under refrigeration, but this hope proved to be unfounded; after the death of the host they remained in about as good condition at ambient temperatures as when chilled.

To the extent that time permitted, the worms were studied alive to observe certain features that are difficult to determine in fixed material. That procedure applied especially to the extent of the bladder and other features of the excretory system, the pattern of which was determined more or less completely for a few species and, in part, for several others.

After removal from the host, the trematodes were washed in 0.7 per cent saline and fixed under just sufficient coverglass pressure to prevent curling. Corrosive sublimate-acetic acid was used as a fixative when there was opportunity to process the material further without delay by washing out the fixative, dehydrating to 70 per cent alcohol, and treating with iodine to remove excess mercury. The bulk of the material was handled in that manner, but some specimens, taken from fishes at Mona Island where facilities and time were limited, were fixed and left in Bouin's fluid for less than 2 weeks, after which they were washed free of picric acid and stored in 70 per cent alcohol. Staining following that treatment gave decidedly poorer preparations than did material fixed in corrosive-sublimate acetic acid. Harris' hematoxylin and, to a less extent, Semichon's carmine were used to stain whole mounts that were cleared in terpineol. Serial sections were cut at 8 to 10 μ , stained with Delafield's hematoxylin, and counterstained with eosin.

All drawings with scales indicated were made by microprojection, and all measurements are in millimeters; other figures were drawn freehand. Sucker ratios are given with the oral sucker taken as 1 and were calculated from averages of the length plus width of suckers where those dimensions differed appreciably; otherwise the ratio is based on their diameters.

Examples of most of the species described, including type specimens of all

new ones, are deposited in the Helminthological Collection of the United States National Museum, Washington, D. C. under the accession numbers given. Asterisks indicate new host records.

KEY TO SPECIES

- | | |
|---|-----------------------------------|
| 1. Mouth on ventral surface, haptor a rhynchus at anterior end. | 2 |
| Mouth anterior, haptor a ventral disk with 3 rows of alveoli. | <i>Colyogaster basiri</i> |
| Mouth at or near anterior end, haptors in the form of suckers. | 6 |
| 2. Rhynchus with 7 tentacles. | <i>Alcicornis carangis</i> |
| Rhynchus without tentacles. | 3 |
| 3. Rhynchus spherical, suckerlike. | <i>Bucephalopsis arcuatus</i> |
| Rhynchus not spherical, or if so, very muscular but not suckerlike. | 4 |
| 4. Rhynchus with pentagonal cap-like expansion. | <i>Rhipidocotyle nagatyi</i> |
| Rhynchus without such an expansion. | 5 |
| 5. Rhynchus wedge-shaped, with longitudinal muscle bands | |
| Rhynchus more or less spherical, uterus extends well anterior to mouth | <i>Prosorhynchus allanticus</i> |
| Rhynchus more or less spherical, uterus extends well anterior to mouth | <i>Prosorhynchus attenuatus</i> |
| 6. Ventral or posterior sucker absent. | 7 |
| Sucker either on ventral surface or at posterior end of body. | 13 |
| 7. With one testis. | <i>Bivesicula hepsetiae</i> |
| With 2 testes. | 8 |
| 8. Testes tandem, median, anterior to ovary; eggs without filaments. | 9 |
| Testes symmetrical, near posterior end; eggs with filaments. | 10 |
| 9. Testes entire, ceca reach level of ovary. | <i>Hexangitrema pricei</i> |
| Testes lobed, ceca not reaching level of ovary. | <i>Hexangitrema breviceca</i> |
| 10. Head collar with prominent ridge, ventral fold of body continuous posteriorly. | 11 |
| Anterior end without prominent ridge; ventral fold, if present, only in anterior region. | 12 |
| 11. Body slender, over 2.0 long, eggs 0.028 to 0.030 long | <i>Glyphicephalus candidulus</i> |
| Body stout, less than 2.0 long, eggs 0.040 to 0.043 long | <i>Glyphicephalus mcintoshi</i> |
| 12. Over 3.0 long, anterior end with fleshy lateral folds; intestine with branching diverticula. | <i>Barisomum erubescens</i> |
| Less than 2.0 long, without fleshy folds; intestinal diverticula short, unbranched | <i>Pseudobarisomum holacanthi</i> |
| 13. Ventral sucker at posterior end of body. | 14 |
| Ventral sucker not at posterior end of body, pharynx present. | 15 |
| Ventral sucker not at posterior end of body, pharynx absent. | <i>Xysitretrum solidum</i> |
| 14. Ventral sucker surrounded by prominent glandular fold, testes symmetrical to slightly oblique, posterior to ovary. | <i>Opistholebes diodontis</i> |
| Ventral sucker without surrounding fold; testes tandem, anterior to ovary | <i>Cleptodiscus reticulatus</i> |
| 15. Intestine rhabdocoele; with a single testis. | 16 |
| Intestine a pair of ceca; 1, 2 or more testes. | 18 |
| 16. Body over 1.4 long; vitelline follicles small, numerous, confined to hindbody | <i>Schikhalotrema manteri</i> |
| Body less than 1.2 long; vitelline follicles few, large, extending to anterior margin of ventral sucker or into forebody. | 17 |
| 17. Sucker ratio 1:1.3, gonads well separated. | <i>Schikhalotrema obtusa</i> |
| Sucker ratio 1:1.5, gonads contiguous. | <i>Schikhalotrema pomacentri</i> |
| Sucker ratio 1:1.8, ventral sucker with posterolateral lobes; ovary entire | <i>Schikhalotrema acuta</i> |
| Sucker ratio 1:1.8, ventral sucker without lobes; ovary lobed | <i>Schikhalotrema adbrachyura</i> |
| 18. Vitelline follicles scanty, not near posterior end of body. | 19 |
| Vitelline follicles extensive, from near posterior end of body well toward ventral sucker or beyond. | 40 |
| 19. Genital pore either not median or not close to ventral sucker. | 20 |
| Genital pore near midline and usually close to ventral sucker. | 25 |

* Number of specimens examined is given at the end of each entry.

20. Ceca short, not extending into hindbody, cirrus sac absent	21
Ceca extending into hindbody, cirrus sac present	22
21. Male copulatory organ cup-shaped, with corona of papillae; metraterm with conspicuous folds	<i>Megalophallus diodontis</i>
Male copulatory organ bilobed, without papillae; metraterm simple, tubular	<i>Carneophallus lactophrysi</i>
22. Cuticle spinose and vitellaria posterior to ventral sucker or cuticle aspinose and vitellaria in forebody	23
Cuticle aspinose, vitellaria restricted to hindbody	90
23. Hindbody with angular lateral expansions and scanty vitellaria; cuticle spinose	<i>Steganoderma atherinae</i>
Hindbody without such expansions, cuticle aspinose, vitellaria in forebody	<i>Diplangus anoplosus</i>
Hindbody without expansions, cuticle spinose, vitellaria in hindbody	24
24. Genital pore near right margin of body, seminal vesicle bipartite	<i>Neozoogonus longicecus</i>
Genital pore near left margin of body, seminal vesicle tubular	<i>Neozoogonus malacanthi</i>
25. Excretory vesicle sac-shaped, confined to hindbody; metraterm conspicuous	26
Excretory vesicle Y-shaped, with arms extending into forebody; metraterm not conspicuous	30
26. Eggs with filaments	27
Eggs without filaments	28
27. Vitellaria 2 lateral groups of follicles	<i>Pseudohurleytrema eucnostomi</i>
Vitelline follicles scattered	<i>Hurleytremaoides chaetodoni</i>
28. Body short, testes near posterior end, uterus reaching level of intestinal bifurcation	<i>Postmonorchis orthopristis</i>
Body more elongate, testes well removed from posterior end, uterus extending into posttesticular space but not to intestinal bifurcation in forebody	29
29. Posttesticular space 3 or 4 times length of testis, metraterm sac reaching well posterior to ventral sucker	<i>Genolopa longicaudata</i>
Posttesticular space less than 3 times length of testis, metraterm sac reaching posterior margin of ventral sucker or but slightly beyond	<i>Genolopa ampullacea</i>
30. Eyespot pigment absent, cirrus sac present	31
Eyespot pigment present, cirrus sac absent	37
31. Anterior end with tentacles, ceca extend far into hindbody	32
Anterior end without tentacles, ceca short	33
32. Sucker ratio 1:1	<i>Tergestia laticollis</i>
Sucker ratio 1:2.5	<i>Tergestia pectinata</i>
33. Testes 2	34
A single testis	<i>Infundibulostomum spinatum</i>
34. Vitellaria in forebody, cirrus sac an inverted U	35
Vitellaria in hindbody, cirrus sac curved	36
35. Body oval to pyriform, not prolonged posteriorly; uterus not extending to level of ceca	<i>Antorchis holacanthi</i>
Body spindle-shaped, with posterior prolongation largely filled by excretory vesicle; uterus to cecal level	<i>Antorchis urna</i>
36. Oral sucker larger than ventral sucker, ovary well separated from testes	<i>Proctoeces neomagnorus</i>
Oral sucker smaller than ventral sucker, ovary close to anterior testis	<i>Proctoeces lintoni</i>
37. Circumoral spines absent	38
Circumoral spines present	39
38. Testes 2, pars prostatica inconspicuous	<i>Meladena adglobosa</i>
Testes 4 to 6 on each side, pars prostatica prominent, bulblike	<i>Siphodera vinaledwardsii</i>
39. Circumoral spines large, 46 to 51; ovary near midlevel	<i>Paracryplogonimus neoumericanus</i>
Circumoral spines small, 64; ovary anterior to midlevel	<i>Paracryplogonimus centropomi</i>
40. Oral sucker with double row of enlarged spines	41
Oral sucker without enlarged spines	44
41. Suckers well separated, hindbody less than 6 times length of forebody, corona of spines uninterrupted	42

Suckers close together, hindbody more than 10 times as long as forebody, corona of spines interrupted ventrally	<i>Manteria brachydera</i>	
42. Vitelline follicles from mid-level of cirrus sac to posterior end of body	<i>Stephanostomum coryphaenae</i>	
Vitelline follicles from posterior margin of cirrus sac to posterior end of body	<i>Stephanostomum sentium</i>	
Vitelline follicles from posterior margin of ventral sucker to posterior end of body		43
43. Circumoral spines 51 to 54	<i>Stephanostomum dentatum</i>	
Circumoral spines 36 to 38	<i>Stephanostomum casum</i>	
44. Testes in forebody, anterior margin of pharynx serrated		45
Testes in hindbody, anterior margin of pharynx smooth		47
45. Ovary lobed, testes well separated		46
Ovary entire, testes close together	<i>Thysanopharynx elongatus</i>	
46. Body short, with tail-like projection; vitelline follicles rounded	<i>Megapera pseudura</i>	
Body elongate, vitelline follicles handlike	<i>Megapera gyrina</i>	
47. Eyespot pigment and cuticular spines present		48
Eyespot pigment absent, cuticle rarely if ever spinose		52
48. Seminal receptacle absent		49
Seminal receptacle present		73
49. Hermaphroditic sac present		50
Hermaphroditic sac absent	<i>Neomegasolena chaelodipteri</i>	
50. Suckerlike structure at genital pore		51
Genital pore without such structure	<i>Hapladena acanthuri</i>	
51. Sucker ratio 1:1.1, forebody not attenuated	<i>Allomegasolena spinosa</i>	
Sucker ratio 1:2.3, forebody attenuated	<i>Allomegasolena attenuata</i>	
52. Muscular postoral ring present		53
Muscular postoral ring absent		54
53. Over 2.0 long, sucker ratio 1:2	<i>Pachycreadium gastrocotylum</i>	
Less than 2.0 long, sucker ratio 1:1.4	<i>Pachycreadium crassigulum</i>	
54. Cirrus sac containing seminal vesicle present		55
Cirrus sac containing seminal vesicle absent		65
55. Eggs with filaments		56
Eggs without filaments		61
56. Testes 2		57
Testes 9		59
57. Oral sucker funnel shaped, ani present	<i>Neohelicometra scorpaenae</i>	
Oral sucker not funnel-shaped, ani absent		58
58. Cirrus sac extends halfway from ventral sucker to ovary	<i>Helicometra equilata</i>	
Cirrus sac not extending posterior to ventral sucker	<i>Helicometra tortia</i>	
59. Body over 2.5 long	<i>Helicometrina nimia</i>	
Body less than 2.0 long		60
60. Vitelline follicles interrupted at level of ventral sucker	<i>Helicometrina mirzai</i>	
Vitelline follicles not interrupted at level of ventral sucker	<i>Helicometrina trachinoti</i>	
61. Ventral sucker surrounded by fleshy fold and muscles radiating into parenchyma, testes symmetrical to slightly diagonal	<i>Pinguirema lobata</i>	
Ventral sucker without fold, testes oblique		62
62. Vitellaria from posterior end to ventral sucker	<i>Pseudoplagiaporus brevicitellus</i>	
Vitellaria from posterior end well into forebody		63
63. Cirrus sac extends posterior to ventral sucker	<i>Hamacreadium longisaccum</i>	
Cirrus sac not extending to ventral sucker		64
64. Vitelline follicles reach intestinal bifurcation, posttesticular space about length of zone occupied by gonads	<i>Hamacreadium mutabile</i>	
Vitellaria not reaching bifurcation, posttesticular space much longer than zone occupied by gonads	<i>Hamacreadium lintoni</i>	
65. Accessory sucker anterior to ventral sucker present		66
Accessory sucker absent		70
66. Accessory sucker with a limiting membrane		67
Accessory sucker without such membrane	<i>Opecoeloides</i> sp., FIGURE 91	
67. Body at least 8 times as long as wide, testes separated		68
Body less than 6 times as long as wide, testes contiguous		69
68. Body extremely slender, over 2.0 long, ventral sucker with 4 anterior and 4 posterior papillae; vitellaria confluent between, and posterior to testes	<i>Opecoeloides elongatus</i> .	

- Body less than 2.0 long, ventral sucker with 3 anterior and 2 posterior papillae; vitellaria not confluent between, or posterior to testes.
- Opecoeloides vitellosus*
69. Accessory sucker 0.093 in diameter; ventral sucker with 3 anterior and 2 posterior papillae. *Opecoeloides* sp., FIGURE 89
Accessory sucker 0.042-0.052 in diameter, ventral sucker with 4 anterior and 4 posterior papillae. *Opecoeloides brachyleleus*
70. Ventral sucker stalked *Pseudopecoeloides equesi* 71
Ventral sucker without a stalk 72
71. Testes tandem
Testes symmetrical *Horatrema crassum*
72. Pharynx about as long as oral sucker, ovary to right of midline, vitelline follicles in racemose clusters. *Pseudopecoelus barkeri*
Pharynx much shorter than oral sucker, ovary median, vitelline follicles not in racemose clusters. *Pseudopecoelus tortugae*
73. Cirrus sac present 74
Cirrus sac absent 84
74. Testes 11 75
Testes 2 76
75. Testes in one group overlapping ovary *Multitestis inconstans*
Testes in 2 groups with ovary between *Multitestis blennii*
76. Body pyriform, ovary anterior to testes, prostate cells not conspicuously grouped around posterior seminal vesicle, testes oblique or tandem. 77
Body elongate, ovary anterior to testis, prostate cells in a compact mass surrounding posterior seminal vesicle, testes tandem to slightly oblique. 78
Body subcircular in outline, prostate cells surrounding neck between internal and external seminal vesicles; testes symmetrical, with ovary between. 83
77. Testes oblique, vitellaria reaching intestinal bifurcation. *Lepocreadium trulla*
Testes tandem, vitellaria not reaching bifurcation *Lepocreadium* sp.
78. Ventral sucker with pair of lateral lamellar pads. *Myzoxenus lachnolaimi* 79
Ventral sucker not so modified.
79. Posterior (external) seminal vesicle and prostate cells not enclosed in a membrane
Lepidapedon holocentri 80
Posterior seminal vesicle and prostate cells enclosed in a membrane. 80
80. Vitellaria from posterior end to level of intestinal bifurcation
Neolepidapedon trachinoti
Vitelline follicles not reaching level of ventral sucker. 81
81. Genital pore posterolateral to ventral sucker. *Neolepidapedon mycteropercae* 82
Genital pore to left of ventral sucker
82. Esophagus long, vitellaria scarcely reaching level of posterior seminal vesicle.
Neolepidapedon epinepheli
Esophagus short, vitellaria reach level of cirrus sac. *Neolepidapedon equitatum*
83. Ventral surface without glandular pits *Pseudocreadium* sp.
Ventral surface with glandular pits *Dermodena laciophrysi*
84. Genital pore posterior to ventral sucker *Postporus epinepheli* 85
Genital pore anterior to ventral sucker 86
85. Lymphatic channels present 86
Lymphatic channels absent 89
86. Mouth a longitudinal, slitlike opening; cecal swollen, vitellaria confluent anterior to ventral sucker 87
Mouth subcircular, ceca narrow, vitellaria not confluent in forebody. 88
87. Body over 4.0 long, sucker ratio 1:0.87 *Neopocreadium angustum*
Body less than 3.0 long, sucker ratio 1:0.65 *Neopocreadium coili*
88. Vitellaria barely reaching level of ventral sucker, sucker ratio 1:1.2
Apocreadium mexicanum
Vitellaria barely reaching level of ovary, sucker ratio 1:1.6
Apocreadium balistes
89. Vitellaria not reaching level of ovary, hindbody foliate. *Homalometron foliatum*
Vitellaria reaching level of seminal vesicle, hindbody cylindrical
Homalometron elongatum
90. Thick-bodied worms over 75 long when full-grown; hindbody enlarged, occupied mostly by expanded ceca *Hirudinella ventricosa*
Less than 25 long, usually much shorter; hindbody cylindrical or but slightly expanded. 91
91. Each cecum with a pouch flanking pharynx *Tetrochelus aluterae* 92
Ceca without such pouches.

tubular, coiled; cirrus sac median, opening into what appears to be a posterior extension of genital atrium, containing pars prostatica, prostate cells, and ejaculatory duct. Ovary smooth, 0.330 to 0.349 by 0.211 to 0.264, slightly to right of midline, anterolateral to right testis. Vitellaria scanty, follicles confined to a narrow band forming an arch well anterior to ovary. Laurer's canal present. Seminal receptacle of uterine type. Uterus voluminous, occupying most of posterior region of body; metraterm tubular, extending anteriorly to left of cirrus sac to join genital atrium. Genital pore median, immediately anterior to ventral disk. Eggs very numerous, colorless, 0.066 to 0.079 by 0.037 to 0.045, containing biocellate miracidia that sometimes hatch in the uterus. Excretory vesicle I-shaped, extending to posterior level of pharynx.

Host: *Calamus calamus*.

Site: posterior intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39300.

The genus *Cotylogaster* was erected by Monticelli (1892) for *C. michaelis* from a Mediterranean teleost. A second species, *C. occidentalis* Nickerson, 1899, was found in a teleost from the Mississippi River. *C. basiri*, the third species of the genus, resembles most *C. michaelis* but differs from that trematode in the structure of the buccal funnel, number of alveoli, extent of vitellaria and size of eggs.

It is of interest to note that another aspidogastrid reported from the Western Atlantic occurs in the same host species as *C. basiri* but belongs to a different genus, namely, *Lobatostoma* (Manter, 1947).

FAMILY BUCEPHALIDAE POCHÉ, 1907

Rhipidocotyle nagaty Manter, 1940 (FIGURE 2)

Host: *Eulhynnus alleletteratus*.

Site: intestine.

Locality: Parguera, P. R.

Deposited specimen: No. 39301.

Alcicornis carangis MacCallum, 1917 (FIGURE 3)

Host: *Caranx ruber*.

Site: stomach.

Locality: off Puerto Real, P. R.

Deposited specimen: No. 39302.

MacCallum (1917) gave a very poor and inaccurate description of *A. carangis*, as pointed out by Nagaty (1937), who redefined the genus.

Prosorhynchus attenuatus n. sp. (FIGURE 4)

Description based on 29 specimens with characters of the genus. Body small, slender, about equally wide throughout except at rounded ends, 0.693 to 1.107 long, 0.138 to 0.184 wide. Cuticle with spines becoming less numerous posteriorly. Rhynchus spherical, suckerlike, muscular, 0.090 to

0.105 in diameter. Mouth submedian, posterior to midlevel; pharynx spherical, 0.033 to 0.045 in diameter; intestine saclike, dorsal to pharynx. Gonads to right of midline; testes 2, entire, 0.051 to 0.070 by 0.060 to 0.075, tandem, postovarian, anterior testis contiguous with intestine, sometimes overlapping ovary. Cirrus sac elongate, extending to level of posterior testis, containing small saclike seminal vesicle, tubular pars prostatica and prostate cells. Genital pore ventral, near posterior end of body. Ovary entire, 0.060 to 0.075 by 0.046 to 0.066, pretesticular, overlapping pharynx. Vitellaria in anterior half of body, in 2 lateral groups of diffuse follicles in linear arrangement. Uterus extends from posterior end of body to anterior limit of vitellaria. Eggs numerous, 0.019 to 0.021 by 0.013 to 0.015. Excretory vesicle tubular, extending well anterior to vitellaria; excretory pore terminal.

Host: *Chloroscombrus chrysurus*.

Site: intestine.

Locality: Playa Mani, P. R.

Type specimen: Holotype No. 39303.

This species is similar to *Prosorhynchus tsengi* Tsin, 1933 (= *Gotonius platycephali* = *Prosorhynchus platycephali* Yamaguti, 1934) but differs from that species in smaller size, shape of the rhynchus, topography of gonads, extent of cirrus sac, and much smaller eggs.

Prosorhynchus atlanticus Manter, 1940 (FIGURE 5)

Host: *Mycteroperca* sp.

Site: intestine and ceca.

Locality: Mona Island, P. R.

Deposited specimen: No. 39304

Prosorhynchus stunkardi n. sp. (FIGURE 6)

Description based on 15 specimens with characters of the genus. Body elongate, 1.056 to 1.227 long, 0.171 to 0.264 wide; anterior half spatulate, posterior half cylindrical. Cuticle distinctly spinose from anterior end to about level of pharynx. Rhynchus oval to pyriform, muscular, 0.052 to 0.118 by 0.064 to 0.099, without papillae. Mouth median, posterior to midlevel; pharynx small, spherical, 0.039 to 0.052 in diameter; esophagus not evident, intestine small, oval in shape. Testes 2, entire, 0.078 to 0.082 by 0.064 to 0.067, close together, slightly to left of midline, posterior to ovary. Cirrus sac long, usually extending to posterior testis; with small, rounded seminal vesicle, well-developed tubular pars prostatica and prostate cells. Genital pore ventral, near end of body. Ovary entire, 0.067 to 0.097 by 0.052 to 0.059, to left of midline, pretesticular, near intestine and anterior testis. Vitellaria in 2 short, lateral bands of small follicles immediately anterior to level of pharynx. Uterus spacious, from posterior end of body to level of pharynx. Eggs very numerous, colorless or yellow, 0.016 to 0.018 by 0.011 to 0.015. Excretory system not observed.

Host: *Scomberomorus* sp.

Site: intestine and ceca.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39305.

This species is similar to *P. freitasi* Nagaty, 1937, and *P. facilis* Ozaki 1924 in general body shape and disposition of gonads, but differs from *P. freitasi* in the shape of the rhynchus, more anterior location of the vitellaria and size of eggs. It differs from *P. facilis* in size and shape of the rhynchus, size and extent of vitelline follicles, and in egg size.

Bucephalopsis arcuatus (Linton, 1900) Eckman, 1932 (FIGURE 7)

Synonyms:

Gasterostomum arcuatum Linton, 1900.

Gasterostomum sp. Linton, 1910.

Host: *Sphyaena barracuda*.

Site: intestine.

Locality: Mona Island.

Deposited specimen: No. 39306.

FAMILY PRONOCEPHALIDAE Looss, 1902

Glyphicephalus candidulus (Linton, 1910) n. comb. (FIGURE 8)

Synonyms:

Himasomum candidulum Linton, 1910.

Barisomum candidulum (Linton) Price, 1931.

Pleurogonius candidulus (Linton) Manter, 1947.

Host: *Pomacanthus arcuatus*.

Site: small intestine.

Locality: Guaniquilla and Guanica, P. R.

Deposited specimen: No. 39307.

We concur in the opinion of Manter (1947) that this species does not belong in the genus *Barisomum* and transfer it to *Glyphicephalus*, with which it is in closer agreement than *Pleurogonius* in respect to the nonfused excretory canals, prominent dorsal ridge of the head collar, and the greater lateral displacement of the sex openings. Other species of *Glyphicephalus* occur in reptiles, with the exception of the following one.

Glyphicephalus mcintoshii n. sp. (FIGURE 9)

Description based on 3 specimens with characters of the genus. Body short and wide, 1.352 to 1.630 long, 0.567 to 0.627 wide, rounded posteriorly, with prominent marginal fold and muscular head collar. Cuticle and pigment as in preceding species. Oral sucker 0.060 by 0.072 to 0.090, esophagus 0.139 to 0.185 long; ceca narrow, with small diverticula, overlapping median edge of testes to end posterior to them. Testes lobed, 0.132 to 0.138 by 0.118 to 0.145, symmetrical, near posterior extremity. Cirrus sac as in preceding species but more or less sigmoid and apparently lacking internal seminal vesicle; genital pores and external seminal vesicle as in that species. Ovary lobed, 0.072 to 0.100 by 0.069 to 0.118; it and Mehlis' gland as in preceding species; vitellaria as in that species but extending about one third of body length from posterior end. Uterus with transverse coils overlapping ceca; metraterm conspicuous. Eggs numerous, their structure as in

preceding species, 0.040 to 0.043 long, exclusive of filaments, 0.019 to 0.022 wide. Excretory system as in that species.

Host: *Pomacanthus arcuatus*.

Site: small intestine.

Locality: Guaniquilla, P. R.

Type specimen: Holotype No. 39308.

Glyphicephalus mcintoshi is shorter and more compact than *G. candidulus*, the only other species of the genus reported from fishes, and has a more conspicuous dorsal ridge of the head collar and much larger eggs.

Barisomum erubescens Linton, 1910 (FIGURE 10)

Synonyms:

Pleurogonius erubescens (Linton) Prudhoe, 1944.

Monostomum pomacanthi MacCallum, 1916.

Pleurogonius pomacanthi (MacCallum) Price, 1931.

Host: *Pomacanthus arcuatus*.

Site: intestine.

Locality: Parguera, P. R.

Deposited specimen: No. 39309.

Pseudobarisomum n. g.

Diagnosis: Pronocephalidae; lacking head collar and marginal fold, ends rounded, cuticle smooth, eyespot pigment present. Esophagus narrow, relatively long, ceca with short, unbranched diverticula, terminating near posterior end of body. Genital pore extracecal, on left, not far posterior to level of intestinal bifurcation. Testes symmetrical, near posterior extremity, extracecal or slightly overlapped by ceca; cirrus sac cylindrical, its basal half occupied by prostatic complex; external seminal vesicle tubular, sinuous. Ovary pretesticular, to right of midline; vitellaria mostly extracecal, pretesticular; seminal receptacle absent; Mehlis' gland median, intertesticular; uterus in close transverse loops occupying intercecal space between Mehlis' gland and cirrus sac; metraterm well differentiated. Eggs with a single filament at each pole. Excretory vesicle with small unpaired portion and 2 arms crossing ceca and extending anteriorly without branching to end blindly at esophageal level. Type and only species:

Pseudobarisomum holacanthi n. g., n. sp. (FIGURE 11)

Diagnosis based on 2 specimens with the characters of the genus. Body 1.531 to 1.564 long, 0.660 to 0.732 wide; oral sucker 0.079 to 0.085 by 0.102 to 0.112; esophagus 0.217 to 0.237 long; ceca with diverticula anteriorly, almost tubular posteriorly. Testes slightly lobed, 0.145 to 0.191 by 0.132 to 0.165; cirrus sac almost straight to sigmoid, extending from genital pore to right and posteriorly across midregion of worm, evidently without internal seminal vesicle. Ovary anteromedian to right testis, slightly irregular in outline, 0.151 to 0.165 by 0.105 to 0.132; vitellaria with a few follicles overlapping ceca, confined to posterior $\frac{2}{5}$ of body. Eggs numerous, 0.030 to 0.033 long exclusive of filaments, 0.015 to 0.018 wide. Excretory

system as in generic diagnosis, pore dorsal near posterior end of body, with conspicuous sphincter.

Host: *Holacanthus tricolor*.

Site: large intestine.

Locality: Parguera, P. R.

Type specimen: Holotype No. 39310.

The genus *Pseudobarisomum* is distinguished from *Barisomum* by the absence of fleshy lateral folds, a single genital pore, and absence of branched intestinal diverticula. Other differences in their species concern the length of the esophagus, level of the genital pore and position of Mehlis' gland.

FAMILY MICROSCAPHIIDAE TRAVASSOS, 1922

Hexangitrema breviceca n. sp. (FIGURE 12)

Diagnosis based on a single specimen in good condition (others shrivelled badly in clearing) with characters of the genus. Body broadly fusiform, notched posteriorly, 3.755 long, 1.70 wide. Cuticle smooth, eye-spot pigment absent. Oral sucker without evident retrodorsal pockets. Prepharynx 0.334 long; pharynx pyriform, 0.147 to 0.149; esophagus absent; ceca simple, ending blindly near midlevel of posterior testis. Genital pore immediately posterior to oral sucker, cirrus sac absent, seminal vesicle a long sinuous tube beginning near intestinal bifurcation. Pars prostatica and prostate cells indistinct. Testes 2, lobed, tandem, intercecal or slightly overlapping ceca, 0.60 to 0.67 by 0.67 to 0.94. Ovary entire, median, post-testicular, near posterior end of body, 0.207 by 0.140; seminal receptacle absent; Mehlis' gland posterior to ovary. Vitelline follicles subspherical, sparsely confluent posterior to ovary, extending to intertesticular level. Uterus beginning posterior to ovary and extending anteriorly through intercecal region; metraterm simple. Eggs 0.082 to 0.088 by 0.054 to 0.057. Excretory vesicle small, its pore almost terminal.

Host: *Pomacanthus arcuatus*.

Site: intestine.

Locality: Guaniquilla, P. R.

Type specimen: Holotype No. 39311.

Hexangitrema breviceca resembles *H. pomacanthi* more than any other form but differs from that species in having lobed, somewhat separated testes, and short ceca that do not reach the posttesticular region.

Hexangitrema pricei n. sp. (FIGURES 13 and 14)

Description based on 5 specimens with characters of the genus. Body 3.56 to 4.42 long, 1.083 to 1.14 wide, notched posteriorly, rounded anteriorly. Cuticle thick, aspinose, parenchyma vesicular, eye-spot pigment present. Oral sucker 0.187 to 0.225 by 0.204 to 0.315, with inconspicuous retrodorsal pockets seen in living specimens only. Prepharynx 0.847 to 1.32 long; pharynx pyriform, 0.198 to 0.262 by 0.165 to 0.232; esophagus absent, intestinal bifurcation slightly anterior to midlevel of body; ceca wide, with

constrictions and undulations, ending blindly near posterior end of body. Lymph system apparently absent. Genital pore median, a short distance posterior to oral sucker; cirrus sac absent; seminal vesicle long, tubular, with posterior portion coiled within arch of ceca. Gonads well within posterior half of body: testes entire, close together in tandem, preovarian, 0.184 to 0.207 by 0.233 to 0.277; ovary subspherical, submedian, near posterior testis, 0.073 to 0.105 in diameter. Vitellaria confined to posterior half of body but not reaching ends of ceca, mainly extracecal but with a few follicles posterior to ovary. Seminal receptacle absent. Mehlis' gland to left of ovary. Uterus intercecal, may extend posterior to ovary a short distance before turning anteriorly as a sinuous tube as far as intestinal bifurcation, then almost straight, paralleling esophagus and seminal vesicle to open at genital pore; metraterm evidently not differentiated. Eggs few to fairly numerous, 0.069 to 0.073 by 0.046 to 0.049. Excretory vesicle small, with short canal to excretory pore situated subdorsally in notch at posterior end; from vesicle 2 main canals extend anteriorly and bifurcate at level of testes; the resultant canals continue anteriorly and form, by further divisions and anastomoses, the complex shown in FIGURE 13. Right and left halves of system connected by one or more commissures.

Host: *Pomacanthus arcuatus*.

Site: intestine.

Locality: off Puerto Real, P. R.

Type specimen: Holotype No. 39312.

Hexangitrema pricei differs from *H. pomacanthi* and *H. breviceca* in body size and shape, position of the gonads, extent of vitellaria, length of prepharynx, and size of the eggs.

Hexangitrema pomacanthi Price, 1937

Host: *Pomacanthus arcuatus*.

Site: intestine.

Locality: Guaniquilla, P. R.

Because the single specimen obtained was in poor condition the species is not illustrated here. It is readily differentiated from *H. breviceca* by the entire, contiguous testes and the long ceca, that extend well posterior to the testes. Price (1937) did not give explicit dimensions of the egg; we find its length to be 0.088 to 0.091 and width 0.059 to 0.062.

FAMILY PARAMPHISTOMATIDAE FISHOEDER, 1901

Cleptodiscus reticulatus Linton, 1910

Host: *Pomacanthus arcuatus*.

Site: large intestine.

Locality: Guaniquilla, P. R.

Eight amphistomes from one host are tentatively identified as the above species. As in many of our microscophiids, the worms shrivelled badly when cleared, yielding preparations too poor for critical study and description.

FAMILY HAPLOSPLANCHNIDAE POCHE, 1925

Schikhobalotrema manteri n. sp. (FIGURE 15)

Description based on 6 specimens with characters of the genus. Body 1.500 to 1.951 long, 0.337 to 0.420 wide, rounded anteriorly, tapering posteriorly. Cuticle aspinose. Eye-spot pigment present. Oral sucker 0.135 to 0.172 by 0.142 to 0.195. Ventral sucker 0.180 to 0.225 by 0.210 to 0.265, about one third body length from anterior end. Sucker ratio 1:1.3. Pharynx 0.082 to 0.112 by 0.090 to 0.105, esophagus short, cecum slender, its extent not observable. Testis elongate, rarely lobulated, 0.202 to 0.390 by 0.075 to 0.112, near posterior end of body. Genital pore ventral, about midway between suckers. Cirrus sac absent; seminal vesicle sinuous, tubular. Ovary entire, 0.075 to 0.157 by 0.068 to 0.082, submedian to left, postequatorial. Vitellaria filling most of available space from posterior margin of ventral sucker to or slightly posterior to testis; follicles small. Seminal receptacle small, spherical, posterior to, and slightly to left of, ovary. Uterus scanty, but extending well posterior to ovary. Eggs few, 0.056 to 0.061 by 0.041 to 0.043. Excretory system not observed.

Host: identified only as a "reef fish with a collar."

Site: intestine.

Locality: Punta Arenas, P. R.

Type specimen: Holotype No. 39313.

Schikhobalotrema manteri differs from all other species of the genus in the distribution of vitellaria, the relative position of the gonads, and the posterior extent of the uterus.

The genus *Schikhobalotrema* was erected by Skrjabin and Guschanskaja (1955) for species of the genus *Haploplanchnus* which have extensive vitellaria, thereby restricting *Haploplanchnus* to those which have sparse vitellaria. We have accepted this arrangement, but it would not be surprising to find intermediate species that would invalidate *Schikhobalotrema*.

Schikhobalotrema acuta Linton, 1910, Skrjabin and Guschanskaja, 1955
(FIGURE 16)

Synonyms:

Deradena acuta Linton, 1910.

Haploplanchnus acutus (Linton) Manter, 1937.

Hosts: *Strongylura* sp., **Hyporhamphus unifasciatus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Deposited specimen: No. 39314.

Our material differs from Manter's description in a few minor details of measurement and relative position of ovary and seminal receptacle. The egg size is slightly smaller.

The species for which Cable (1954a) determined the life history probably was *S. acuta*. On the basis of that study, La Rue (1957) considers the Haploplanchnidae to be closely related to the echinostomes and fasciolids.

Schikhobalotrema pomacentri Manter, 1937, Skrjabin and Guschanskaja, 1955 (FIGURE 17)

Synonym:

Haplospalchnus pomacentri Manter, 1937.

Host: **Pomacentrus fuscus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Deposited specimen: No. 39315.

Schikhobalotrema obtusa Linton, 1910, Skrjabin and Guschanskaja, 1955 (FIGURE 18)

Synonyms:

Deradena obtusa Linton, 1910.

Haplospalchnus obtusa (Linton) Manter, 1937.

Host: **Acanthurus bahianus*, *Sparisoma viride*.

Site: intestine.

Locality: Mona Island, P. R.

Deposited specimen: No. 39316.

Schikhobalotrema adbrachyura n. sp. (FIGURES 19 and 20)

Description based on 10 specimens with characters of the genus. Body 0.675 to 0.682 long, 0.262 to 0.292 in maximum width at level of ventral sucker. Cuticle aspinose. Eye-spot pigment present. Oral sucker 0.086 to 0.129 by 0.108 to 0.120. Ventral sucker 0.172 to 0.240 by 0.165 to 0.195, slightly posterior to midlevel. Sucker ratio 1:1.8. Prepharynx short, pharynx 0.046 to 0.058 by 0.067 to 0.086; cecum long, extending to posterior margin of ovary. Genital pore slightly to left of midline, midway between pharynx and ventral sucker. Seminal vesicle sinuous, tubular, not extending beyond midlevel of ventral sucker. Testis entire, 0.073 to 0.086 by 0.077 to 0.103, near posterior end of body. Ovary with 5 to 6 distinct lobes, closely anterior to testis. Seminal receptacle small, round, adjacent to ovary. Vitelline follicles small, scattered from pharyngeal region almost to posterior end of body. Uterus scanty, preovarian. Eggs very few, 0.079 by 0.068. Excretory vesicle sac-shaped; excretory pore terminal.

Host: *Sparisoma* sp.

Site: intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39317.

Of the 11 species in the genus *Schikhobalotrema*, *S. adbrachyura* resembles most *S. brachyura* but differs from it in having a strongly lobed ovary and shorter seminal vesicle.

Some haplospalchnids in addition to those reported above were found in the intestine of the rainbow parrotfish *Pseudoscarus quacamaia* and green parrotfish *Sparisoma viride* but were in too poor condition to be identified positively. In general, haplospalchnids seem to deteriorate rapidly after the death of the host.

FAMILY ZOOGONIDAE ODHNER, 1911

Neozoogonus longicecus n. sp. (FIGURE 21)

Description based on 5 specimens with characters of the genus. Body flat, rounded at ends, 0.792 to 1.273 long, 0.310 to 0.369 in maximum width at level of ventral sucker. Cuticle spinose anteriorly, spines fading out posterior to ventral sucker. Oral sucker subterminal, 0.066 to 0.082 by 0.090 to 0.105. Ventral sucker 0.075 to 0.105 in diameter, anterior to intestinal bifurcation. Sucker ratio 1:1.2. Prepharynx 0.010 to 0.013 long, pharynx 0.037 to 0.061 in diameter, esophagus 0.260 to 0.330 long; ceca wide, extending to anterior end of excretory vesicle. Genital pore marginal, on right near level of ventral sucker. Cirrus sac large, arching posteromedially from genital pore; seminal vesicle with 2 spherical divisions; prostate well developed; pars prostatica tubular. Testes 2, entire, 0.090 to 0.120 by 0.076 to 0.105, nearly symmetrical, anterior to ovary. Ovary entire, 0.090 to 0.127 by 0.084 to 0.105, median, posterior to left testis. Vitellaria a compact mass posterior or posterolateral to ovary. Seminal receptacle large, on left, posterolateral to ovary. Laurer's canal present. Uterus tubular, its coils filling posterior region of body, with terminal portion passing between testes to join metraterm; metraterm muscular, with accessory seminal receptacle near genital pore. Eggs very numerous, 0.040 to 0.045 by 0.022 to 0.030, with the appearance of membranous sacs containing miracidia in all stages of development. Excretory vesicle short, sac-shaped; excretory pore terminal, without evident sphincter.

Host: *Mulloidichthys martinicus*.

Site: intestine.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39318.

Neozoogonus malacanthi n. sp. (FIGURE 22)

Description based on 2 specimens with characters of the genus. Body 0.615 to 0.892 long, 0.232 to 0.262 wide, ends rounded. Cuticle with large, scalelike spines, numerous anteriorly, becoming more scattered towards posterior end. Eye-spot pigment absent. Oral sucker terminal, 0.073 to 0.086 by 0.098 to 0.099. Ventral sucker about one third body length from anterior end, median, 0.077 to 0.092 in diameter. Sucker ratio 1:0.97. Prepharynx short, pharynx 0.046 to 0.058 in diameter, esophagus very long, intestinal bifurcation well posterior to ventral sucker, immediately anterior to left testis; ceca moderately wide, extending into posterior one fourth of body. Genital pore submarginal, on left, posterior to level of ventral sucker. Cirrus sac large, arcuate, extending from genital pore almost to right margin of body; seminal vesicle tubular, pars prostatica spherical, prostate cells well developed. Testes 2, entire, 0.072 to 0.103 by 0.087 to 0.116, at about midlevel, oblique, with left testis anteriormost. Ovary entire, 0.094 to 0.108 by 0.062 to 0.086, submedian, posterior to left testis. Seminal receptacle spherical, posterior to ovary. Vitellaria a compact mass dorsal to, and to right of, ovary. Uterus extensive, tubular, occupying postovarian region,

overlapping ceca; metraterm distinct, muscular, arching anterior to distal end of cirrus sac to approach genital atrium; recurrent segment with distinct accessory seminal receptacle. Eggs numerous, with membranous shells, 0.053 to 0.060 by 0.032 to 0.037. Excretory vesicle sac-shaped, small; excretory pore terminal, without evident sphincter.

Host: *Malacanthus plumieri*.

Site: esophagus and intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39319.

We have assigned the 2 preceding species to the genus *Neozoogonus* Arai, 1954, because they are in closer agreement with *N. californicus* than other zoogonids. However, generic distinctions in these trematodes are not well defined. The so-called accessory seminal receptacle has been described for some species of both *Zoogonus* and *Zoogonoides* but not for others, and the level of the intestinal bifurcation and length of ceca are features of questionable validity in separating genera. Recognized for the time being, the genus *Neozoogonus* includes *N. californicus* and the 2 species above, which may be differentiated by the shape and position of the oral sucker, course of the metraterm, position of the genital pore, size of eggs, and shape of the seminal vesicle. The extent to which the last feature differs in the 3 is greater than is usually encountered in a single genus as is also the reversed position of the genital pore in *N. longicecus* and *N. malacanthi*.

Steganoderma atherinae (Price, 1934) Manter, 1947 (FIGURE 23)

Synonyms:

Lecithostaphylus atherinae Price, 1934.

Steganoderma (*L.*) *atherinae* (Price) Yamaguti, 1953.

Host: **Hepsetia stipes*.

Site: intestine.

Locality: Punta Arenas, P. R.

Deposited specimen: No. 39320.

Diplangus anoplosus n. sp. (FIGURE 24)

Description based on a single specimen with characters of the genus. Body rounded anteriorly, tapering posteriorly, 1.427 long, 0.400 wide, ventral surface with a fold. Cuticle smooth, eye-spot pigment absent. Oral sucker almost terminal, 0.153 by 0.167. Ventral sucker at midlevel of body, 0.240 by 0.247. Sucker ratio 1:1.5. Prepharynx very short; pharynx 0.100 by 0.120; esophagus 0.092 long; ceca swollen, ending blindly and extending to midlevel of posterior testis. Genital pore submedian, ventral to pharynx. Cirrus sac very delicate, thin-walled; seminal vesicle bipartite, pars prostatica well developed; prostate cells sparse. Testes 2, contiguous, entire, slightly diagonal, postovarian, 0.116 to 0.139 by 0.112 to 0.131. Ovary entire, contiguous with anterior testis, median, 0.102 by 0.108. Seminal receptacle small, between ventral sucker and ovary. Vitelline follicles numerous, in lateral fields, from base of oral sucker to anterior margin of ventral sucker. Laurer's canal present. Uterus voluminous,

occupying all available space posterior to testes; metraterm simple. Eggs numerous, 0.027 to 0.029 by 0.015 to 0.018. Excretory vesicle I-shaped, extending to ventral sucker; excretory pore almost terminal.

Host: *Ocyurus chrysurus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39321.

The above species differs from the 3 others that have been assigned to the genus *Diplangus* Linton, 1910, in having numerous vitelline follicles situated at the sides of the forebody rather than 6 to 13 follicles lateral and posterior to the ventral sucker.

FAMILY BIVESICULIDAE YAMAGUTI, 1939

Bivesicula hepsetiae Manter, 1947 (FIGURE 25)

Host: *Hepsetia stipes*.

Site: intestine.

Locality: Punta Arenas and Parguera, P. R.

There must be other bivesiculids in fishes of the region since 6 species of furcocystocercous cercariae, which are larvae of that group, were found in Puerto Rican snails. The life history apparently is completed by fishes eating the cercariae; immature bivesiculids were found in the intestine of several species of fishes in which the parasites evidently were unable to develop to maturity. From the number of such fishes, it seems that the bivesiculids have a high degree of host specificity.

FAMILY MICROPHALLIDAE TRAVASSOS, 1921

Megalophallus diodontis n. sp. (FIGURE 26)

Description based on 4 specimens with characters of the genus. Body pyriform or oval, 0.990 to 1.128 long, 0.646 to 0.759 wide. Cuticle spinose, with spines fading out posterior to ventral sucker. Oral sucker 0.055 to 0.064 by 0.058 to 0.078. Ventral sucker almost equatorial, 0.085 to 0.138 by 0.099 to 0.151. Sucker ratio 1:1.8. Prepharynx longer than pharynx, pharynx 0.022 to 0.030 in diameter, intestinal bifurcation about midway between pharynx and ventral sucker, ceca very short, extending but little posterior to bifurcation, with epithelial lining. Genital pore to left of ventral sucker. Cirrus sac absent, seminal vesicle a large sac lying transversely anterior to ventral sucker, slightly overlapping it dorsally; prostate cells form a conspicuous mass at left end of vesicle; pars prostatica tubular, ejaculatory duct opens into base of a large cuplike male copulatory organ, the rim of which bears 12 to 19 papillae. Genital atrium spacious to accommodate male organ. Testes entire, 0.125 to 0.184 by 0.178 to 0.264, symmetrically placed at beginning of hindbody. Ovary entire, 0.099 to 0.184 by 0.132 to 0.204, equatorial, anterior to right testis, usually between it and seminal vesicle, and slightly overlapping ventral sucker dorsally. Seminal receptacle absent, oviduct observed in living specimens to have an almost imperceptible enlargement serving as a fertilization chamber. Laurer's canal and Mehlis'

gland present. Vitellaria poorly defined, immediately posterior to testes. Uterus voluminous, occupying almost all available space in the hindbody and extend into forebody on each side but not reaching level of ceca or crossing forebody. Metraterm a very conspicuous, pocketed mass posterolateral to male copulatory organ, folded on itself and joining genital atrium at genital pore. Eggs numerous, 0.019 to 0.024 by 0.012 to 0.013. Excretory vesicle V- to U-shaped, with arms extending almost to testes, each receiving at the tip a main canal, which divides somewhat posterior to level of ventral sucker to form an anterior and posterior secondary tubule. Each secondary tubule with 2 groups of 2 flame cells each, so that the flame cell formula is $2[(2 + 2) + (2 + 2)]$. Excretory pore terminal, without evident sphincter.

Hosts: *Diodon hystrix*, *Spheroides testudineus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Type specimen: Holotype No. 39322.

Life History: *Cercaria caribbea* XXVI developing in sporocysts in *Cerithium variable*; metacercariae in the blue crab, *Callinectes* sp.

The genus *Megalophallus* was erected by Cable *et al.* (in press) for *M. pentadactylus* from shore birds in Puerto Rico. The genus is distinguished from other microphallids by the opening of the ejaculatory duct into the expanded lumen of a male copulatory organ bearing small papillae and by the complex metraterm. *M. diodontis* differs from *M. pentadactylus* in body size and in having the margin of the male copulatory organ entire rather than lobed.

The present study reports for the first time adult microphallids from marine fishes. It is surprising that they have not been found before because of the apparent lack of host specificity among these trematodes. The metacercaria of *M. diodontis* as in other microphallids, has fully formed adult structures and requires but a short time in the definitive host to become ovigerous. In fact, when an infected crab was killed and left at room temperature for several hours it was found that the metacercariae had produced eggs in considerable numbers. For that reason it might be expected that the adult could occur in any vertebrate that ingests the second intermediate host. However, *M. diodontis* was never found in a number of birds collected from Punta Arenas where infected crabs were especially abundant.

Carneophallus lactophrysi n. sp. (FIGURE 27)

Description based on 33 specimens with characters of the genus. Body linguiform, 0.732 to 1.023 long, 0.297 to 0.396 wide. Cuticle spinose to, or slightly posterior to, testes. Oral sucker 0.060 to 0.087 by 0.081 to 0.097. Ventral sucker posterior to midlevel, median, 0.055 to 0.075 in diameter. Sucker ratio 1:0.89. Prepharynx short but distinct, pharynx 0.030 to 0.043 in diameter, esophagus 0.224 to 0.363 long; intestinal bifurcation near midlevel of body, ceca short, with epithelial lining, not extending posterior to midlevel of ventral sucker. Genital pore to left of that sucker. Cirrus sac absent, seminal vesicle large, saclike anterior to ventral sucker, usually overlapping it dorsally; pars prostatica well developed, surrounded by

prostate cells. Male copulatory organ a conspicuous muscular structure filling the spacious genital atrium, with a dorsal and a ventral lobe, not bearing papillae or spines. Ejaculatory duct a narrow, sinuous tube, piercing ventral lobe to open at its tip. Testes 2, 0.066 to 0.105 by 0.090 to 0.135, irregular, symmetrical, or left testis somewhat posterior to right. Ovary entire, 0.061 to 0.077 by 0.070 to 0.104, anterior to right testis, usually overlapping ventral sucker dorsally. Seminal receptacle absent. Laurer's canal and Mehlis' gland present. Vitelline follicles in 2 racemose groups, posterior to or slightly overlapping testes. Uterus scanty, confined to hind-body; metraterm simple, entering genital atrium posterodorsally. Eggs few, 0.019 to 0.021 by 0.012 to 0.013. Excretory vesicle broadly V- to Y-shaped, arms not overreaching testes; excretory pore terminal, without evident sphincter.

Host: *Lactophrys bicaudalis*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39323.

The genus *Carneophallus* was erected by Cable and Kuns (1951) for *C. trilobatus* from a Mexican insect hawk and *C. pseudogonotylus* Chen, 1944 from the domestic duck in China. There are 3 other species: *C. muellhaupti* Coil, 1956, from a sanderling; *C. turgidus* Leigh, 1958, from a racoon in South Florida; and *C. bilobatus* Cable *et al.* (in press) from a sandpiper in Puerto Rico. *C. lactophrysi* resembles *C. pseudogonotylus* and *C. bilobatus* in having a bilobed male copulatory organ, but differs from both species in the form of that organ and in having the ejaculatory duct pierce the ventral rather than the dorsal lobe.

FAMILY CRYPTOGONIMIDAE CIUREA, 1933

Siphodera vinaledwardsii (Linton, 1901) Linton, 1910 (FIGURE 28)

Synonym:

Monostomum vinaledwardsii Linton, 1901.

Hosts: **Lutianus synagris*, **L. analis*.

Site: intestine.

Locality: Punta Arenas, P. R.

Siphodera vinaledwardsii is an unusual species in that it occurs in shallow-water fishes from the Caribbean to Massachusetts. Our specimens from Puerto Rico were lost but not until they had been prepared as whole mounts and compared with material from Woods Hole, Mass., with no differences being found. In its southern range, the species changes its definitive host from the toadfish to species of *Lutianus* but has a very closely related if not identical molluscan intermediate host if *Cercaria caribbea XIII* Cable, 1956, is its larva. Further comparison of that cercaria with detailed, unpublished notes on the larva of *S. vinaledwardsii* in the Woods Hole region shows complete agreement.

Paracryptogonimus neoamericanus n. sp. (FIGURE 29)

Description based on 17 specimens with characters of the genus. Body linguiform, rounded at ends, 0.640 to 0.884 long, 0.349 to 0.488 wide at

level of testes. Cuticle with very fine spines. Eye-spot pigment present. Oral sucker terminal, 0.099 to 0.145 by 0.118 to 0.151, with 46 to 51 circumoral spines 0.018 to 0.020 long. Ventral sucker 0.082 to 0.099 by 0.092 to 0.118, to right of midline, enclosed in ventrogenital sac with diameter of opening about that of sucker. Sucker ratio 1:0.67. Prepharynx short, pharynx 0.045 to 0.059 by 0.060 to 0.085, esophagus short, ceca wide, extending almost to posterior end of body. Genital pore within ventrogenital sac, immediately anterior to ventral sucker; genital atrium very short. Cirrus sac absent, seminal vesicle elongate, bipartite, dorsal to, or deflected to side of, ventral sucker; pars prostatica small, surrounded by inconspicuous prostatic cells; ejaculatory duct short; gonotyl absent. Testes 2, 0.112 to 0.138 by 0.099 to 0.151, subspherical to oval, symmetrical, just postequatorial, overlapping ceca. Ovary extensively lobed, about equatorial, slightly pretesticular. Seminal receptacle large, immediately posterior to seminal vesicle, dorsal to ovary. Laurer's canal present. Vitellaria in 2 lateral groups of follicles at ovarian level, overlapping ceca and, to some extent, testes. Uterus except terminal limb postovarian, between and slightly overlapping ceca, extending almost to posterior end of body. Eggs very numerous, 0.016 to 0.018 by 0.010 to 0.015. Excretory vesicle Y-shaped, with wide stem and long arms reaching pharyngeal region; excretory pore terminal.

Hosts: *Ocyurus chrysurus*, *Lulianus aya*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39324.

The first species of its genus to be reported outside the Pacific, *Paracryptogonimus neoamericanus*, resembles *P. americanus* Manter, 1940, in sucker ratio, topography of the gonads and vitellaria, and extent of the uterus and form of the ceca, but differs from *P. americanus* in being a much smaller species and in having fewer circumoral spines, a terminal oral sucker and smaller eggs. In certain of these respects, *P. neoamericanus* is more like *P. acanthostomus* Yamaguti, 1934, but that species is still significantly larger than *P. americanus* and has longer eggs, a different arrangement of the gonads, and a more compact ovary.

Paracryptogonimus centropomi n. sp. (FIGURE 30)

Description, based on a single whole mount and notes on 2 additional specimens studied alive but lost during processing, with characters of the genus. Body elongated, spatulate, 0.851 long, 0.343 wide, rather uniformly wide throughout, broadly rounded posteriorly, less so anteriorly. Entire cuticle spinose. Eye-spot pigment present. Oral sucker subterminal, 0.060 by 0.069, retractable into a body fold, circumoral spines 64, very small, when oral sucker retracted appearing in 2 rows that blend into a single one when sucker is protracted. Ventral sucker spherical, 0.052 in diameter, enclosed in ventrogenital sac. Sucker ratio 1:0.78. Prepharynx short, pharynx spherical, 0.035 to 0.039 in diameter; esophagus short, ceca simple, arching widely in forebody and then curving medially in hindbody; their posterior extent obscured by eggs. Genital pore median, within ventrogenital

sac, immediately anterior to ventral sucker. Gonotyl and cirrus sac absent. Seminal vesicle massive, bipartite; prostatic complex poorly developed. Testes 2, oval, 0.147 to 0.173 by 0.107 to 0.127, extracecal, symmetrical, slightly anterior to midlevel. Ovary transversely elongate, strongly lobed, spanning intercecal space immediately anterior to testes. Seminal receptacle anterodorsal to, and to right of ovary; contiguous with seminal vesicle. Vitelline follicles in 2 lateral clusters, 1 anterior to each testis, joined by transverse vitelline duct. Uterus voluminous, nearly filling available space posterior to testes. Eggs numerous, pyriform, opercular end narrowed, 0.018 to 0.019 by 0.010 to 0.012. Excretory vesicle probably as in preceding species.

Host: *Centropomus ensiferus*.

Site: intestine.

Locality: Guanajibo, P. R.

Type specimen: Holotype No. 39325.

Paracryptogonimus centropomi is distinguished from other species of its genus by the large number and small size of circumoral spines, topography of gonads, and the relatively small suckers in comparison with body size. The retraction of the oral sucker with an infolding of the body in this species is suggestive of the genus *Metadena*. It may well be that *Cercaria caribbea* XIV Cable, 1956, which has that distinctive feature, is the larva of *P. centropomi*.

Metadena adglobosa Manter, 1947 (FIGURES 31 to 33)

Hosts: *Lutianus apodus*, *L. griseus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Deposited specimen: No. 39326.

Life history: *Cercaria caribbea* XV Cable, 1956, developing in *Cerithium variable*; metacercariae in tissues of *Gerres cinereus*; no pigmentation response.

FAMILY GORGODERIDAE LOOSS, 1901

Xystretrum solidum Linton, 1910 (FIGURE 34)

Synonyms:

Catoproides aluterae MacCallum, 1919.

Catoproides magnus MacCallum, 1917.

Xystretrum papillosum Linton, 1910.

Macia pulchra Travassos, 1921.

†*Xystretrum pulchrum* (Travassos) Manter, 1947.

Host: **Lactophrys bicaudalis*.

Site: urinary bladder.

Locality: Cabo Rojo, P. R.

Three species of *Xystretrum*, namely, *X. solidum*, *X. pulchrum*, and *X. caballeroi* have been described. Manter (1947) remarked on the difficulty of distinguishing the first 2; the present specimen combines the characters

† New synonymy.

that have been used to separate them. For that reason *X. pulchrum* is here reduced to synonymy with *X. solidum*.

FAMILY MONORCHIIDAE ODHNER, 1911

Genolopa longicaudata n. sp. (FIGURE 35)

Description based on 3 specimens with characters of the genus. Body 0.851 to 0.963 long, 0.136 to 0.264 wide, with broadly rounded ends, forebody with vermiform cutaneous glands. Cuticle spinose, eye-spot pigment absent. Oral sucker 0.040 to 0.052 by 0.054 to 0.067, subterminal. Ventral sucker 0.030 to 0.039 by 0.037 to 0.042, submedian, at about one fifth body length from anterior end. Sucker ratio 1:0.68. Prepharynx very short, pharynx 0.021 to 0.031 in diameter, esophagus short, intestinal bifurcation about midway between suckers, ceca simple, concealed by eggs posteriorly and their extent not observable in whole mounts. Genital pore median, immediately anterior to ventral sucker; genital atrium spinose. Cirrus sac extending posteriorly from genital pore as far as ovarian level, containing seminal vesicle, prostate cells, tubular pars prostatica, and spined cirrus. Testis single, irregular, 0.127 to 0.150 by 0.082 to 0.112, to right of midline, about equatorial, partly concealed by eggs. Ovary entire, 0.076 to 0.109 by 0.075 to 0.082, on right immediately anterior to testis. Seminal receptacle absent. Vitelline follicles large, in 2 lateral groups a little longer than ovary, at or slightly anterior to its level, depending on contraction of the worm. Uterus voluminous, occupying all available space posterior to testis, then with convolutions extending anteriorly in mid-region to enter metraterm sac at junction of its spiny anterior, and vesicular posterior divisions. Metraterm sac large, about two thirds as long as cirrus sac, extending posteriorly to left of ventral sucker. Eggs very numerous, 0.015 to 0.018 by 0.010 to 0.012. Excretory system not observed.

Host: *Odontoscion dentex*.

Site: intestine.

Locality: Punta Arenas, P. R.

Type specimen: Holotype No. 39327.

Genolopa longicaudata resembles *G. pisodontophidis* (Yamaguti, 1938) Skrjabin, 1955, in most respects but differs from that species in length of the hindbody, position of the genital pore, extent of vitellaria, and size of eggs.

Genolopa ampullacea Linton, 1910 (FIGURE 36)

Host: *Haemulon plumieri*.

Site: intestine.

Locality: Boqueron Bay, P. R.

Deposited specimen: No. 39328.

Hurleytrematoides chaetodoni (Manter, 1942) Yamaguti, 1953 (FIGURE 37)

Synonym:

Hurleytrema chaetodoni Manter, 1942.

Host: *Chaetodon capistratus*.

Site: intestine.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39329.

Pseudohurleytrema eucinostomi (Manter, 1942) Yamaguti, 1953
(FIGURE 38)

Synonym:

Hurleytrema eucinostomi Manter, 1942.

Host: **Gerres cinereus*.

Site: intestine.

Localities: Punta Arenas, Boqueron Bay and Cabo Rojo, P. R.

Deposited specimen: No. 39330.

Postmonorchis orthoprists Hopkins, 1941 (FIGURES 39 and 40)

Host: **Haemulon plumieri*.

Site: intestine.

Locality: Boqueron Bay, P. R.

Deposited specimen: No. 39331.

Our specimens of *Postmonorchis orthoprists*, all from a single fish, are much smaller in body size than those described by Hopkins (1941), but otherwise they are in fairly close agreement with his material. Certain ones resemble his specimen more than the one from which FIGURE 39 was drawn.

FAMILY FELLODISTOMATIDAE NICOLL, 1913

Tergestia laticollis (Rudolphi, 1819) Stossich, 1899 (FIGURES 41 and 42)

Synonyms:

Distoma laticolle Rudolphi, 1819.

Pharyngora polonii Molin of Olsson, 1869.

Hosts: *Euthynnus alletteratus*, **Selene vomer*, **Anchoviella epsetus*.

Site: intestine.

Localities: Parguera, Punta Arenas, Boqueron Bay, and Playa Mani, P. R.

Deposited specimen: No. 39332.

The flame cell pattern was observed in 2 immature specimens belonging to the genus *Tergestia*. One from *Gerres cinereus* had the pattern described for *T. laticollis* by Hopkins (1940), but in the other, a much smaller specimen from *Selene vomer*, the formula was $2[(1 + 2) + (1 + 2)]$. It is possible that both were *T. laticollis* and that with further development their excretory patterns would agree. However, the presence of 14 cephalic lobes in one and 13 in the other suggests that they may be distinct species, further differentiation of which must await the discovery of mature individuals.

Tergestia pectinata (Linton, 1905) Manter, 1940 (FIGURE 43)

Synonyms:

Distomum pectinatum Linton, 1905.

Theledera pectinata (Linton) Linton, 1910.

Host: *Chloroscombrus chrysurus*.

Site: intestine.

Locality: Playa Mani, P. R.

Deposited specimen: No. 39333.

Antorchis holacanthi n. sp. (FIGURE 44)

Description based on 30 specimens with characters of the genus. Body 0.792 to 0.924 long, 0.316 to 0.468 wide, oval to pyriform or broadly fusi-form with anterior end rounded and posterior end more acute; maximum width near level of testes. Entire cuticle with spines, less numerous posteriorly. Eye-spot pigment absent. Oral sucker terminal, 0.151 to 0.158 by 0.138 to 0.151, oval to pyriform. Ventral sucker subspherical, in posterior half of body, 0.105 to 0.138 in diameter. Sucker ratio 1:0.81. Prepharynx absent, pharynx 0.028 to 0.049 by 0.048 to 0.060, esophagus slender, 0.112 to 0.151 long; ceca short, divergent, with ends slightly swollen, not extending posterior to vitellaria. Genital pore very close to, or encroaching on, anterior border of ventral sucker, appearing in some specimens to open into its cavity. Cirrus sac well developed, inverted U-shaped, arching dorsally from genital pore to left or right; its basal portion overlapping level of ventral sucker and containing a bipartite seminal vesicle; remainder of the cirrus sac occupied by conspicuous prostatic complex. Testes 2, smooth, symmetrical, anterolateral to ventral sucker, 0.099 to 0.125 by 0.085 to 0.112. Ovary smooth, to right of midline, 0.079 to 0.099 in diameter, overlapping ventral sucker posterolaterally. Seminal receptacle large, posterolateral to ovary, overlapping it dorsally. Laurer's canal extends posteriorly from female complex to open dorsally near posterior end at a prominent opening. Vitellaria in 2 lateral clusters of follicles in forebody, from pharyngeal level to ends of ceca. Uterus largely in hindbody, but may extend anteriorly on each side to, or slightly beyond, testes; metraterm not differentiated. Eggs numerous, 0.029 to 0.033 by 0.015 to 0.017. Excretory vesicle V-shaped, with long arms extending to level of ceca; excretory pore terminal, without sphincter.

Hosts: *Holacanthus tricolor*, *H. ciliaris*.

Site: ceca.

Locality: Parguera, P. R.

Type specimen: Holotype No. 39334.

Of the previously described species of *Antorchis*, *A. holacanthi* differs from *A. urna* in general shape and size of the body and pharynx, form of vitellaria, position of the testes, extent of uterus, and shape of the oral sucker. It differs from *A. lintoni* Travassos *et al.*, 1928, in sucker ratio, length of esophagus, size of the pharynx, extent of the ceca, and position of the genital pore. Their description of *A. lintoni* does not mention the structure and shape of the cirrus sac, which is a characteristic feature of this genus, nor did they state that a seminal receptacle was present.

Antorchis urna (Linton, 1910) Linton, 1911 (FIGURES 45 and 46)

Synonym:

Mesorchis urna Linton, 1910.

Hosts: *Poamacanthus arcuatus*.

Site: intestine.

Locality: off Puerto Real; Guaniquilla, P. R.

Deposited specimen: No. 39335.

Our material of *A. urna* agrees rather closely with previous descriptions of that species. However, the muscular lining of the genital atrium is reflected over the end of the cirrus sac, giving it an annulated appearance described as a spined cirrus by Manter (1947).

Megalomyzon robustum Manter, 1947

Host: **Diodon hystrix*.

Site: intestine.

Locality: Guánica, P. R.

The single immature specimen found does not permit an adequate figure.

The next trematode has features of the family Monorchidae but is placed in the Fellodistomatidae because it agrees with members of that family in every respect except in having a single testis and because it lacks the highly developed metraterm and structure of the cirrus sac characteristic of monorchids. It thus is necessary to erect for the species a new genus which is defined as follows:

Infundibulostomum n. g.

Diagnosis: Fellodistomatidae. Distomes with spinose cuticle; eye-spot pigment absent. Oral sucker funnel-shaped or pyriform. Prepharynx short; pharynx present; esophagus fairly long; intestinal bifurcation anterior to ventral sucker; ceca not extending far into hindbody, with epithelial lining. Genital pore median or submedian, immediately anterior to ventral sucker. Cirrus sac arcuate, seminal vesicle bipartite, prostatic complex well developed. Testis single, postovarian. Ovary smooth or irregular. Seminal receptacle present. Vitellaria in two groups of follicles near ovarian level. Uterus voluminous, metraterm simple. Eggs small. Excretory vesicle V-shaped. Parasites of marine fishes. Type and only species:

Infundibulostomum spinatum n. g., n. sp. (FIGURE 47)

Description based on 11 specimens with characters of the genus. Body elongate oval, broadly rounded anteriorly, more pointed posteriorly, 0.414 to 0.673 long, 0.213 to 0.293 wide. Oral sucker 0.112 to 0.123 by 0.112 to 0.149. Ventral sucker spherical, near midlevel of body, 0.054 to 0.063 in diameter. Sucker ratio 1:0.48. Prepharynx short, pharynx subspherical, 0.029 to 0.034 in diameter; ceca simple, terminating at posterior level of vitelline follicles. Cirrus sac large, broad, arching dorsolaterally from genital pore, with base slightly overlapping posterior margin of ventral sucker or not, and containing a massive prostatic complex and small saclike seminal vesicle; some specimens with what appears to be a still smaller external

seminal vesicle. Testis entire, median or submedian, just within posterior half of body, 0.049 to 0.100 by 0.085 to 0.103. Ovary entire to irregular, 0.060 to 0.089 by 0.054 to 0.066, diagonally anterior to, and contiguous with testis. Seminal receptacle small, dorsal, anterior to ovary. Vitelline follicles large, in 2 lateral clusters in dorsal part of body at level of ovary and joined by inconspicuous vitelline duct at or slightly anterior to level of ovary. Laurer's canal not observed. Uterus occupies nearly all available space posterior to gonads. Eggs very numerous, 0.020 to 0.023 by 0.010 to 0.014. Excretory pore subterminal, without evident sphincter.

Host: *Haemulon flavolineatum*.

Site: intestine and stomach.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39336.

Proctoeces neomagnorus n. sp. (FIGURE 48)

Description based on a single specimen with characters of the genus. Body subcylindrical, 3.40 long, 0.74 wide. Cuticle smooth, eye-spot pigment absent. Oral sucker 0.50 in diameter, ventral sucker 0.394 by 0.414. Prepharynx very short, pharynx 0.152 by 0.146, esophagus 0.116 long, ceca long but not reaching posterior end of body. Genital pore immediately anterior to ventral sucker. Cirrus sac curved, extending slightly posterior to that sucker; cirrus muscular; pars prostatica long, tubular, surrounded by prostate cells; seminal vesicle subspherical. Testes 2, tandem, entire, near midlevel of hindbody, 0.267 to 0.30 by 0.253 to 0.293. Ovary entire, near posterior edge of ventral sucker, 0.160 by 0.207. Seminal receptacle absent. Vitelline follicles small, scattered in 2 lateral fields from ovary to anterior testis. Uterus fills most available space in hindbody. Eggs thin-shelled, mostly collapsed, 0.033 to 0.049 by 0.013 to 0.022. Excretory system not observed.

Host: *Acanthurus caeruleus*.

Site: intestine.

Locality: Parguera, P. R.

Type specimen: Holotype No. 39337.

Although having the same sucker ratio as *P. magnorus*, *P. neomagnorus* differs from that species in size of the body, suckers, and pharynx and the shape of the seminal vesicle which usually is a constant feature of trematodes. It is a long, coiled tube in *P. magnorus* in contrast to the short, almost spherical, sac in *P. neomagnorus*.

Proctoeces lintoni n. sp. (FIGURE 49)

Description based on 2 specimens with characters of the genus. Body cylindrical, 1.634 to 1.968 long, 0.567 to 0.640 wide. Cuticle smooth, eye-spot pigment absent. Oral sucker terminal, 0.20 to 0.207 by 0.267. Ventral sucker 0.260 to 0.273 by 0.30 to 0.354, in fleshy protuberance about one third body length from anterior end. Sucker ratio 1:1.25. Prepharynx absent, pharynx 0.160 to 0.180 in diameter, esophagus very short; ceca

swollen, extending almost to posterior end of body. Genital pore submedian, about midway between ventral sucker and pharynx. Cirrus sac curved, extending slightly posterior to ventral sucker; cirrus short, muscular; pars prostatica long, tubular, surrounded by prostate cells; seminal vesicle bipartite, anterior division a long coiled tube, posterior division saclike. Testes 2, entire, close together, diagonal to almost tandem, within anterior half of hindbody, 0.153 to 0.233 in diameter. Ovary entire, submedian, near anterior testis, 0.127 to 0.167 by 0.113 to 0.133; seminal receptacle absent. Vitelline follicles sparse, confined to, and confluent in, zone of gonads. Uterus filling space posterior to ovary; metraterm simple. Eggs numerous, 0.054 to 0.057 by 0.015 to 0.018. Excretory vesicle Y-shaped with stem reaching testicular level; pore subterminal dorsally.

Host: *Calamus calamus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39338.

Proctoeces lintoni agrees with *P. subtenue* except in having a bipartite seminal vesicle. We have reexamined Linton's material of *P. subtenue*, and Hanson has done the same with her specimens and those collected by Manter. All have found the seminal vesicle to be unipartite in *P. subtenue*.

FAMILY ACANTHOCOLPIDAE LÜHE, 1909

Stephanostomum coryphaenae Manter, 1947 (FIGURES 50 and 51)

Host: *Coryphaena hippurus*.

Site: intestine.

Locality: Mona Passage, P. R.

Deposited specimen: No. 39339.

Stephanostomum dentatum (Linton, 1901) Linton, 1940 (FIGURES 52 and 53)

Synonyms:

Distomum dentatum Linton, 1901.

Stephanochasmus dentatus (Linton) Manter, 1931.

Echinostephanus pagrosomi Yamaguti, 1939.

Stephanostomum pagrosomi (Yamaguti) Manter, 1947.

Host: **Epinephelus striatus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 39340.

Stephanostomum casum (Linton, 1910), McFarlane, 1936 (FIGURES 54 and 55)

Synonyms:

Stephanochasmus casus Linton, 1910.

Lechradena edentula Linton, 1910.

Host: **Lutianus analis*.

Site: intestine.

Locality: Parguera, P. R.

Deposited specimen: No. 39341.

Stephanostomum sentum (Linton, 1910) Manter, 1947 (FIGURES 56 and 57)

Synonym:

Stephanochasmus sentus, Linton 1910.

Hosts: **Haemulon flavolineatum*, **Calamus arctifrons*, **Gerres cinereus*.

Site: intestine.

Localities: Cabo Rojo and Mona Island, P. R.

Deposited specimen: No. 39342.

The presence of the uroproct in *S. sentum* was first observed by Manter (1947), but has not been observed for *S. minus* Looss, 1901, to synonymy with which Caballero (1952) reduced *S. sentum*. That action seems unwarranted because of the much smaller body and eggs of *S. minus*. Both Manter (1947) and Skrjabin (1954) have accepted *S. sentum* as a valid species.

Manteria brachydera (Manter, 1940) Caballero, 1950 (FIGURES 58 to 61)

Synonym:

Dihemistephanus brachyderus Manter, 1940.

Host: *Oligoplites saurus*.

Site: intestine.

Locality: Guanajibo, P. R.

Deposited specimen: No. 39343.

Our material is identified as *Manteria brachydera*, although it differs from that species, as described by Manter (1940a), in size of pharynx, number of circumoral spines, and extent of vitellaria. He also described the main excretory canal as dividing a short distance from the excretory vesicle but the especially close approach of the recurrent canal to the ascending one at that level (PLATE 9, FIGURE 60) could easily be mistaken for an actual junction of the 2. The system thus is stenostomate, just as Martin (1939) described for *S. tenuis*, and apparently is typical of acanthocolpids.

FAMILY HAPLOPORIDAE NICOLL, 1914

Included in the collection are 2 species that have the characters of the genus *Megasolena* except that a suckerlike structure occupies the terminal end of the hermaphroditic sac near the genital pore, and the metraterm and ejaculatory duct remain separate until they approach the genital pore, whereas they unite well back in the sac in *Megasolena estrix*, as described by Manter (1935). To receive the 2 species the following genus is proposed:

Allomegasolena n. g.

Diagnosis: Haploporidae. Distome, with elongated body, cuticle spinose. Eye-spot pigment present. Prepharynx distinct, pharynx massive, larger than oral sucker, esophagus long, intestinal bifurcation immediately posterior to ventral sucker, ceca simple, extending to posterior end of body. Lymph system present. Genital pore median or slightly submedian, between pharynx and ventral sucker. Hermaphroditic sac not extending into hind-body, with muscular, suckerlike structure near genital pore, followed by conspicuous cell mass traversed by male and female ducts that do not unite

before entering suckerlike terminal organ. Male duct with a small internal seminal vesicle and pars prostatica followed by a simple ejaculatory duct. External seminal vesicle a narrow tube extending well into hindbody. Testes 2, entire, median, tandem, removed from posterior end of body. Ovary entire, median, pretesticular. Uterine seminal receptacle present. Vitelline follicles not reaching ventral sucker anteriorly, extending along and overlapping ceca almost to posterior end of body, confluent posterior to testes. Uterus preovarian, not extensive; metraterm simple. Eggs few to moderate in number, medium in size. Parasites of marine fishes. Type species: *Allomegasolena spinosa* n. sp. Includes also: *Allomegasolena attenuata* n. sp.

Allomegasolena spinosa n. g., n. sp. (FIGURES 62 and 63)

Description based on 3 mature and 2 immature specimens with characters of the genus. Body 1.400 to 2.521 long, 0.253 to 0.267 wide, elongate, rather uniformly wide, ends rounded. Anterior half with spinose cuticle. Oral sucker terminal or subterminal, 0.100 to 0.120 by 0.113 to 0.180. Ventral sucker 0.127 to 0.200 in diameter. Sucker ratio 1:1.1. Prepharynx muscular, 0.100 to 0.133 long; pharynx 0.120 to 0.160 by 0.140 to 0.193, esophagus 0.267 to 0.367 long, ceca wide, broadly rounded at blind ends. Lymphatic system consists of 2 longitudinal channels on each side extending from oral sucker to posterior end of body; channels beyond ends of ceca provided with circular muscles and showing peristaltic movements in life. Genital pore about midway between ventral sucker and pharynx. Testes ovoid to slightly irregular, 0.167 to 0.253 by 0.120 to 0.180, somewhat posterior to midlevel. Ovary subspherical, 0.073 to 0.120 in diameter, a short distance from anterior testis. Laurer's canal not observed. Vitelline follicles large, extending from posterior end of seminal vesicle to posterior ends of ceca, overlapping them and confluent posterior to testes. Eggs few, 0.062 to 0.066 by 0.034 to 0.045. Excretory vesicle sac-shaped, extending almost to ovary in adults, to ventral sucker in immature specimens; main canals leave anterior end of vesicle and seem to extend to sides of oral sucker and then turn posteriorly; the system thus would be stenostomate. Excretory pore terminal, without evident sphincter.

Host: *Chaetodipterus faber*.

Site: intestine.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39344.

Allomegasolena attenuata n. g., n. sp. (FIGURE 64)

Description based on 1 of 3 specimens found: with characters of the genus. Body 2.145 long, 0.297 wide, forebody narrow, tapering, hindbody cylindrical, ends somewhat pointed. Most of cuticular spines lost, but seen on one side of hindbody to extend to posttesticular level. Oral sucker subterminal, 0.063 to 0.069 in diameter. Ventral sucker in anterior third of body, 0.158 by 0.165. Sucker ratio 1:2.3. Prepharynx 0.217 long, pharynx 0.100 to 0.112 in diameter, esophagus 0.267 long, ceca somewhat expanded. Lymphatic system present, much as in preceding species. Hermaphroditic sac and genital opening immediately anterior to ventral sucker. Testes elongate oval,

0.231 to 0.297 by 0.158 to 0.165, entire, tandem. Seminal vesicle convoluted, extending well posterior to ventral sucker. Ovary a short distance from anterior testis, 0.099 to 0.105 in diameter. Vitelline follicles large, their distribution as in preceding species. Laurer's canal not observed. Uterus scanty; metraterm present. Eggs few, 0.051 to 0.066 by 0.030 to 0.041. Excretory system not observed.

Host: *Lutianus apodus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Type specimen: Holotype No. 39345.

Allomegasolena attenuata differs from *A. spinosa* in body shape, sucker ratio, and size of pharynx.

Hapladena acanthuri n. sp. (FIGURE 65)

Description based on 2 specimens with characters of the genus. Body 2.963 to 4.620 long, 0.785 to 1.254 wide. Anterior half of cuticle spinose. Eye-spot pigment present. Oral sucker terminal, 0.264 to 0.310 by 0.224 to 0.376. Ventral sucker 0.217 to 0.297 in diameter, within anterior one third of body length. Sucker ratio 1:0.92. Prepharynx about 0.100 long, pharynx 0.138 to 0.217 in diameter, esophagus swollen, long; intestinal bifurcation dorsal to ventral sucker, ceca wide, extending almost to posterior end of body, contiguous in posttesticular zone. Lymphatic system with 4 longitudinal channels. Genital pore anterior to ventral sucker. Hermaphroditic sac elongated, extending a short distance posterior to ventral sucker; occupied largely by prostatic cells and conspicuous metraterm joined by male duct near base of sac. External seminal vesicle tubular, with constriction at junction with hermaphroditic sac; within sac, male duct parallels metraterm for a short distance as an internal seminal vesicle then forms a small pars prostatica from which the ejaculatory duct crosses metraterm to join it. Testis 0.587 to 0.752 by 0.244 to 0.415, entire, elongate oval, decidedly postequatorial, with two vasa efferentia. Ovary 0.204 to 0.269 by 0.211 to 0.264, median, entire or slightly notched, pretesticular. Seminal receptacle apparently absent. Laurer's canal present. Vitelline follicles dendritic but still appearing more follicular than tubular, extending from level of ventral sucker to posterior end. Uterus preovarian; metraterm and hermaphroditic duct spinose. Eggs 0.054 to 0.057 by 0.036 to 0.041. Excretory system stenostomate, with main tubules reaching sides of oral sucker and returning to level of ventral sucker before branching.

Host: *Acanthurus caeruleus*.

Site: intestine.

Locality: Parguera, P. R.

Type specimen: Holotype No. 39346.

Of the species of *Hapladena* the one most like *H. acanthuri* is *H. varia*, which, however, differs from *H. acanthuri* in size of body and eggs, form of the vitellaria, extent of cuticular spination, and the spiny hermaphroditic duct.

The species shown in PLATE 10, FIGURE 66 cannot be placed in any family or genus as defined previous to this study. It resembles the Acanthocolpidae

and Lepocreadiidae but is closest to the Haploporidae as conceived by Manter (1957), differing from members of that family only in lacking the hermaphroditic sac. As a cirrus sac also is absent, the terminal gonoducts lie free in the parenchyma. Because modifications of these structures have been shown to be of less than family significance in certain other groups, the family Haploporidae is redefined as follows to include the new genus and species:

FAMILY HAPLOPORIDAE NICOLL, 1914 emended

Synonyms:

Megasolenidae.

Waretrematidae.

Diagnosis: Distomes with cuticle spinose or not. Eye-spot pigment usually present. Oral sucker terminal or subterminal, with or without 6 prominent conical papillae; prepharynx present; pharynx well developed; esophagus long; intestinal bifurcation dorsal or posterior to ventral sucker; length of ceca variable. Ventral sucker in anterior half of body. Testes usually one, sometimes 2 in tandem; median, in posterior half of body. Cirrus sac absent. Hermaphroditic sac present or absent; if present, with small internal seminal vesicle followed by an external one, and with prostatic complex, ejaculatory duct, and metraterm, which may join male duct either close to genital pore or at a distance from that opening. If absent, terminal gonoducts the same except that metraterm does not join male duct at a distance from genital pore, and both are free in parenchyma. Genital pore median, or submedian, between pharynx and ventral sucker. Ovary pretesticular. Seminal receptacle present or absent, of the uterine type. Laurer's canal present. Uterus pretesticular and usually preovarian. Vitellaria of follicular or tubular acini, confined to hindbody, extensive or scanty and compact. Excretory vesicle I- or Y-shaped. Lymph channels often present. Parasites of fishes, mostly marine.

Neomegasolena n. g.

Diagnosis: Haploporidae. Distomes with elongated body. Cuticle spinose. Eye-spot pigment present. Prepharynx long, pharynx massive, esophagus long, intestinal bifurcation posterior to ventral sucker. Lymphatic system present. Genital pore median; genital atrium small. Hermaphroditic sac absent. Testes 2, tandem, and in posterior half of body. Seminal vesicle long, coiled, tubular, bipartite with small anterior division followed by prostatic complex. Ovary pretesticular. Uterine seminal receptacle present. Uterus preovarian; metraterm entering genital atrium independently of male duct. Excretory vesicle Y-shaped, with long stem and short arms. Parasitize ceca and intestine of marine fishes. Type and only species:

Neomegasolena chaelodipteri n. g., n. sp. (FIGURE 66)

Description based on 5 specimens with characters of the genus. Body 1.201 to 2.428 long, 0.300 to 0.528 wide, with rounded ends. Cuticular spines fade out posterior to testis. Oral sucker terminal, subspherical, 0.140 to 0.237 in diameter. Ventral sucker 0.092 to 0.151 by 0.126 to 0.178. Sucker ratio 1:0.7. Prepharynx 0.065 to 0.178 long, pharynx 0.131 to 0.231 in diameter,

ceca wide, ending blindly a short distance from posterior end of body. Lymphatic system with 2 channels on each side, paralleling and extending posterior to ends of ceca in hindbody, reaching sides of oral sucker in forebody, enlarging at level of prepharynx. Genital pore median, close to anterior margin of ventral sucker. Seminal vesicle sinuous, posterior division extending to anterior margin of ovary; prostate cells, large, numerous, surrounding small anterior division of seminal vesicle and pars prostatica. Testes 2, entire, 0.184 to 0.270 by 0.165 to 0.184, posterior to midlevel but well removed from posterior end of body. Ovary entire, subspherical, 0.105 to 0.132 in diameter, slightly to right of midline, situated near equatorial level. Vitelline follicles from level of ovary almost to posterior end of body, confluent posterior to testes, dorsal bands of few follicles at intergonadal levels. Uterus preovarian; metraterm small, dorsal to ventral sucker. Laurer's canal not observed. Eggs moderate in number, 0.052 to 0.066 by 0.034 to 0.041. Excretory system stenostomate, excretory vesicle Y-shaped, stem long, extending to posterior margin of ovary, arms short, main excretory tubules extending from them to oral sucker and then turning posteriorly; excretory pore slightly subterminal, dorsal, without evident sphincter.

Host: *Chaetodipterus faber*.

Site: ceca and intestine.

Locality: Isla Ratones, P. R.

Type specimen: Holotype No. 39347.

FAMILY MEGAPERIDAE MANTER, 1947

Megapera gyrina (Linton, 1907) Manter, 1934 (FIGURE 67)

Synonyms:

Distomum gyrinus Linton, 1907.

Eurypera gyrina (Linton) Manter, 1933.

Hosts: *Lactophrys bicaudalis*, *Lactophrys tricornis*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 34348.

Life history: Cercaria probably *C. caribbea* XXXVII Cable, 1956, which develops in *Crepidula convexa* and encysts in the open (Cable, 1954b).

Megapera pseudura (Manter, 1933) Manter, 1934 (FIGURE 68)

Synonym:

Eurypera pseudura Manter, 1933.

Host: *Lactophrys tricornis*.

Site: intestine.

Locality: off Puerto Real, P. R.

Deposited specimen: No. 39349.

Thysanopharynx elongatus Manter, 1933 (FIGURE 69)

Host: *Lactophrys tricornis*.

Site: intestine.

Locality: off Puerto Real, P. R.

FAMILY OPISTHOLEBETIDAE FUKUI, 1929

Opistholebes diodontis Cable, 1956 (FIGURES 70 to 72)

Host: *Diodon hystrix*.

Site: posterior intestine.

Locality: Punta Arenas, Guánica, P. R.

Type specimens: Holotype and paratype No. 37440 deposited by Cable (1956).

Pachycreadium gastrocotylum (Manter, 1940) Manter, 1954 (FIGURE 73)

Synonym:

Plagioporus gastrocotylus Manter, 1940.

Host: **Calamus calamus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Our material agrees with Manter's (1940a), description of *P. gastrocotylum* except in the shape of body and size of the testes to judge from his figure; Manter did not give the measurements of them. From Manter's material, Cable (1956a) verified the presence of a postoral ring in the species.

The genus *Pachycreadium* was erected by Manter (1954) to include *Plagioporus gastrocotylus* Manter, 1940, and *P. crassigulus* (Linton, 1910) Price, 1934. Cable (1956a) emended the family Opistholebetidae and transferred the genus *Pachycreadium* from the Opecoelidae to it.

Pycnadenoides pagrosomi Yamaguti, 1938, and *P. calami* Manter, 1947, show many similarities to species of *Pachycreadium*. If, as seems very likely, a postoral ring is present in the 2 species, *Pachycreadium* should be reduced to synonymy with *Pycnadenoides* if, indeed, both genera are not synonymous with *Pycnadena*, a genus that differs from *Pachycreadium* only in the symmetrical arrangement of the testes. It may be significant that species of all 3 genera have been described from porgies which, with the puffers, include almost all known hosts of the opistholebetids.

Pachycreadium crassigulum (Linton, 1910) Manter, 1954 (FIGURE 74)

Synonyms:

Lebouria crassigula Linton, 1910.

Plagioporus crassigulus (Linton) Price, 1934.

Host: *Calamus calamus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 39350.

Our material does not agree with Linton's description in respect to the distribution of the vitelline follicles in the forebody, the position of the genital pore, and the presence of postoral ring which is easily overlooked.

FAMILY OPECOELIDAE OZAKI, 1925

A trematode represented in the collection by 6 specimens resembles *Pycnadena* but differs from species of that genus in having a strongly lobed ovary and definitely lacking a postoral ring, the presence of which in *Pycnadena*

has not been excluded, in our opinion. In possessing a fleshy body fold surrounding the ventral sucker, the species resembles opistholebetids, but its nearest relatives probably are opecoelids of the genus *Hamacreadium*. However, the species differs from members of that genus in body shape, position of the testes and genital pore, presence of the body fold, and extent of the excretory vesicle and uterus. A new genus thus is erected for the species and defined as follows:

Pinguitrema n. g.

Diagnosis: Opecoelidae. Distomes with powerful ventral sucker, surrounded by a fleshy fold; aperture transverse, with muscles radiating from its ends into parenchyma. Postoral ring absent. Cuticle aspinose. Eye-spot pigment absent. Prepharynx, pharynx and esophagus present; intestinal bifurcation anterior to ventral sucker. Genital pore ventral, to left of midline, at esophageal level. Cirrus sac clavate; with coiled, tubular seminal vesicle, prostatic complex and simple, unarmed cirrus. Testes 2, entire, symmetrical to slightly diagonal. Ovary lobed, anterolateral to right testis. Seminal receptacle and Laurer's canal present. Vitellaria in both fore and hindbody. Uterus scanty, metraterm tubular. Excretory vesicle sac-shaped. Parasites of marine fishes. Type and only species:

Pinguitrema lobata n. g., n. sp. (FIGURE 75)

Description based on 6 specimens with characters of the genus. Body pyriform to oval, 1.008 to 1.456 long, 0.588 to 0.896 wide. Oral sucker subspherical, 0.091 to 0.161 in diameter. Ventral sucker 0.182 to 0.259 by 0.203 to 0.273, somewhat anterior to midlevel. Sucker ratio 1:1.9. Prepharynx very short, pharynx 0.056 to 0.105 in diameter, esophagus 0.056 to 0.063 long, ceca but slightly expanded. Cirrus sac reaches ventral sucker, usually overlapping its anterior margin slightly. Seminal vesicle coiled, tubular. Testes 0.161 to 0.224 by 0.112 to 0.154, spherical to oval, symmetrical or slightly diagonal, in posterior third of body. Ovary anterior to, and contiguous with, right testis; with 8 to 10 lobes. Seminal receptacle anterodorsal to ovary, sometimes overlapping it or displaced to its left. Vitelline follicles in lateral fields from pharyngeal level to posterior end of body, confluent posterior to testes, mostly extracecal in anterior half of body, overlapping and concealing ceca posteriorly. Uterus pretesticular, coiling to left of ovary and ascending to left of ventral sucker; metraterm narrow tubular. Eggs few to moderate in number, 0.063 to 0.070 by 0.042. Excretory vesicle sac-shaped, between, and extending to anterior margin of, testes; excretory pore dorsal, near posterior end of body, without evident sphincter.

Host: *Gerres cinereus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39351.

Hamacreadium lintoni n. sp. (FIGURE 76)

Description based on 3 specimens with characters of the genus. Body 3.502 to 5.822 long, 0.734 to 1.034 in maximum width at about level of ven-

tral sucker from which body tapers toward both ends. Cuticle aspinose, eye-spot pigment absent. Oral sucker 0.180 to 0.273 by 0.247 to 0.287, subterminal. Ventral sucker 0.380 to 0.474 in diameter, slightly anterior to midlevel. Sucker ratio 1:1.7. Prepharynx short, pharynx 0.147 to 0.200 in diameter, esophagus longer than pharynx, ceca simple, ending blindly near posterior end of body. Genital pore submedian, about midway between intestinal bifurcation and ventral sucker. Cirrus sac clavate, extending to anterior edge of ventral sucker, almost in midline; containing tubular seminal vesicle, small pars prostatica, and short cirrus; seminal vesicle with coiled proximal region swollen with sperms and long, narrow, almost straight distal portion joining pars prostatica (FIGURE 76b). Testes 2, 0.343 to 0.454 by 0.327 to 0.427, lobed, diagonal, posterior to midlevel. Ovary 0.280 to 0.287 by 0.347 to 0.367, strongly lobed, submedian, diagonally to right of anterior testis. Seminal receptacle anterodorsal to ovary. Vitelline follicles in lateral fields from slightly anterior to genital pore to posterior end of body, in more or less distinct bands median and lateral to ceca in posttesticular space. Uterus preovarian, intercecal, moderately extensive; metraterm simple, passing to left of ventral sucker. Eggs numerous, 0.063 to 0.072 by 0.037 to 0.042. Excretory vesicle I-shaped, extending to intestinal bifurcation; excretory pore dorsal, near posterior end of body, with sphincter.

Hosts: *Epinephelus striatus*, *Cephalopholis fulvus*.

Site: intestine and stomach.

Locality: Mona Island, P. R.

Type specimen: Holotype and Paratype No. 39352.

Hamacreadium lintoni differs from *H. lehrini* Yamaguti, 1934; *H. mehsena* and *H. interruptus* Nagaty, 1941; *H. morgani* Baz, 1946; *H. leiperi* and *H. krusadaiensis* Gupta, 1956, in having an almost median genital pore. In distribution of vitellaria it differs from all other species except *H. lehrini*. *Hamacreadium mutabile*, *H. oscitans*, *H. consuetum*, and *H. gulella* Linton, 1910, all have a median genital pore, but *H. lintoni* differs from them in 1 or more of the following features: body shape and size, sucker ratio, extent of cirrus sac, topography of gonads, position of genital pore, posttesticular space, egg size, extent of vitellaria, length of esophagus, and extent of excretory vesicle. In body shape, *H. lintoni* is somewhat similar to *H. epinepheli* Yamaguti, 1934, but differs from that species in the level of genital pore, size of the cirrus sac, and extent of vitellaria. *H. lintoni* is distinguished from *H. lariosi* Caballero, 1946, in having a single, more posterior genital pore, smaller eggs, lobed testes, and a longer posttesticular space.

Hamacreadium longisaccum n. sp. (FIGURE 77)

Description based on 3 specimens with characters of the genus. Body elongate, 2.05 to 2.87 long, 0.490 to 0.812 wide, rounded at either end, rather uniformly wide throughout length. Cuticle aspinose, eye-spot pigment absent. Oral sucker subspherical, 0.154 to 0.196 in diameter, almost terminal. Ventral sucker 0.231 to 0.366 by 0.196 to 0.273, slightly anterior to midlevel. Sucker ratio 1:1.5. Prepharynx short, pharynx subspherical, 0.105 to 0.140 by 0.126 to 0.154, esophagus 0.070 to 0.087 long, ceca simple, extending to

posterior end of body. Genital pore slightly to left of midline, near arch of left cecum. Cirrus sac very long, extending to about midway between ventral sucker and ovary, containing coiled, tubular seminal vesicle, prostatic complex, long ejaculatory duct and cirrus. Testes 2, 0.175 to 0.238 in diameter, slightly lobed, diagonal, in posterior third of body. Ovary 0.091 to 0.161 by 0.098 to 0.231, with 3 to 5 lobes, somewhat to right of midline, near anterior testis. Seminal receptacle small, overlapping ovary anterodorsally. Vitelline follicles small, in lateral fields, from esophageal level to posterior end of body, confluent posterior to testes, and denser in that region than elsewhere. Uterus scanty, preovarian; metraterm a slender muscular tube. Eggs few, 0.054 to 0.069 by 0.033 to 0.048. Excretory vesicle I-shaped, extending to posterior margin of pharynx; excretory pore terminal, with sphincter.

Host: *Epinephelus adscensionis*.

Site: intestine.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39353.

Hamacreadium longisaccum is the only species in its genus that has a cirrus sac extending well posterior to the ventral sucker; in others it does not reach the posterior margin of that organ.

Hamacreadium mutabile Linton, 1910 (FIGURE 78)

Hosts: *Lutianus analis*, *Lutianus jocu*, *Lutianus griseus*, *Lutianus apodus*, *Ocyurus chrysurus*.

Site: intestine.

Localities: Parguera, Puerto Real, Punta Arenas, and Mayagüez, P. R.

Deposited specimen: No. 39354.

Pseudoplagioporus brevitellus n. sp. (FIGURE 79)

Description based on 3 specimens with characters of the genus. Body stout, 0.959 to 1.043 long, 0.525 to 0.546 wide, more rounded posteriorly than anteriorly. Cuticle aspinose, eye-spot pigment absent. Oral sucker 0.133 to 0.154 by 0.154 to 0.175, terminal or slightly subterminal; ventral sucker 0.224 to 0.231 by 0.280 to 0.294, its posterior margin at about midlevel of body. Sucker ratio 1:1.7. Prepharynx very short, pharynx 0.098 to 0.119 in diameter, esophagus very short, intestinal bifurcation anterior to ventral sucker; ceca simple, ending blindly near posterior end of body. Genital pore slightly to left of midline, near anterior border of ventral sucker. Cirrus sac extending to left of ventral sucker, ending at about its midlevel; seminal vesicle coiled, tubular; ejaculatory duct short. Testes 2, 0.103 to 0.175 by 0.120 to 0.136, diagonal, irregular, within posterior section of body. Ovary 0.077 to 0.144 by 0.120 to 0.142, with 2 or 3 lobes, on right, opposite anterior testis. Seminal receptacle anterodorsal to ovary. Vitelline follicles small, from midlevel of ventral sucker to posterior end of body, confluent posterior to testes. Uterus scanty, sometimes slightly overlapping posterior testis; metraterm muscular, dorsal to ventral sucker. Eggs moderate in number, 0.034 to 0.038 by 0.023 to 0.027 (0.034 by 0.028 in living material). Excretory vesicle extends to anterior edge of anterior testis.

Host: *Malacanthus plumieri*.

Site: intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39355.

The genus *Pseudoplagioporus*, as defined by Yamaguti (1938), agrees with the present species in all respects except extent of vitellaria and position of genital pore. *P. brevivitellus* further differs from *P. microrchis* in egg size, sucker ratio, extent of excretory vesicle and topography of gonads; and from *P. lehrini* in most of these respects.

Helicometrina nimia Linton, 1910 (FIGURE 80)

Host: *Scorpaena plumieri*.

Site: intestine.

Locality: Puerto Real, P. R.

Helicometrina trachinoti n. sp. (FIGURE 81)

Description based on 5 specimens with characters of the genus. Body 1.001 to 1.239 long, 0.434 to 0.462 in maximum width somewhat posterior to ventral sucker, rounded posteriorly, tapering anteriorly. Cuticle aspinose, eye-spot pigment absent. Oral sucker terminal, 0.091 to 0.112 by 0.098 to 0.140. Ventral sucker subspherical, 0.140 to 0.224 in diameter, anterior to midbody, with a transverse slitlike aperture. Sucker ratio 1:2.4. Prepharynx short, pharynx 0.040 to 0.054 by 0.056 to 0.084; esophagus longer than pharynx; ceca simple, extending almost to posterior end of body. Testes 9, 0.091 to 0.112 in diameter, entire or slightly irregular, the group almost reaching posterior end of body. Genital pore submedian, ventral to intestinal bifurcation. From pore, cirrus sac extends posteriorly to left of ventral sucker, terminating near its midlevel; containing coiled, tubular seminal vesicle, pars prostatica, long ejaculatory duct and cirrus. Ovary 0.091 to 0.126 by 0.140 to 0.238, irregularly lobed, pretesticular, median or slightly to right, posterior to midlevel of body. Seminal receptacle on right, anterolateral to ovary. Vitelline follicles in lateral fields from near level of pharynx to posterior end of body, largely concealing ceca. Uterus intercecal, forming a spiral coil between ovary and ventral sucker; metraterm narrow, tubular, dorsal to ventral sucker. Eggs few, each with a unipolar filament; 0.056 to 0.070 long exclusive of filament, 0.024 to 0.028 wide. Excretory vesicle sac-shaped, extending to level of ovary.

Hosts: *Trachinotus* sp., *Mulloidichthys martinicus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Type specimen: Holotype No. 39356.

Helicometrina trachinoti differs from *H. parva* Manter, 1933, and from *H. seplorchis* Srivastava, 1936, in the number of testes, and from *H. elongata* Noble and Park, 1937, and *H. orientalis* Srivastava, 1936, in body shape and size, sucker ratio, distribution of vitellaria, and arrangement of gonads. It is distinguished from *H. nimia* Linton, 1910, by body shape, extent of cirrus sac, less lobed ovary, location of testes, and the slitlike aperture of the ventral sucker.

Helicometrina mirzai n. sp. (FIGURE 82)

Description based on 13 specimens with characters of the genus. Body 0.763 to 1.141 long, 0.343 to 0.427 wide, elongate oval to pyriform, more broadly rounded posteriorly than anteriorly. Cuticle aspinose, eye-spot pigment absent. Oral sucker terminal, spherical, 0.077 to 0.112 in diameter. Ventral sucker at midlevel of body, 0.147 to 0.203 in diameter. Sucker ratio 1:1.83. Prepharynx very short, pharynx 0.056 to 0.070 by 0.063 to 0.091, esophagus 0.070 to 0.105 long; ceca simple, ending blindly near posterior end of body. Cirrus sac extending to midlevel of ventral sucker or deflected to its side and reaching only slightly beyond its anterior margin; containing coiled, tubular seminal vesicle, prostatic complex, long ejaculatory duct and unarmed cirrus. Testes 9, 0.042 to 0.084 in diameter, entire, their arrangement variable, in posterior third of body length. Ovary 0.042 to 0.084 by 0.084 to 0.126, lobed, median or submedian, sometimes displaced to one side, contiguous with anterior testes. Seminal receptacle anterior to ovary. Vitelline follicles in lateral fields, from pharyngeal level almost to posterior end of body, with wide interruption at level of ventral sucker. Uterus scanty, in a spiral coil, between ovary and ventral sucker; metraterm a narrow, muscular tube. Eggs few, 0.049 to 0.063 by 0.021 to 0.035 exclusive of uni-polar filament. Excretory vesicle sac-shaped, extending to anterior margin of testes group; excretory pore terminal, with sphincter.

Host: *Lactophrys bicaudalis*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39357.

Helicometrina mirzai resembles *H. trachinoti* but differs from that species in the position of ventral sucker, sucker ratio, and interrupted vitellaria. The vitellaria are interrupted also in *H. elongata*, but that species differs from *H. mirzai* in the shape and size of body, position of genital pore, and location of gonads.

Helicometra equilata (Manter, 1933) n. comb. (FIGURE 83)

Synonym:

Stenopera equilata Manter, 1933.

Host: *Holocentrus ascensionis*.

Site: intestine.

Locality: Mona Island, P. R.

Deposited specimen: No. 39358.

The genus *Stenopera* Manter, 1933, is here reduced to synonymy with *Helicometra*. In our opinion, the elongated cirrus sac and anterior position of the ventral sucker are of no more than specific value.

Helicometra torta Linton, 1910 (FIGURE 84)

Host: *Epinephelus striatus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 39359.

Our material combines features of both *H. torta* of Linton (1910) and *H. pretiosa* Bravo-Hollis and Manter (1957). Egg size is intermediate, and the posterior end of the cirrus sac may be filled with the seminal vesicle as in *H. torta* or not, as in *H. pretiosa*. According to Manter (1933) the gonads of *H. torta* may be either lobed or entire. Thus, *H. pretiosa* probably is not a valid species.

The next species is a new one closely related to opecoelids of the genera *Helicometra*, *Helicometrina*, and *Helicometroides*, but differs from those trematodes in having a funnel-shaped oral sucker and ceca with separate ani. A new genus is proposed for that species and is characterized as follows:

Neohelicometra n. g.

Diagnosis: Opecoelidae. Distome with elongate body, aspinose cuticle, no eye-spot pigment. Oral sucker funnel-shaped; ventral sucker sessile, without papillae; accessory sucker absent. Prepharynx, pharynx, and esophagus present; intestinal bifurcation anterior to ventral sucker; ceca with separate ani at posterior end of body. Genital pore in esophageal region. Cirrus sac with coiled, tubular seminal vesicle, pars prostatica and long ejaculatory duct. Testes 2, tandem. Ovary pretesticular, seminal receptacle present. Vitellaria in both fore- and hindbody. Laurer's canal present. Uterus pretesticular; metraterm simple. Eggs with unipolar filaments. Excretory vesicle sac-shaped. Parasites of marine fishes. Type and only species:

Neohelicometra scorpaenae n. g., n. sp. (FIGURE 85)

Description (based on a single specimen): with characters of the genus. Body 1.732 long, 0.420 wide, rather uniformly wide throughout length, ends rounded. Oral sucker 0.217 by 0.315. Ventral sucker 0.150 by 0.120. Sucker ratio 1:0.5. Prepharynx short, pharynx 0.090 in diameter, ceca tubular, narrowing posteriorly to open at ani. Genital pore submedian, at posterior margin of pharynx; genital atrium small. Cirrus sac somewhat sinuous, extending to midlevel of ventral sucker. Testes irregular, 0.070 to 0.084 in diameter, within posterior third of body, well removed from posterior end. Ovary 0.119 by 0.161, lobed. Seminal receptacle small, anterolateral to ovary. Vitelline follicles extending from midlevel of esophagus almost to posterior extremity, mostly extracecal, but with intercecal bands in posttesticular region, narrowly confluent at their extreme posterior ends. Uterus fairly extensive. Eggs moderate in number, 0.043 to 0.051 long exclusive of filament, 0.025 to 0.029 wide. Excretory vesicle sac-shaped, extending to anterior margin of ovary; excretory pore dorsal, near posterior end.

Host: *Scorpaena* sp.

Site: intestine.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39360.

Opecoeloides vitellosus (Linton, 1900) Von Wicklen, 1946 (FIGURE 86)

Synonyms:

Distomum vitellosum Linton, 1900.

Cymbephallus vitellosus (Linton) Linton, 1934.

Anisoporus manteri Hunninen and Cable, 1940.

Host: *Mulloidichthys martinicus*.

Site: intestine.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39361.

Opecoeloides elongatus Manter, 1947 (FIGURES 87 and 88)

Host: **Mulloidichthys martinicus*.

Site: intestine.

Locality: off Puerto Real, P. R.

Deposited specimen: No. 39362.

Our material differs from Manter's (1947) description in having 4 posterior papillae on the ventral sucker instead of 3 and an accessory sucker with a limiting membrane which, according to Manter, is lacking in his specimens. Our material was dead when taken from the host. The papillae of such trematodes usually retract when living material is fixed, and their exact number is difficult to determine.

Opecoeloides sp. (FIGURE 89)

Description based on a single specimen with characters of the genus. Body 1.141 long, 0.316 wide. Cuticle aspinose, eye-spot pigment absent. Oral sucker subterminal, 0.112 by 0.151. Ventral sucker 0.191 by 0.178, with 3 anterior and 2 posterior papillae. Accessory sucker 0.093 in diameter, with a limiting membrane. Sucker ratio 1:1.4. Prepharynx short, pharynx 0.099 by 0.145, esophagus longer than pharynx, intestinal bifurcation at level of ventral sucker, ceca simple, expanded, joining excretory vesicle to form a wide uroproct in posterior region of body. Genital pore about midway between oral and accessory suckers. Cirrus sac absent; seminal vesicle long, tubular, extending well posterior to ventral sucker; prostatic complex weakly developed. Testes 2, 0.099 to 0.105 by 0.125 to 0.132, smooth, tandem, contiguous, almost in posterior third of body. Ovary 0.059 in diameter, smooth, pretesticular, contiguous with anterior testis. Seminal receptacle absent. Vitelline follicles scattered from slightly anterior to level of ovary to posterior end of body, confluent posterior to testes. Uterus pre-ovarian; metraterm simple. Eggs few, collapsed, 0.054 to 0.056 by 0.028 to 0.030. Excretory vesicle sac-shaped, extending to anterior margin of ovary; excretory pore terminal.

Host: *Trichurus lepturus*.

Site: intestine.

Locality: Joyuda, P. R.

Deposited specimen: No. 39363.

The above species agrees with Manter's (1940a) description of *O. euci-*

nostomi, except that the pharynx and eggs are slightly larger, the accessory sucker has a limiting membrane, and the seminal vesicle extends posterior to the ventral sucker. The species may be new, but judgment is withheld because only a single, excessively flattened mature specimen and 4 immature ones were available.

Opecoeloides brachyleus Manter, 1947 (FIGURE 90)

Host: *Mulloidichthys martinicus*.

Site: intestine.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39364.

Our material differs from that described by Manter (1947) chiefly in having 4 posterior papillae on the ventral sucker.

Opecoeloides (?) sp. (FIGURE 91)

Description based on 1 immature and 2 mature specimens with characters of the genus. Body 0.665 to 0.735 long, 0.133 to 0.147 wide. Cuticle aspinose, eye-spot pigment absent. Oral sucker 0.061 to 0.079 in diameter. Ventral sucker pedunculate, 0.065 to 0.112 in diameter, with 3 anterior and 2 posterior papillae. Accessory sucker a short distance posterior to pharynx, without a limiting membrane. Sucker ratio 1:1.3. Prepharynx short, pharynx 0.052 to 0.067 in diameter, esophagus longer than pharynx, intestinal bifurcation at level of ventral sucker; ceca simple, extending almost to posterior end of body; their connection with excretory vesicle could not be detected in either living or fixed specimens. Separate ani absent. Genital pore to left of median line, at posterior margin of pharynx. Cirrus sac absent; seminal vesicle long, tubular; prostatic complex not well developed. Testes 2, 0.060 by 0.075, entire, median, within posterior third of body. Ovary entire, 0.039 to 0.042 in diameter, to right, anterolateral to anterior testis. Seminal receptacle absent. Vitelline follicles scattered along ceca from base of seminal vesicle to posterior end of body, not confluent in posttesticular space. Uterus preovarian; metraterm muscular. Eggs few, 0.063 by 0.023. Excretory vesicle sac-shaped.

Host: *Centropomus ensiferus*.

Site: intestine.

Locality: Guanajibo, P. R.

Deposited specimen: No. 39365.

The generic status of this species is questionable because of inability to establish the presence or absence of a uroproct. If such is present, the trematode is a species of *Opecoeloides*; if not, which seems likely, it resembles members of the genus *Genitocotyle*, in which, however, the ventral sucker lacks the characteristics of the present species and of those definitely assigned to the genus *Opecoeloides*.

Pseudopecoeloides equesi Manter, 1947 (FIGURE 92)

Host: *Equus acuminatus*.

Site: intestine.

Locality: Cabo Rojo, P. R.
 Deposited specimen: No. 39366.

Pseudopocoelus barkeri Hanson, 1950 (FIGURE 93)

Hosts: *Holocentrus ascensionis*, **Holocentrus vexillarius*.

Site: intestine.

Locality: Mona Island, P. R.

Deposited specimen: No. 39367.

Except in slightly smaller body size and distribution of vitellaria, the present material is in complete agreement with that described by Hanson (1950).

Pseudopocoelus tortugae Von Wicklen, 1946 (FIGURE 94)

Synonym:

Cymbephallus fimbriatus Linton of Manter, 1934.

Host: **Apogon maculatus*.

Site: intestine.

Locality: Punta Arenas, P. R.

Deposited specimen: No. 39368.

The present material is in close agreement with Manter's (1934) description of *P. tortugae* except in body size and sucker ratio.

Horatrema crassum Manter, 1947 (FIGURE 95)

Hosts: *Eques acuminatus*, *Odontoscion dentex*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 39369.

Coilocecum sp.

Hosts: *Labrisomus nuchipinnes*, *Halichoeres bivittata*.

Site: intestine.

Localities: Mona Island and Isla Ratones, P. R.

A single specimen belonging to the genus *Coilocecum* was found in each of the above hosts. The 2 trematodes are of different species, but the available material is insufficient for adequate descriptions.

FAMILY LEPOCREADIIDAE NICOLL, 1934

Homalometron elongatum Manter, 1947 (FIGURE 96)

Hosts: *Gerres cinereus*, **Chaetodipterus faber*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 39370.

Homalometron foliatum n. sp. (FIGURE 97)

Description based on 5 specimens with characters of the genus. Body 1.540 to 2.457 long, 0.357 to 0.476 wide, elongate, hindbody foliate, anterior

end bluntly round. Cuticle spinose, eye-spot pigment present. Oral sucker slightly subterminal, subspherical, 0.196 to 0.287 in diameter. Ventral sucker 0.140 to 0.168 by 0.175 to 0.189. Sucker ratio 1:0.76. Prepharynx somewhat longer than pharynx, which measures 0.070 to 0.084 in diameter, esophagus about as long as pharynx, intestinal bifurcation about midway between suckers; ceca simple, slender, ending blindly near posterior end of body. Genital pore median, at anterior margin of ventral sucker. Cirrus sac absent; seminal vesicle sac-shaped, oval, posterior to ventral sucker, to right of midline, ejaculatory duct long and narrow. Testes 2, 0.091 to 0.175 by 0.168 to 0.182, smooth to irregular, tandem, close together, intercecal, near midlevel of body. Ovary 0.084 to 0.126 in diameter, smooth, median or submedian, about midway between ventral sucker and anterior testis. Seminal receptacle small, on right, anterodorsal to ovary. Vitelline follicles from testicular level to posterior end of body, almost filling posttesticular space. Uterus scanty, extending a short distance posterior to ovary before ascending toward genital pore. Eggs few, 0.066 to 0.077 by 0.045 to 0.053. Excretory vesicle sac-shaped, extending to anterior testis; excretory pore dorsal, near posterior end of body, with sphincter.

Host: *Haemulon flavolineatum*.

Site: intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39371.

Homalometron foliatum differs from *H. pallidum* Stafford, 1904, *H. armatum* MacCallum, 1895, and *H. pearsii* Hunter and Bangham, 1932, in sucker ratio, extent of vitellaria, egg size and location of testes. It differs from *H. elongatum* in the position of the ventral sucker and testes and in the extent of vitellaria.

The next 2 species, represented by 7 and 12 individuals respectively, have been described as new species of *Apocreadium* by Sogandares-Bernal (1959), but they differ from members of that genus in having a longitudinal slitlike mouth, a massive pharynx, wide ceca, and confluent vitelline fields in the forebody. Collectively, these differences are of generic rank and, to receive these 2 species, a new genus is proposed and characterized as follows:

Neopocreadium n. g.

Diagnosis: Lepocreadiidae. Distomes with thick, elongate bodies; cuticle spinose; eye-spot pigment present. Oral sucker subterminal, with longitudinal slitlike opening. Prepharynx present; pharynx massive, with conspicuous anterior muscle ring; esophagus very short or absent; intestinal bifurcation well anterior to ventral sucker, ceca swollen, ending near posterior end of body. Genital pore median, anterior to ventral sucker. Cirrus sac absent; seminal vesicle saclike. Testes 2, intercecal, tandem. Ovary to right of midline, pretesticular. Seminal receptacle present. Vitellaria in both fore- and hindbody; their fields confluent anterior to ventral sucker and in posttesticular space. Uterus pretesticular; metraterm present. Eggs few to numerous. Excretory vesicle sac-shaped or tubular. Lymph system present. Parasites of fishes.

Type species: *Neoapocreadium angustum* (Sogandares-Bernal, 1959) n. comb. Other species: *Neoapocreadium coili* (Sogandares-Bernal, 1959) n. comb.; *Neoapocreadium bravoii* (Sogandares-Bernal, 1959) n. comb.

Neoapocreadium angustum n. comb. (FIGURE 98)

Synonym:

Apocreadium angustum Sogandares-Bernal, 1959.

Host: **Lactophrys bicaudalis*.

Site: intestine.

Locality: Cabo Rojo, P. R.

Deposited specimen: No. 39372.

Neoapocreadium coili n. comb. (FIGURE 99)

Synonym:

Apocreadium coili Sogandares-Bernal, 1959.

Host: **Balistes vetula*.

Site: intestine.

Locality: off Paraguera, P. R.

Deposited specimen: No. 39373.

Postporus epinepheli (Manter, 1947) Manter, 1949 (FIGURE 100)

Synonyms:

Opisthoporus epinepheli Manter, 1947.

† *Postporus mycteropercae* (Manter) Manter, 1949.

Host: **Epinephelus striatus*.

Site: intestine.

Locality: Mona Island, P. R.

Deposited specimen: No. 39374.

The genus *Postporus* was named for *Opisthoporus* (preoccupied) by Manter (1949), who described 2 species, each represented by 2 specimens from different host species. The present material consisting of 21 specimens from a single host species presents very interesting variations in the characters that he used to distinguish species. Some specimens are similar to *P. epinepheli* in body shape, extent of the excretory vesicle and distribution of vitellaria. Others are like *P. mycteropercae* in those respects or intermediate to that species and *P. epinepheli*, presenting a complete range between them. It is for this reason that *P. mycteropercae* is here reduced to synonymy with *P. epinepheli*, which has page priority.

Apocreadium balistis Manter, 1947 (FIGURE 101)

Host: *Balistes vetula*.

Site: intestine.

Locality: off Paraguera, P. R.

Deposited specimen: No. 39375.

The present material agrees in most details with Manter's (1947) descrip-

† New synonymy.

tion based on a single specimen, except that the sucker ratio is slightly different, the pharynx is smaller, and the testes lack equatorial ridges.

Apocreadium mexicanum Manter, 1937 (FIGURE 102)

Host: **Balistes vetula*.

Site: intestine.

Locality: off Parguera, P. R.

Deposited specimen: No. 39376.

The present material agrees with Manter's (1937) description except for slight differences in sucker ratio, width of eggs, and length of posttesticular space.

Multitestis blennii Manter, 1931 (FIGURE 103)

Host: **Chaetodipterus faber*.

Site: intestine.

Locality: Isla Ratones, P. R.

Deposited specimen: No. 39377.

Multitestis inconstans (Linton, 1905) Manter, 1931 (FIGURE 104)

Synonym:

Distomum inconstans Linton, 1905.

Host: *Chaetodipterus faber*.

Site: intestine and ceca.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39378.

Lepocreadium trulla (Linton, 1907) Linton, 1910 (FIGURE 105)

Synonym:

Distomum trulla Linton, 1907.

Hosts: **Rhomboplites aurorubens*, *Ocyurus chrysurus*.

Site: intestine.

Locality: off Puerto Real, P. R.

Deposited specimen: No. 39379.

Lepocreadium sp. (FIGURE 106)

Host: *Ocyurus chrysurus*.

Site: intestine.

Locality: Cabo Rojo, P. R.

This species is neither named nor described because only a single specimen in poor condition was available.

Neolepidapedon trachinoti n. sp. (FIGURE 107)

Description based on a single specimen with characters of the genus. Body 1.491 long, 0.371 wide, rounded posteriorly, tapering anteriorly. Cuticle thick, spinose. Eye-spot pigment present. Oral sucker subterminal, 0.090 by 0.094. Ventral sucker 0.094 by 0.088. Sucker ratio 1:1. Prepharynx

0.069 long, pharynx 0.061 by 0.064, esophagus 0.135 long, ceca simple, extending almost to posterior end of body. Genital pore to left, at anterior margin of ventral sucker. Cirrus sac club-shaped, ending a little short of midway between ventral sucker and ovary; internal seminal vesicle short, concave anteriorly to receive posterior end of conspicuous oval to pyriform pars prostatica; ejaculatory duct long, cirrus simple. External seminal vesicle small and curved. It and posterior end of cirrus sac surrounded by prostate cells; their ducts enter posterior end of cirrus sac around neck of external seminal vesicle, then diverge to pass anteriorly around internal seminal vesicle, and open in pars prostatica. Testes 2, 0.175 to 0.210 by 0.168 to 0.175, more nearly tandem than diagonal, smooth, contiguous, within posterior two fifths of body. Ovary 0.112 by 0.100, somewhat irregular, to right of midline, close to anterior testis, without intervening vitelline follicles. Seminal receptacle submedian, to left of ovary. Vitelline follicles in lateral fields, from level of intestinal bifurcation to posterior end of body, confluent posterior to testes. Laurer's canal present. Uterus with relatively few eggs, not posterior to ovary; metraterm well developed, tubular. Eggs 0.039 to 0.050 by 0.025 to 0.035. Excretory vesicle sac-shaped, extending to posterior margin of anterior testis; excretory pore subterminal, dorsal, with sphincter.

Host: *Trachinotus* sp.

Site: intestine.

Locality: Punta Arenas, P. R.

Type specimen: Holotype No. 39380.

The genus *Neolepidapedon* was erected by Manter (1954) for trematodes that differ from species of *Lepidapedon* only in having a true external seminal vesicle and prostate cells free in the parenchyma, instead of a membrane enclosing those structures and presumably a part of the cirrus sac. Manter allocated 4 species to *Neolepidapedon* and, recently, Montgomery (1957) has added a fifth. *N. trachinoti* differs from all other species in the extent of vitellaria, larger pars prostatica, smaller excretory vesicle, and smaller eggs. It is close to *N. polyprioni* Manter, 1954, but is distinguished from that species by the above features and also by the smaller size of body and pharynx and the shorter esophagus.

Neolepidapedon epinepheli n. sp. (FIGURE 108)

Description (based on 7 specimens): with characters of the genus. Body 1.652 to 3.885 long, 0.679 to 0.777 wide, elongate, hindbody leaflike. Cuticle spinose. Eye-spot pigment present. Oral sucker 0.098 to 0.140 by 0.154 to 0.189, subterminal, ventral sucker subspherical, 0.133 to 0.182 in diameter. Sucker ratio 1:1. Prepharynx very short, pharynx 0.091 to 0.119 by 0.077 to 0.105, esophagus fairly long, intestinal bifurcation about midway between pharynx and ventral sucker; ceca narrow, extending almost to posterior end of body. Genital pore to left, on level with anterior margin of ventral sucker. Cirrus sac with prominent pars prostatica at left of ventral sucker and saclike internal seminal vesicle posterior to that sucker; cirrus small; external seminal vesicle a curved, elongated sac, surrounded by prostate

cells with ducts entering cirrus sac as in preceding species. Testes 2, 0.175 to 0.280 in diameter, smooth, diagonal, in posterior third to quarter of body. Ovary 0.105 to 0.133 by 0.133 to 0.168, smooth to somewhat irregular, median, separated from anterior testis by the large, saclike seminal receptacle. Vitelline follicles in lateral fields from base of external seminal vesicle to ends of ceca, sparsely if at all confluent posterior to testes. Uterus intercecal, from ovarian level to ventral sucker; metraterm slender, tubular, paralleling cirrus sac. Eggs moderate to numerous, 0.057 to 0.065 by 0.035 to 0.041. Excretory vesicle tubular, extending to anterior margin of ventral sucker; excretory pore subterminal, with sphincter.

Hosts: *Epinephelus striatus*, *Epinephelus adscensionis*.

Site: intestine.

Locality: Mona Island and Puerto Real, P. R.

Type specimen: Holotype no. 39381.

Neolepidapedon epinepheli resembles *N. cablei* Manter, 1954, but differs from that species in size of pharynx, length of esophagus, arrangement of gonads, and position of the ventral sucker.

Neolepidapedon equitatum n. sp. (FIGURE 109)

Description based on a single specimen with characters of the genus. Body 2.212 long, 0.441 wide, cylindrical, ends rounded. Entire cuticle spinose. Eye-spot pigment present. Oral sucker subterminal, 0.070 by 0.076. Ventral sucker spherical, 0.105 in diameter. Sucker ratio 1:1.37. Prepharynx apparently absent, pharynx 0.034 by 0.036, intestinal bifurcation near mid-level of forebody; ceca simple, narrow, extending almost to posterior end of body. Genital pore on left, near anterior margin of ventral sucker. Cirrus sac sinuous, extending posterior to ventral sucker about one fourth of the distance to ovary; internal seminal vesicle small, pars prostatica elongated, followed by narrow ejaculatory duct and short cirrus; external seminal vesicle long, tubular, coiled, surrounded by prostate cells as in preceding species. Testes 2, 0.168 to 0.182 by 0.189 to 0.191, smooth, tandem, separated by a few vitelline follicles, in slightly more than posterior third of body. Ovary 0.105 by 0.126, smooth, median, a little posterior to midlevel, separated from anterior testis by a few vitelline follicles and seminal receptacle. Vitelline follicles from base of cirrus sac to posterior end of body, confluent posterior to testes. Uterus with moderate number of eggs, preovarian; metraterm tubular. Eggs 0.057 to 0.060 by 0.030 to 0.033. Excretory vesicle sac-shaped, extending to level of ovary; excretory pore dorsal near posterior end, with sphincter.

Host: *Cephalopholis fulvus*.

Site: intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39382.

Neolepidapedon equitatum may be differentiated from other species of the genus by position of the genital pore, length of esophagus, absence of prepharynx, size of pharynx, and separation of gonads. It comes closest to *N. cablei* but differs from that species in the slightly greater sucker ratio, relative position of gonads with vitelline follicles between them, and more anterior position of the ventral sucker and intestinal bifurcation.

Neolepidapedon mycteropercae n. sp. (FIGURE 110)

Description based on a single specimen with characters of the genus. Body 3.248 long, 0.315 wide, rather uniformly wide throughout length except near rounded ends. Cuticle spinose. Eye-spot pigment present. Oral sucker 0.052 by 0.063, slightly subterminal. Ventral sucker 0.081 by 0.091, a little less than one quarter body length from anterior end. Sucker ratio 1:1.4. Prepharynx 0.022 long, pharynx 0.028 by 0.039, intestinal bifurcation distinctly nearer oral than ventral sucker; ceca narrow, extending almost to posterior end of body. Genital pore on left, posterolateral to ventral sucker; genital atrium large, muscular. Cirrus sac sigmoid, ending a little less than halfway between ventral sucker and ovary; internal seminal vesicle small, pars prostatica elongated; external seminal vesicle long, tubular, coiled, its distal end surrounded by prostate cells. Gonads median, smooth, tandem, separated, with vitelline follicles between them. Testes 2, 0.168 to 0.210 by 0.113 to 0.147, within posterior third of body. Ovary 0.126 by 0.112, anterior to testes. Seminal receptacle posterior to ovary. Vitelline follicles from base of external seminal vesicle to posterior ends of ceca, confluent posterior to testes. Uterus preovarian; metraterm tubular, wide, Eggs few, 0.048 to 0.057 by 0.035 to 0.038. Excretory vesicle I-shaped, reaching almost to intestinal bifurcation; excretory pore dorsal, near posterior end, with sphincter.

Host: *Mycteroperca* sp.

Site: intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39383.

Neolepidapedon mycteropercae differs from all other species of the genus in the position of genital pore. In body shape and certain other features, *N. mycteropercae* is much like *N. medialunae* Montgomery, 1957, but differs from that species in the length of the forebody, prepharynx, and esophagus, level of intestinal bifurcation, and spacing of gonads.

Lepidapedon holocentri n. sp. (FIGURE 111)

Description based on 3 specimens with characters of the genus. Body 1.358 to 1.631 long, 0.294 to 0.406 wide, tapering anteriorly, rounded posteriorly. Cuticle spinose almost to posterior end. Eye-spot pigment present. Oral sucker 0.063 to 0.085 in diameter, subterminal. Ventral sucker 0.058 to 0.063 in diameter. Sucker ratio 1:0.78. Prepharynx short, pharynx 0.063 to 0.077 by 0.051 to 0.057, esophagus slender, somewhat longer than pharynx, intestinal bifurcation almost midway between pharynx and ventral sucker; ceca simple, extending almost to posterior end of body. Genital pore to left of ventral sucker; genital atrium large, muscular. Cirrus sac extending halfway from ventral sucker to ovary, of 2 parts separated by a narrow constriction. Anterior part clavate, with small, spherical division of seminal vesicle at base, followed by pyriform pars prostatica and sinuous ejaculatory duct; posterior part massive, thin-walled; filled with sinuous, saclike posterior division of seminal vesicle and prostate cells. Testes 2, 0.119 to 0.147 by 0.073 to 0.077, smooth, diagonal,

in posterior third of body. Ovary 0.084 to 0.091 by 0.066 to 0.080, with 3 or 4 lobes, median, pretesticular, separated from anterior testis by oval seminal receptacle contiguous with those gonads. Vitelline follicles in lateral fields from level of ventral sucker to ends of ceca, a few in median region posterior to testes. Uterus scanty, preovarian; metraterm a long, muscular tube. Eggs 0.046 to 0.056 by 0.032 to 0.033. Excretory vesicle I-shaped, extending to intestinal bifurcation; excretory pore dorsal, near posterior end, with sphincter.

Hosts: *Holocentrus ascensionis*, *Chaetodipterus faber*.

Site: stomach and ceca.

Locality: Cabo Rojo, P. R.

Type specimen: Holotype No. 39384.

According to Hanson's (1950) key to the species of *Lepidapedon*, *L. holocentri* would be identified as *L. nicolli* Manter, 1934. However, it differs from that species in having a distinctly lobed ovary, smaller eggs, subterminal oral sucker, and diagonal testes. Recently Manter (1954) described 2 additional species, *L. congeri* and *L. australis*. *L. holocentri* comes closer to *L. congeri*, but differs from it in sucker ratio, length of prepharynx, position of testes, anterior extent of vitellaria, and size of eggs.

Myzoxenus lachnolaimi Manter, 1947 (FIGURE 112)

Host: *Lachnolaimus maxiums*.

Site: intestine.

Locality: off Parguera, P. R.

Deposited specimen: No. 39385.

Dermadena lactophrysi Manter, 1945 (FIGURES 113 and 114)

Synonym:

Distomum lamelliforme Linton, 1907, in part.

Hosts: *Lactophrys tricornis*, *Lactophrys triqueter*, **Monacanthus hispidus*.

Site: intestine.

Localities: Mona Island, off Puerto Real, and Cabo Rojo, P. R.

Deposited specimen: No. 39386.

Pseudocreadium sp. (FIGURES 115 and 116)

Host: *Lactophrys tricornis*.

Site: intestine.

Locality: off Puerto Real, P. R.

This species is not described or identified because only a single specimen without eggs was found. It may be *P. scaphosomum* Manter, 1940. The excretory vesicle is much as in *Dermadena*, but the flame cell pattern is simpler, its formula being $2[(2 + 2 + 2) + (2 + 2)]$.

Opechona sp.

Host: *Chloroscombrus chrysurus*.

Site: intestine.

Locality: Playa Mani, P. R.

An immature specimen of *Opechona* species was found but is not figured or described here.

Diploproctodaenum sp.

Hosts: *Myrichthys ocellatus*, *Canthigaster rostratus*.

The species cannot be identified or described adequately because only 2 dead specimens in poor condition were recovered, one from each of the above hosts.

FAMILY ACCACOELIIDAE Looss, 1912

Tetrochetus alulerae (Hanson, 1955) Yamaguti, 1958 (FIGURE 117)

Synonym:

Paratetrochetus alulerae Hanson, 1955.

Hosts: *Coryphaena hippurus*, **Acanthocybium solandri*.

Site: intestine and stomach.

Locality: off Puerto Real, Mona Is., P. R.

Deposited specimen: No. 39387.

The genus *Paratetrochetus* Hanson, 1955, was reduced to synonymy with *Tetrochetus* Looss, 1912, by Yamaguti (1958), and we agree, since the 2 species differ only as to whether the conelike elevation at the base of oral sucker is pharyngeal or prepharyngeal. Our specimens are in more or less complete agreement with Hanson's (1955) account of *Tetrochetus alulerae*. Furthermore, they are so similar to *T. proctocolus* Manter, 1950, and *T. coryphaenae* Yamaguti, 1934, as to suggest that the 3 species are identical. They seem to differ but slightly in egg size.

FAMILY HEMIURIDAE LÜHE, 1901

The next species is unique among known hemiurids in having the vitelline follicles in 2 widely separated, 7-lobed groups. To accommodate it, the following genus is proposed:

Bilecithaster n. g.

Diagnosis: Hemiuridae. Small, oval, smooth nonappendiculate distomes. Oral sucker subterminal, prepharynx short, pharynx spherical, esophagus longer than pharynx, ceca short, simple, ending blindly. Genital pore at base of oral sucker. Sinus sac rudimentary. Seminal vesicle with 2 saclike divisions; pars prostatica subspherical. Prostate cells sparse. Testes 2, tandem to diagonal. Ovary in testicular zone, smooth. Seminal receptacle present. Vitellaria in 2 groups each with 7 lobes, in preovarian zone. Uterus extends to near posterior end of body; metraterm simple. Excretory arms uniting dorsal to oral sucker. Parasites of marine fishes. Type and only species:

Bilecithaster ovalis n. g., n. sp. (FIGURE 118)

Description based on 3 specimens with characters of the genus. Body 0.440 to 0.547 long, 0.247 to 0.267 wide. Oral sucker 0.051 to 0.057 by 0.063

to 0.066. Ventral sucker 0.133 to 0.136 by 0.120 to 0.133. Sucker ratio 1:2.2. Pharynx 0.035 to 0.036 by 0.039 to 0.042, esophagus 0.056 long; ceca reach level of anterior testis. Gonads smooth; testes 0.054 to 0.066 in diameter; ovary submedian, on left, 0.042 to 0.049 in diameter. Seminal receptacle anteromedian to ovary. Uterus voluminous. Eggs very numerous, 0.028 to 0.031 by 0.014 to 0.015. Excretory vesicle extends to anterior testis; excretory pore slightly subterminal.

Host: *Haemulon plumieri*.

Site: ceca.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39388.

Hysterolecitha rosea Linton, 1910 (FIGURE 119)

Host: *Acanthurus bahianus*.

Site: stomach.

Locality: Mona Island, P. R.

Deposited specimen: No. 39389.

Leurodera decora Linton, 1910 (FIGURE 120)

Host: **Haemulon melanurum*.

Site: intestine.

Locality: off Puerto Real, P.R.

Deposited specimen: No. 39390.

Hyperparasitism of the single specimen by a microsporidian was observed.

Dichadena acuta Linton, 1910 (FIGURE 121)

Synonym:

Lecithaster acutus (Linton) Manter, 1947.

Hosts: *Acanthurus caeruleus*, *A. bahianus*.

Site: intestine and stomach.

Locality: Mona Island; Puerto Real, P.R.

Deposited specimen: No. 39391.

In erecting the genus *Dichadena*, Linton (1910) was unable to see the intestine and described the ovary as being entire in *D. acuta*. Manter (1947) identified as that species a form that had a lobed ovary and, for that reason, transferred *D. acuta* to *Lecithaster* in which, however, the ceca end blindly. He did not observe the cyclocoel intestine, which probably would have been overlooked by us except for 1 excessively flattened specimen. As that feature is of generic significance, we propose that the genus *Dichadena* be restored to include *D. acuta* as the type and only species. Our material is identified as that species but differs from Linton's description in the length and shape of the pars prostatica and seminal vesicle to a degree that may prove to be of specific magnitude. Skrjabin and Guschanskaja (1955) recognized the genus *Dichadena* and transferred *Lecithaster galeatus* Looss, 1907, to it because of the unlobed ovary. However, Looss (1907b) clearly described ceca ending blindly in that species and for that reason it is to be excluded

from *Dichadena* and belongs instead in either *Lecilhaster* or *Mordvilkovia*st Pigulevsky, 1938.

Theletrum fustiforme Linton, 1910 (FIGURE 122)

Hosts: **Acanthurus caeruleus*, **Pomacanthus arcuatus*.

Site: intestine and stomach.

Locality: Guaniquilla, Parguera, P. R.

Deposited specimen: No. 39392.

The next trematode resembles species of *Genolinea*, but differs from them and other hemiurids in having a large pars prostatica with thick spiral musculature, a saclike seminal vesicle, a narrow, tubular sinus sac, and distinct cuticular striations. To receive that species, the following genus is proposed.

Neogenolinea n. g.

Diagnosis: Hemiuridae. Small distomes without ecsoma. Cuticle with prominent striations. Oral sucker subterminal, pharynx spherical, esophagus short, ceca swollen, ending blindly in posterior region of body. Genital pore ventral, at base of oral sucker. Sinus sac tubular, pars prostatica large, oval, with thick covering of spiral muscle fibers; prostate cells sparse; seminal vesicle large, saclike, posterior to and slightly overlapping ventral sucker, connected with pars prostatica by a narrow duct. Testes 2, diagonal to symmetrical, posterior to ventral sucker. Ovary posttesticular. Seminal receptacle present. Vitellaria of 2 compact indented masses near ovary. Uterus extensive; metraterm simple. Excretory vesicle with arms uniting dorsal to oral sucker. Parasites of marine fishes. Type and only species:

Neogenolinea opisthonemae n. g., n. sp. (FIGURE 123)

Description based on 40 specimens with characters of the genus. Body 0.534 to 0.827 long, 0.153 to 0.193 wide. Oral sucker 0.052 to 0.069 by 0.068 to 0.079. Ventral sucker 0.094 to 0.120 in diameter. Sucker ratio 1:1.6. Pharynx 0.031 to 0.037, testes 0.029 to 0.069, ovary 0.039 to 0.069 in diameter. Gonads entire, ovary median. Seminal receptacle posteromedian to ovary. Eggs 0.029 to 0.032 by 0.012 to 0.015. Excretory pore dorsally subterminal.

Host: *Opisthonema oglinum*.

Site: stomach.

Locality: Playa Mani, P.R.

Type specimen: Holotype No. 39393.

Macradena acanthuri n. sp. (FIGURE 124)

Description based on 3 specimens with characters of the genus. Body nonappendiculate, 1.347 to 2.401 long, 0.300 to 0.480 wide, slightly tapered near both ends. Cuticle smooth, thick. Oral sucker subterminal, 0.100 to 0.140 by 0.147 to 0.173, with muscular preoral lip. Ventral sucker one third from anterior end, 0.207 to 0.260 by 0.180 to 0.253. Sucker ratio 1:1.5.

Prepharynx absent, pharynx 0.069 to 0.100 by 0.086 to 0.120, esophagus very short, ceca swollen, crenate, extending to posterior end of body. Genital pore immediately posterior to intestinal bifurcation. Sinus sac small, hermaphroditic duct very short. Seminal vesicle tubular, appearing as a compact saclike structure at midlevel of body. Pars prostatica a long sinuous tube, surrounded by sparse prostate cells. Gonads almost contiguous; testes 2, entire, 0.065 to 0.111 in diameter, slightly diagonal, just posterior to midbody. Ovary entire, submedian, posttesticular, 0.102 to 0.156 in diameter. Seminal receptacle a large, swollen sac lateral to ovary. Vitellaria of 8 lobes in a rosette, posterior to ovary and overlapping it. Uterus voluminous, occupies all available space in hindbody; metraterm unmodified. Eggs very numerous, 0.023 to 0.026 by 0.012 to 0.015. Excretory pore almost terminal. Excretory crura unite dorsal to pharynx.

Host: *Acanthurus bahianus*.

Site: stomach.

Locality: Puerto Real, P. R.

Type specimen: Holotype No. 39394.

The present species has been assigned to the genus *Macradena* on the basis of its general similarity with that genus. However, the less lobed vitellaria and unlobed ovary are distinctive features of this species. It differs from *M. perfecta* Linton, 1910, in the presence of a preoral lobe, and in sucker ratio in addition to the above-mentioned characters.

Aponorus elongatus n. sp. (FIGURE 125)

Synonym:

Aponorus sp. Linton, 1940.

Description based on 4 specimens with characters of the genus. Body without ecsoma, slightly tapering at each end or truncate posteriorly, 1.277 to 1.908 long, 0.200 to 0.380 wide. Cuticle smooth. Oral sucker subterminal, 0.069 to 0.091 by 0.085 to 0.117. Ventral sucker 0.193 to 0.300 in diameter, almost one third body length from anterior end. Sucker ratio 1:2.5. Prepharynx absent, pharynx 0.039 to 0.062 in diameter, esophagus short, ceca crenate, swollen, extending to posterior end of body. Genital pore slightly submedian, ventral to esophagus. Sinus sac pyriform or oval, hermaphroditic duct thick, muscular, metraterm and ejaculatory duct joining it at base of sac. Seminal vesicle large, sacshaped, anterior to or slightly overlapping ventral sucker; pars prostatica a sinuous tube surrounded by conspicuous prostate cells filling arch of ceca. Testes 2, diagonal, entire 0.069 to 0.095 by 0.088 to 0.100, close together, a short distance posterior to ventral sucker. Ovary posttesticular, submedian, entire, 0.066 to 0.092 in diameter. Seminal receptacle present. Vitellaria of 7 large lobes immediately posterior to ovary. Uterus voluminous, extending into posterior region of body then anteriorly, passing dorsal to ventral sucker; metraterm narrow, long, muscular, ventral to seminal vesicle. Eggs numerous, 0.026 to 0.029 by 0.013 to 0.016. Excretory arms unite dorsal to pharynx.

Host: *Chaetodipterus faber*.

Site: stomach.

Locality: Isla Ratones, P. R.

Type specimen: Holotype No. 39395.

Aponurus symmetrorchis n. sp. (FIGURE 126)

Description based on 3 specimens with characters of the genus. Body without ecsoma, spindle-shaped, rounded at both ends, 0.787 to 1.127 long, 0.273 to 0.347 wide. Cuticle smooth. Oral sucker subterminal, 0.069 to 0.087 by 0.092 to 0.113. Ventral sucker anterior to midlevel, 0.173 to 0.260 in diameter. Sucker ratio 1:2.3. Prepharynx absent, pharynx subspherical, 0.039 to 0.066 in diameter, esophagus very short, ceca simple, inflated, ending blindly near posterior end of body. Genital pore median, ventral to base of metraterm and male duct at base of sac. Seminal vesicle small, sac-shaped, anterior to ventral sucker, or slightly overlapping it. Pars prostatica a short tube, surrounded by prostate cells. Testes 2, entire, symmetrical, 0.046 to 0.092 in diameter, a short distance posterior to ventral sucker. Ovary to right of midline, entire, 0.046 to 0.068 in diameter, posttesticular. Seminal receptacle a spherical sac, anteromedian to ovary. Vitellaria of 7 lobes, in ovarian and immediately postovarian zone. Uterus not voluminous, extends posterior to vitellaria and anteriorly; metraterm a narrow, muscular tube. Eggs 0.026 to 0.031 by 0.015 to 0.018. Excretory arms unite dorsal to pharynx; excretory pore terminal.

Hosts: *Chaetodon ocellatus*, *Haemulon album*.

Site: stomach.

Locality: off Puerto Real, P. R.

Type specimen: Holotype No. 39396.

Aponurus symmetrorchis resembles most *A. intermedius* Manter, 1934, but differs from that deepwater species in the sucker ratio and general dimensions including egg size.

Parectenurus chloroscombri n. sp. (FIGURE 127)

Description based on a single specimen with characters of the genus. Body appendiculate, total length 1.982, width 0.393, length without ecsoma 1.400. Cuticular plications well developed ventrally from level of ventral sucker almost to posterior end of body proper. Oral sucker terminal, 0.090 by 0.119; ventral sucker 0.249 by 0.295. Sucker ratio 1:2.6. Prepharynx absent, pharynx 0.066 by 0.071, esophagus short; ceca simple, almost straight in hindbody, extending into ecsoma. Genital pore at posterior border of pharynx. Sinus sac 0.386 long, narrow, extending slightly posterior to ventral sucker; at its base, metraterm and male duct unite to form hermaphroditic duct. Seminal vesicle a curved sac between ventral sucker and anterior testis; with shallow constrictions but not divided into distinct divisions; pars prostatica a compactly coiled tube embedded in prostate cells with ducts entering distal portion of tube. Gonads contiguous; testes 2, entire, 0.068 to 0.083 by 0.121 to 0.158, diagonal, immediately posterior to seminal vesicle. Ovary entire, median, posttesticular, 0.098 by 0.174; seminal receptacle absent. Vitellaria of 7 coiled tubules, in 2 groups of 4 and

3, confined to ovarian and postovarian zone. Mehlis' gland posterior to ovary. Uterus moderately extensive, mostly postovarian, not extending into ecsoma; metraterm simple. Eggs 0.012 to 0.014 by 0.006 to 0.009. Excretory arms ending blindly at sides of oral sucker; excretory pore subterminal.

Host: *Chloroscombrus chrysurus*.

Site: intestine.

Locality: Playa Mani, P. R.

Type specimen: Holotype No. 39397.

The above species is assigned to *Parectenurus* but with some reservations as to the validity of separating that genus from *Dinurus*, *Ectenurus*, and *Magnacelabulum* by the form of the seminal vesicle and distribution of prostate cells along the male duct.

In the length of the sinus sac, *P. chloroscombri* comes closer to *Ectenurus* than *P. americanus* but has an undivided seminal vesicle as in *P. americanus*. *P. chloroscombri* differs from that species in size of body and pharynx, sucker ratio and extent of uterus.

Parahemiurus merus (Linton, 1910) Woolcock, 1935 (FIGURE 128)

Synonyms:

Hemiurus merus Linton, 1910.

Parahemiurus parahemiurus Vaz et Pereira, 1930.

P. platyichthyi Lloyd, 1938.

P. atherinae Yamaguti, 1938.

P. harengulae Yamaguti, 1938.

Host: **Opisthonema oglinum*, **Vomer setapinnis*.

Site: stomach.

Locality: Playa Mani, P. R.

Deposited specimen: No. 39398.

Sterrhurus fusiformis (Lühe, 1901) Looss, 1907 (FIGURE 129)

Synonym:

Lecithochirium fusiforme Lühe, 1901.

Host: *Gymnothorax* sp.

Site: stomach.

Locality: off Puerto Real, P. R.

Deposited specimen: No. 39399.

Sterrhurus floridensis Manter, 1934 (FIGURE 130)

Host: *Paralichthys* sp.

Site: stomach.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39400.

Sterrhurus monticellii (Linton, 1898) Linton, 1910 (FIGURES 131 and 132)

Synonyms:

Distomum monticellii Linton, 1898.

Hemiurus monticellii (Linton) Looss, 1899.

Hosts: * *Bothus ocellatus*, * *Ocyurus chrysurus*, * *Mulloidichthys martinicus*, * *Trachinotus* sp.

Site: stomach.

Locality: Punta Arenas, P. R.

Deposited specimen: No. 39401.

Sterrhurus microcercus Manter, 1947 (FIGURE 133)

Host: *Fistularia* sp.

Site: stomach.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39402.

Lecithochirium parvum Manter, 1947 (FIGURE 134)

Host: *Euthynnus alletteratus*.

Site: stomach.

Locality: Parguera, P. R.

Deposited specimen: No. 39403.

Dinurus breviductus Looss, 1907 (FIGURE 135)

Host: *Coryphaena hippurus*.

Site: intestine and stomach.

Locality: Mona Island, P. R.

Deposited specimen: No. 39404.

Dinurus barbatus (Cohn, 1903) Looss, 1907 (FIGURE 136)

Synonym:

Lecithocladium barbatum Cohn, 1903.

Host: *Coryphaena hippurus*.

Site: stomach.

Locality: Mona Island, P. R.

Deposited specimen: No. 39405.

Dinurus tornatus (Rudolphi, 1819) Looss, 1907 (FIGURE 137)

Synonyms:

Distomum tornatum Rudolphi, 1819.

Lecithocladium tornatum (Rudolphi) Lühe, 1901.

Host: *Coryphaena hippurus*.

Site: stomach.

Locality: Mona Island, P. R.

Deposited specimen: No. 39406.

Tubulovesicula lindbergi (Layman, 1930) Yamaguti, 1934 (FIGURE 138)

Synonyms:

Lecithaster lindbergi Layman, 1930.

Lecithurus lindbergi (Layman) Pigulevsky, 1938.

Host: *Leptocephalus conger*.

Site: stomach.

Locality: Puerto Real, P. R.

Deposited specimen: No. 39407.

FAMILY HIRUDINELLIDAE DOLLFUS, 1932

Hirudinella ventricosa (Pallas, 1774) Baird, 1853 (FIGURE 139)

Synonym:

Fasciola ventricosa Pallas, 1774.

Host: *Coryphaena hippurus*.

Site: stomach.

Locality: off Mayagüez, P. R.

Deposited specimen: No. 39408.

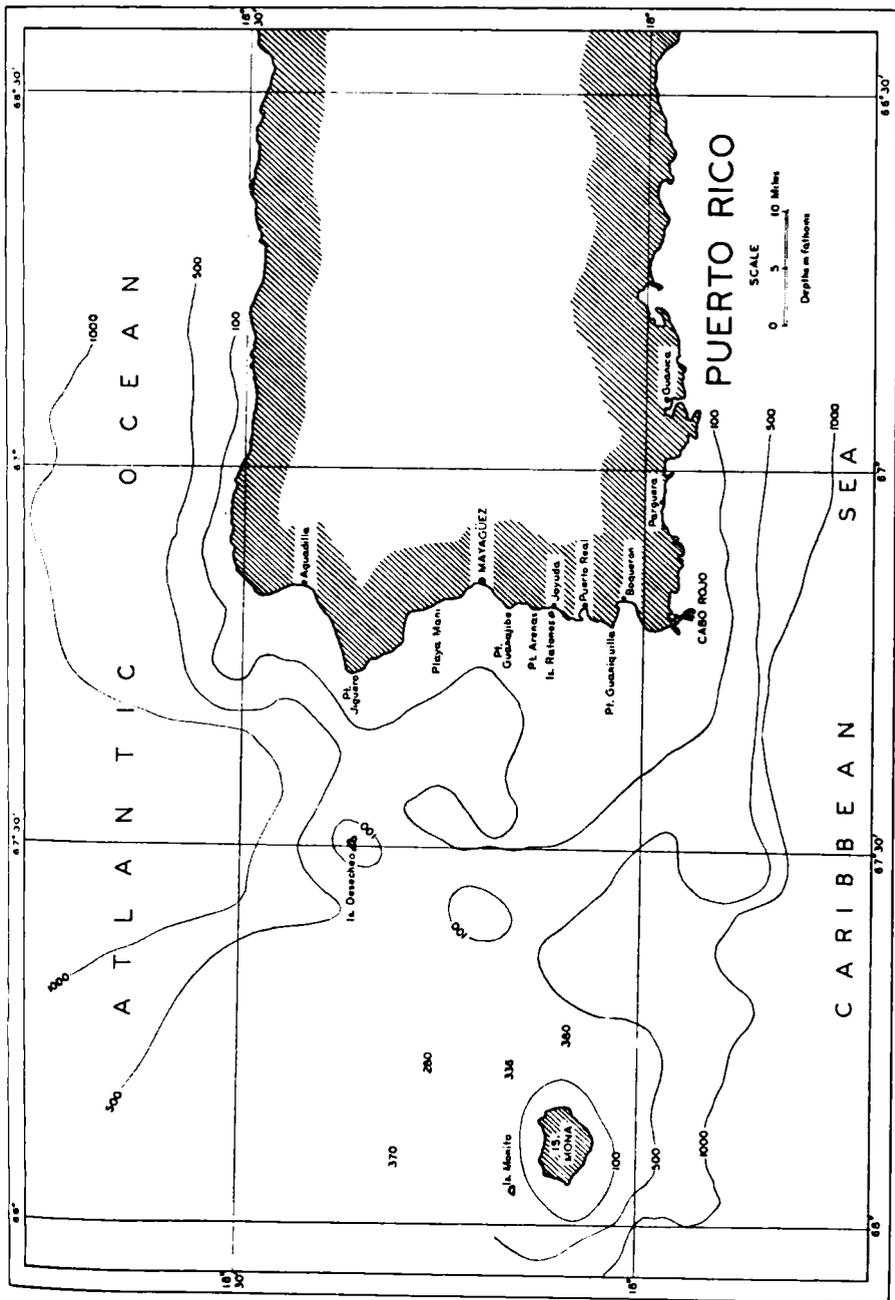
Our material is tentatively assigned to *H. ventricosa* as it appears very similar to that species as described by Manter (1947). In immature specimens, the excretory vesicle was observed as an elongate sac without the median tubular prolongation that receives the main excretory tubes in hemiurids. Instead, the vesicle receives those tubes independently at its anterolateral margins. The system is complex and apparently has 2 commissures anterior to the oral sucker.

DISCUSSION

The geographical distribution of the digenetic trematodes of marine fishes has been summarized by Manter (1947, 1955), who was concerned mostly with rather widely separated localities and the comparison of their trematode faunas. The present study focuses attention on the occurrence of those parasites in fishes from waters adjacent to 2 relatively close land masses, Puerto Rico and Mona Island, which are about 45 miles apart (TEXT FIGURE 1). All fishes examined in Puerto Rico were taken off the western and southwestern coasts, mostly at a depth of less than 100 fathoms. Those at Mona Island came chiefly from depths of less than 200 fathoms to the northwest and north of the island. The deepest continuous channel separating the two is closer to Mona than Puerto Rico and probably is a minimum of 250 fathoms.

Of the total of 123 species of digenetic trematodes found (TABLE 1) 78 were previously described ones. Of that number, 63 were from Puerto Rican waters, 10 from Mona and 5 from both localities. Of the 45 new species, 36 were from Puerto Rico, 8 from Mona, and but 1 from both places. Although the number of host species examined at Mona was but about one tenth that from Puerto Rico, the proportion of new to described trematodes was about the same for the 2 localities. Five of the 8 new species found only at Mona were recovered from host species not examined in Puerto Rico. Thus 2 factors concerned with speciation of these parasites must be considered: host specificity and isolation of host populations.

In general, digenetic trematodes are believed not to exhibit the high degree of host specificity observed for certain other helminth parasites. The 39 new host records reported here for previously described trematodes,



TEXT FIGURE 1. Map of western Puerto Rico and Mona Island.

TABLE 1
SPECIES DISTRIBUTION OF DIGENETIC TREMATODES FOUND IN THIS STUDY

Family	Number of Species				Total
	Puerto Rico		Mona Island		
	Old	New	Old	New	
(1) Aspidogastridae	0	1	0	0	1
(2) Bucephalidae	2	2	2	0	6
(3) Paramphistomatidae	1	0	0	0	1
(4) Pronocephalidae	2	2	0	0	4
(5) Microscaphiidae	1	2	0	0	3
(6) Haplospilachnidae	2	1	1	1	5
(7) Zoogonidae	1	2	0	1	4
(8) Bivesiculidae	1	0	0	0	1
(9) Microphallidae	0	2	0	0	2
(10) Cryptogonimidae	2	2	0	0	4
(11) Monorchidae	4	1	0	0	5
(12) Fellodistomatidae	4	3	0	1	8
(13) Acanthocolpidae	5	0	1*	0	5
(14) Haploporidae	0	4	0	0	4
(15) Megaperidae	3	0	0	0	3
(16) Opistholebetidae	2	1	0	0	3
(17) Opecoelidae	12	5	3*	2	21
(18) Lepocreadiidae	14	3	2*	4*	21
(19) Accacoeliidae	1	0	1*	0	1
(20) Hemiuridae	10	6	5*	0	20
(21) Hirudinellidae	1	0	0	0	1
Totals	68	37	15	9	123

* One species common to both localities.

and the long host-lists of some of them support that belief. However, exceptions are such that host specificity cannot be ruled out as a significant factor in explaining the small number of trematodes found common to both of the localities investigated.

Food habits of potential hosts undoubtedly play an important role, and other aspects of the trematode life cycle may be equally significant. For example, the ability of a species to attain maturity in a wide range of hosts may depend on the extent to which the parasite develops prior to gaining entry to such hosts. The metacercariae of many trematodes and even the cercaria of a few attain full reproductive maturity through progenetic development, and it may be expected that they could establish themselves in a variety of vertebrates for a sufficiently long period to be found there as ovigerous worms. The best known example of that situation is the family Microphallidae, 2 species of which are here reported from marine fishes for the first time. As described for one of them, *Megalophallus diodontis*, metacercariae became ovigerous when the second intermediate host, a crab, was killed and left in the laboratory for several hours. Conversely, a species whose metacercaria develops but partially toward the adult condition, and especially one that grows a great deal in the definitive host before becoming sexually functional, may be able to do so in but one or a few closely re-

lated host species in which mutual tolerance is possible for the length of time required. However, in certain groups such as the echinostomes and fasciolids, metacercariae grow and acquire adult characters hardly at all before they are infective to a variety of hosts in which they can develop to large, mature adults.

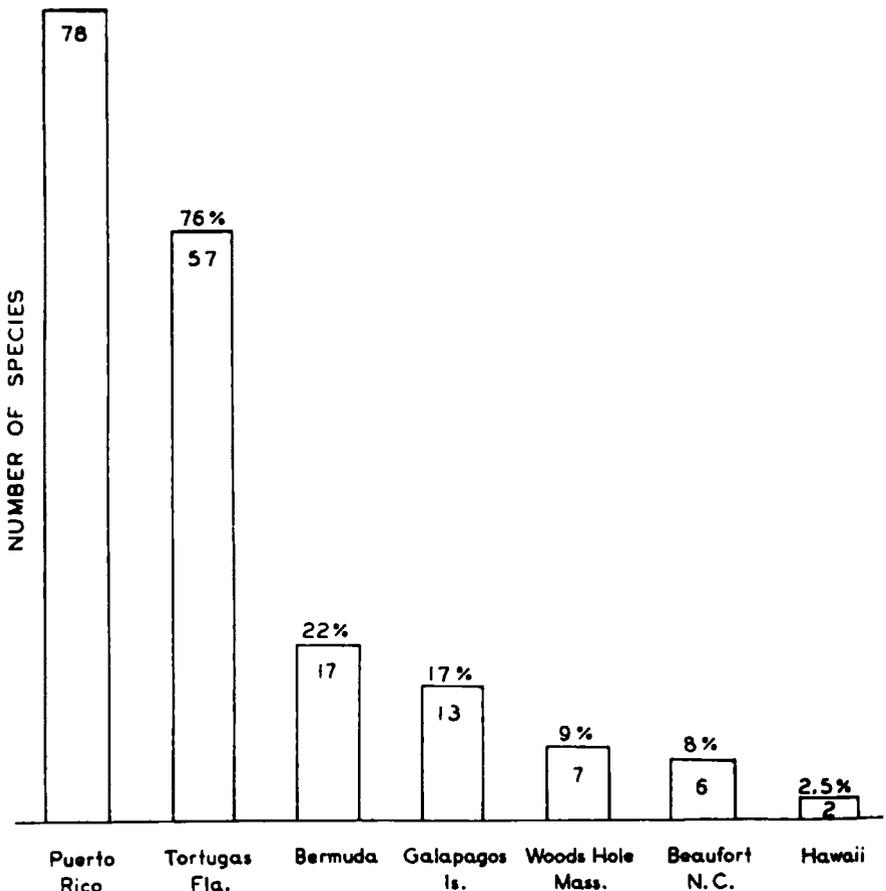
Another factor that may affect host specificity of the digenetic trematodes is the site at which the parasite localizes in the definitive host; that factor may account for the long host lists of certain species, notably many hemiurids which are predominantly stomach parasites of marine fishes. Thus as Manter (1957) stated, "... the status of each parasite must be appraised on its own merits" in weighing host specificity against other isolating mechanisms. However, such appraisal is hampered by meager information concerning the habits of hosts and the life histories of their parasites.

As expected, the wide-ranging pelagic fishes examined by us yielded the same species of trematodes reported from those hosts elsewhere. Shallow-water and reef fishes, however, presented quite another picture, harboring nearly all 45 of the new species found. Of that number, 18 occurred in host species examined by Manter (1947) at Tortugas, Fla. Although the remaining 27 were from fishes not collected by him, several occurred in species closely related to those he did examine. Thus host specificity alone is not an adequate explanation of the differences in the trematode faunas of Tortugas and the northeastern Caribbean region. In addition, deep waters and ocean currents may be an important factor through the isolation of host populations and therefore their parasites. Although the number of fishes examined at Mona Island was not large, a degree of their isolation from populations adjacent to Puerto Rico is indicated by finding but one of the 45 new species in both localities and 3 at Mona in host species that were examined in larger numbers in Puerto Rico without finding those parasites.

The distribution of the trematodes according to families is of interest with respect to life history patterns. Excluding families represented by but a few species, 5 contain over one half of the new trematodes: Fellodistomatidae with 4 of 7 new; Opeceolidae and Lepocreadiidae each with 7 of 21; Hemiuridae 6 of 20; and Haploporidae 4 of 4. Of those families, life histories are best known for the Opeceolidae, in which the cercaria is microcercous, unable to swim, and therefore required to utilize as a second intermediate host a bottom-frequenting organism, almost always a crustacean. Although lepecreadiid cercariae are good swimmers at least some of them become photonegative and likewise seek a bottom form as the next host, which may be a mollusk, annelid, or turbellarian. Cercariae of the Fello-distomatidae exhibit all degrees of swimming ability, but to our knowledge utilize only mollusks to reach definitive hosts that feed upon such shellfish. In the Hemiuridae, pelagic invertebrates, mostly copepods, serve as the second intermediate host of certain species and account for their wide distribution. Evidently, some of these cercariae may be obtained by large fish when eating smaller ones that may be a third intermediate or paratenic host that ingests infected copepods; the life histories of such cercariae have not yet been elucidated. However, some hemiurid cercariae cannot swim

and, being unable to penetrate the intermediate host, must be eaten by one necessarily with bottom-feeding habits. As to the Haploporidae, all 4 species of which were new, a life history has not yet been demonstrated for the family, but it seems very likely to parallel that of the lepecreadiids. The definitive hosts of the 4 species are shallow-water and reef-dwelling fishes. On the other hand, no new species were found in the family Acanthocolpidae, whose members are common in wide-ranging fishes, which obtain them by eating smaller fishes.

Factors controlling the distribution of marine organisms are not well understood, but an important one is water depth, which affects both their abundance and variety. Thus fishes depending for food on organisms restricted to waters of shallow and moderate depth, especially bottom-dwelling invertebrates, would likewise be restricted by that factor if not by the habits of the fishes themselves. Deep water therefore would serve to



TEXT FIGURE 2. Similarity of trematode fauna at various localities in American waters.

isolate populations of such fishes and of the parasites that they obtain in feeding. As isolation is generally acknowledged as essential to species formation, it thus is to be expected that the trematodes of fishes of shallow water adjacent to land masses separated by deep water may differ in the species present, and that the difference would increase with the distance between such masses, other factors being equal. At the same time, the number of trematode species common to both regions would be expected to decrease. That relationship for the coastal waters of Puerto Rico (including Mona Island) and certain other regions is shown graphically in TEXT FIGURE 2. Greatest similarity of the Puerto Rican fauna is to that of Tortugas, Fla., and then Bermuda, with ecological conditions more like those of Puerto Rico than of Beaufort, N. C. More than twice as many Puerto Rican species occur in the Galapagos region as at Beaufort, just as Manter (1947) reported in comparing Tortugas with those regions. Manter found, however, fewer Tortugas species at Bermuda than in the Galapagos area. The marine trematode fauna of Cuba is still largely unknown and has not been investigated at all for other islands and island groups in the Caribbean region, some isolated by much deeper water than that separating Puerto Rico and Mona Island. Studies in those regions would contribute much toward the evaluation of factors influencing speciation of the digenetic trematodes of marine fishes and to marine zoology and ecology in general.

HOST-PARASITE LIST

- | | |
|--|--|
| <i>Acanthocybium solandri</i> (Cuvier and Valenciennes), peto | <i>Cotylogaster basiri</i> |
| <i>Tetrochetus oliverae</i> | <i>Pachycreadium crassigulum</i> |
| <i>Acanthurus bahianus</i> Castelnau, ocean surgeonfish | <i>Pachycreadium gastrocolylum</i> |
| <i>Dichadena acuta</i> | <i>Proctoeces lintoni</i> |
| <i>Ilysteroleicitha rosea</i> | <i>Canthigaster rostratus</i> (Bloch) sharp-nosed puffer |
| <i>Macradena acanthuri</i> | <i>Diploproctodaenum</i> sp. |
| <i>Schikhobalotrema obtusa</i> | <i>Caranx ruber</i> (Bloch), runner |
| <i>Acanthurus caeruleus</i> Bloch and Schneider, blue tang | <i>Alcicornis carangis</i> |
| <i>Dichadena acuta</i> | <i>Centropomus ensiferus</i> Poey, snook |
| <i>Hapladena acanthuri</i> | <i>Opecoeloides</i> (?) sp. |
| <i>Proctoeces neomagnorus</i> | <i>Paracryptogonimus centropomi</i> |
| <i>Theletrum justiforme</i> | <i>Cephalopholis fulvus</i> (Linnaeus), coney |
| <i>Anchoviella epsetus</i> (Bonnaterre), striped anchovy | <i>Hamacreadium lintoni</i> |
| <i>Tergestia laticollis</i> | <i>Neolepidapedon equilatatum</i> |
| <i>Apogon maculatus</i> (Poey), cardinal fish | <i>Chaetodipterus faber</i> (Broussonet), spadefish |
| <i>Pseudopecoelus tortugae</i> | <i>Allomegasolena spinosa</i> |
| <i>Balistes vetula</i> Linnaeus, queen triggerfish | <i>Aponurus elongatus</i> |
| <i>Apocreadium balistis</i> | <i>Ilomalomeltron elongatum</i> |
| <i>Apocreadium mexicanum</i> | <i>Lepidapedon holocentri</i> |
| <i>Neapocreadium colli</i> | <i>Multitestis blennii</i> |
| <i>Bothus ocellatus</i> (Agassiz), flounder | <i>Multitestis inconstans</i> |
| <i>Sterrhurus monticellii</i> | <i>Neomegasolena chaetodipteri</i> |
| <i>Calamus arcifrons</i> Goode and Bean, grass porgy | <i>Chaelodon capistratus</i> Linnaeus, butterfly fish |
| <i>Stephanostomum sentum</i> | <i>Hurleytrematoides chaetodoni</i> |
| <i>Calamus calamus</i> (Cuvier and Valenciennes), saucer-eye porgy | <i>Chaelodon ocellatus</i> Bloch, butterfly fish |
| | <i>Aponurus symmetricus</i> |
| | <i>Chloroscombrus chrysurus</i> (Linnaeus), bumper |
| | <i>Opechona</i> sp. |

- Parectenurus chloroscomбри*
Prosorhynchus attenuatus
Tergestia pectinata
Coryphaena hippurus Linnaeus, "dolphin"
Dinurus barbatus
Dinurus breviductus
Dinurus tornatus
Hirudinella ventricosa
Stephanostomum coryphaenae
Tetrochetus aluterae
Diodon hystrix Linnaeus, porcupine fish
Megalomyzon robustum
Megalophallus didodontis
Opistholebes didontis
Epinephelus adscensionis (Osbeck), rock hind
Hamacreadium longisaccum
Neolepidapedon epinepheli
Epinephelus striatus (Bloch), Nassau grouper
Hamacreadium lintoni
Helicometra torta
Neolepidapedon epinepheli
Postporus epinepheli
Stephanostomum dentatum
Eques acuminatus (Bloch and Schneider), croaker
Horadrema crassum
Pseudopocoelus equesi
Euthymnus alleteratus (Rafmesque), little tunny
Lecithochirium parvum
Rhipidocotyle nagatyi
Tergestia laticollis
Fistularia sp., cornet fish
Sterrhurus microcerus
Gerres cinereus (Walbaum), white mojarra
Homalometron elongatum
Pinguilrema lobata
Pseudohurleytrema eucinostomi
Stephanostomum sentum
Gymnothorax sp., moray eel
Sterrhurus fusiformis
Haemulon album Cuvier and Valenciennes, margate fish
Aponurus symmetrorchis
Haemulon flavolineatum (Desmarest), French grunt
Homalometron foliatum
Infundibulostomum spinatum
Stephanostomum sentum
Haemulon melanurum (Linnaeus), French margate fish
Leurodera decora
Haemulon plumieri (Lacépède), common grunt
Bilecithaster ovalis
Genolopa ampullacea
Postmomorchis orthoprists
Halschaeres bivittatus (Bloch), slippery dick
Coitocecum sp.
Hepsetia stipes (Müller and Troschel), hardhead
Bivesicula hepstiae
Steganoderma atherinae
Holacanthus ciliaris (Linnaeus), queen angelfish
Antorchis holacanthi
Holacanthus tricolor (Bloch), rock beauty
Antorchis holacanthi
Pseudobarisomum holacanthi
Holocentrus ascensionis (Osbeck), squirrelfish
Helicometra equitata
Lepidapedon holocentri
Pseudopocoelus barkeri
Holocentrus vexillarius (Poey), squirrelfish
Pseudopocoelus barkeri
Hyporhamphus unifasciatus (Ranzani), halfbeak
Schikhobalotrema actua
Labrisomus nuchipinnis (Quoy and Gaimard), hairy blenny
Coitocecum sp.
Lachnolaimus maximus (Walbaum), hogfish
Myzoxenus lachnolaimi
Lactophrys bicaudalis (Linnaeus), trunkfish
Carneophallus lactophrysi
Helicometrina mirzai
Megapera gyrina
Neopocreadium angustum
Xystretum solidum
Lactophrys tricornis (Linnaeus), common trunkfish
Dermadena lactophrysi
Megapera gyrina
Megapera pseudura
Pseudocreadium sp.
Thysanopharynx elongatus
Lactophrys triquetel (Linnaeus), trunkfish
Dermadena lactophrysi
Leptocephalus conger (Linnaeus), conger eel
Tubulovesicula lindbergi
Lutianus analis (Cuvier and Valenciennes), mulletfish
Hamacreadium mutabile
Siphodera vinalwardsii
Stephanostomum casum
Lutianus apodus (Walbaum), schoolmaster
Allomegasolena attenuata
Hamacreadium mutabile
Metadena adglobosa
Lutianus aya (?)
Paracrypogonimus neoamericanus
Lutianus griseus (Linnaeus), gray snapper
Hamacreadium mutabile
Metadena adglobosa
Lutianus jocu (Bloch and Schneider), dog snapper
Hamacreadium mutabile
Lutianus synagris (Linnaeus), lane snapper
Siphodera vinalwardsii
Malacanthus plumieri (Bloch), blanquillo
Neosoogonius malacanthi
Pseudoplagioporus brevirellus
Monacanthus hispidus (Linnaeus), filefish
Dermadena lactophrysi
Mulloidichthys martinicus (Cuvier and Valenciennes), yellow goatfish
Helicometrina trachinoti

- Neozoogonus longicecus*
Opecoeloides brachyteleus
Opecoeloides elongatus
Opecoeloides vitellosus
Sterrhurus monticellii
Mycteroperca sp.
Neolepidapedon mycteropercae
Prosorhynchus atlanticus
Myrichthys oculatus (Kaup), snake eel
Diploproctodaemum sp.
Ocyurus chrysurus (Bloch), yellowtail
Diplangus anoplosus
Hamacreadium mutabile
Lepocreadium trulla
Lepocreadium sp.
Paracryptogonimus neoamericanus
Sterrhurus monticellii
Odontoscion dentex (Cuvier and Valenciennes), corvina
Genolopa longicaudata
Horatrema crassum
Oligoplites saurus (Bloch and Schneider), leather jacket
Manteria brachydera
Opisthonema oglinum (Le Sueur), thread herring
Neogenolinea opisthonemae
Parahemiurus merus
Paralichthys sp., flounder
Sterrhurus floridensis
Pomacanthus arcuatus (Linnaeus), black angelfish
Antorchis urna
Barisomum erubescens
Clepodiscus reticulatus
Glyphicephalus candidulus
Glyphicephalus mcintoshii
Hexangitrema breviceca
Hexangitrema pomacanthi
Hexangitrema pricei
Theletrum justiforne
Pomacentrus adustus (Troschel), maria molle
Schikhobalotrema pomacentri
Pseudoscarus guacamaiia (Cuvier), rainbow parrotfish
Schikhobalotrema sp.
Rhomboplites aurorubens (Cuvier and Valenciennes), vermilion snapper
Lepocreadium trulla
Scomberomorus sp.
Prosorhynchus stunkardi
Scorpaena sp., scorpionfish
Neohelicometra scorpaenae
Scorpaena plumieri Bloch, scorpionfish
Helicometrina nimia
Selene vomer (Linnaeus), moonfish
Tergestia laticollis
Sparisoma sp., parrotfish
Schikhobalotrema adbrachyura
Sparisoma viride (Bonnaterre), green parrotfish
Schikhobalotrema sp.
Schikhobalotrema obtusa
Spheroides testudineus (Linnaeus), West Indian puffer
Megalophallus diodontis
Sphyaena barracuda (Walbaum), great barracuda
Bucephalopsis arcuatus
Sirongylura sp., houndfish
Schikhobalotrema acuta
Trachinotus sp., pompano
Helicometrina trachinoti
Neolepidapedon trachinoti
Sterrhurus monticellii
Trichurus lepturus Linnaeus, cutlass fish
Opecoeloides sp.
Vomer selapinnis (Mitchill), horsefish or lookdown
Parahemiurus merus
 Unidentified: "collarfish"
Schikhobalotrema manteri
- The following list includes fishes negative for trematodes. The number of each examined is in parenthesis.
Abudefduf saxatilis (Linnaeus) (3)
Acanthurus sp. (3)
Anchovia producta (5)
Apogon conklinii (Silvester) (5)
Archosargus unifasciatus (Bloch) (1)
Atherina sp. (1)
Aulostomus maculatus Valenciennes (1)
Bathygobius soporalor (Cuvier and Valenciennes) (11)
Bathystoma rimator (Jordan and Swain) (1)
Caranx sp. (2)
Caranx latus Agassiz (3)
Caranx lugubris (Poey) (1)
Carcharias limbatus Muller and Henle (1)
Chaetodon striatus Linn. (2)
Chilomycterus sp. (1)
Cryptopomus auropunctatus (Cuvier and Valenciennes) (1)
Dactyloscopus tridigitatus Gill (4)
Epinephelus guttatus (Linnaeus) (4)
Epinephelus morio (Cuvier and Valenciennes) (1)
Eucinostomus californiensis (Gill) (4)
Haemulon sciurus (Shaw) (1)
Halichoeres radiatus (Linnaeus) (1)
Harengula macrophthalmia (Ranzani) (3)
Hippichthys brachycephalus (Poey) (1)
Lactophrys trigonus (Linnaeus) (2)
Lutianus buccanella (Cuvier and Valenciennes) (1)
Monacanthus ciliatus (Mitchill) (5)
Monacanthus tokeri Bean (1)
Mugil brasiliensis Agassiz (1)
Mugil curema Cuvier and Valenciennes (8)
Myripristis jacobus Cuvier and Valenciennes (1)
Pomacentrus leucostictus Muller and Troschel (1)
Priacanthus cruentatus (Lacépède) (1)
Pseudupeneus maculatus (Bloch) (1)
Rypticus bistrispinus (Mitchill) (1)
Scarus croicensis Bloch (1)
Scoliodon terraenovae (Richardson) (1)

- MANTER, H. W. 1940a. Digenetic trematodes of fishes from the Galapagos Islands and the neighboring Pacific. *Allan Hancock Pac. Exp.* **2**: 329-497.
- MANTER, H. W. 1940b. The geographical distribution of digenetic trematodes of marine fishes of the tropical American Pacific. *Allan Hancock Pac. Exp.* **2**: 531-547.
- MANTER, H. W. 1947. The digenetic trematodes of marine fishes of Tortugas, Fla. *Am. Midland Naturalist* **38**: 257-416.
- MANTER, H. W. 1949. An additional trematode from Tortugas, Fla., and a new name for *Opisthoporus* Manter, 1947 preoccupied. *Am. Midland Naturalist* **41**: 432-435.
- MANTER, H. W. 1954. Some digenetic trematodes from fishes of New Zealand. *Trans. Roy. Soc. New Zealand* **82**: 475-568.
- MANTER, H. W. 1955. The zoogeography of trematodes of marine fishes. *Exptl. Parasitol.* **4**: 62-86.
- MANTER, H. W. 1957. Host specificity and other host relationships among the digenetic trematodes of marine fishes. First symposium on host specificity among parasites of vertebrates. Neuchatel.
- MARTIN, W. E. 1939. Studies on the trematodes of Woods Hole. II. The life cycle of *Stephanostomum tenue*. (Linton). *Biol. Bull.* **77**: 65-73.
- MONTGOMERY, W. R. 1957. Some digenetic trematodes of marine fishes of La Jolla, Calif. *Trans. Am. Microscop. Soc.* **76**: 13-36.
- MONTICELLI, F. S. 1892. *Cotylagaster michaelis* n. g., n. sp., e revisione degli Aspidobothridae. *Festschr. Leukart.* 168-214.
- NAGATY, H. F. 1937. Trematodes of fishes from the Red Sea. I. Egyptian Univ. Fac. Med. Publ. No. **12**: 172 pp.
- PRICE, E. W. 1937. Three new genera and species of trematodes from cold blooded vertebrates. *Skrjabin Jubilee Vol.*: 483-490.
- SKRJABIN, R. I. & GUSCHANSKAJA. 1955. Trematodes of animals and man (in Russian). Vols. 10-11. Moscow, USSR.
- SOGANARES-BERNAL, F. 1959. Digenetic trematodes of marine fishes from the Gulf of Panama and Bimini, British West Indies. *Tulane Stud. Zool.* **7**: 69-117.
- TRAVASSOS, L., P. ARTIGAS, & C. PEREIRA. 1928. Fauna helmintologica dos peixes de agua doce do Brasil. *Arch. Inst. Biol. Def. Agr. Animal.* **1**: 5-68.
- YAMAGUTI, S. 1938. Studies on the helminth fauna of Japan. Pt. 24. Trematodes of fishes. V. *Japan. J. Zool.* **8**: 15-74.
- YAMAGUTI, S. 1953. *Systema Helminthum*. Part I. Digenetic trematodes of fishes. Tokyo, Japan. 405 pp.
- YAMAGUTI, S. 1958. *Systema Helminthum*. Vol. 1. Digenetic trematodes of vertebrates, in 2 parts. xi + 1575 pp. New York, N. Y.

PLATES

PLATE I

- FIGURE 1. (a) *Cotylogaster basiri* (ventral view); (b) terminal reproductive organs.
FIGURE 2. *Rhipidocotyle nagatyi* (dorsal view).
FIGURE 3. *Alcicornis carangis* (ventral view).
FIGURE 4. *Prosorhynchus attenuatus* (dorsal view).
FIGURE 5. *Prosorhynchus atlanticus* (ventral view).
FIGURE 6. *Prosorhynchus stunkardi* (ventral view).
FIGURE 7. *Bucephalopsis arcuatus* (ventral view).

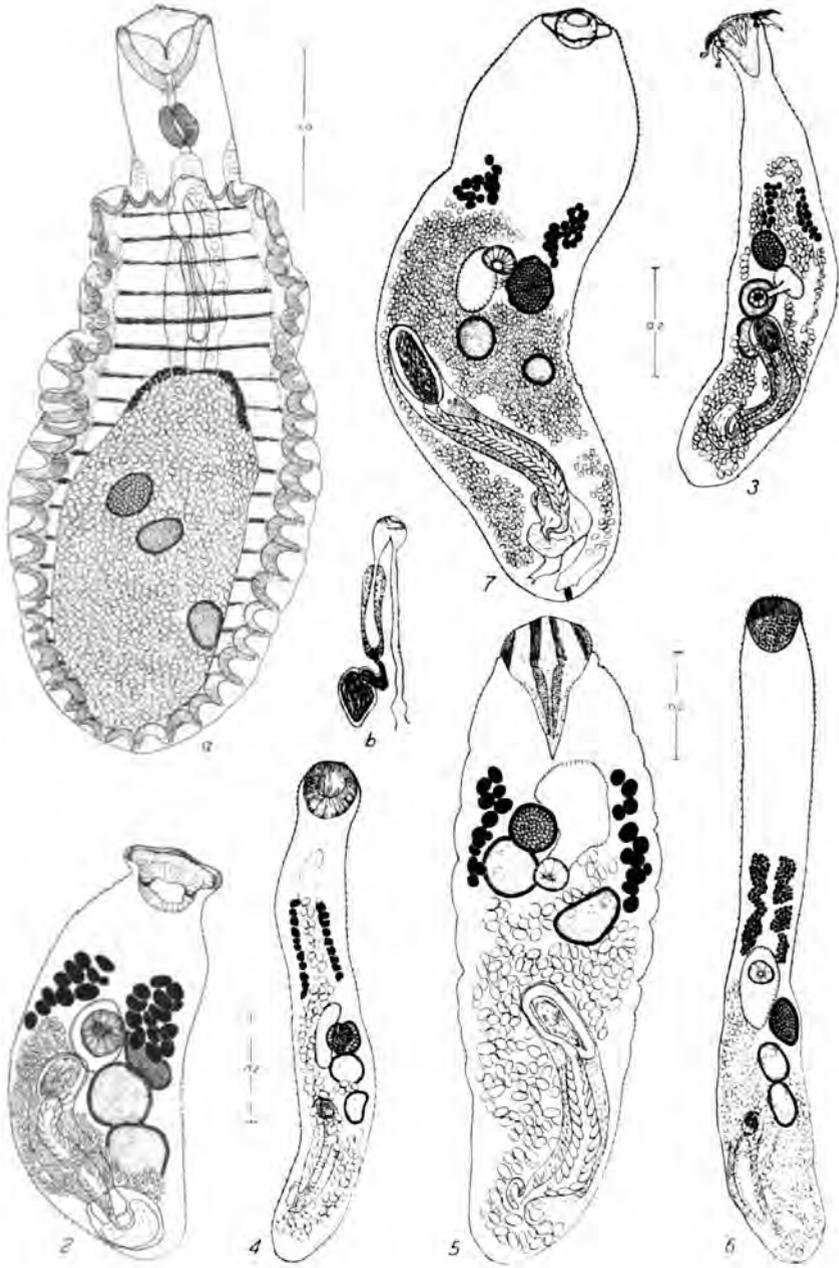


PLATE II

- FIGURE 8. *Glyphicephalus candidulus* (ventral view).
FIGURE 9. *Glyphicephalus mcintoshi* (ventral view).
FIGURE 10. *Barisomum erubescens* (ventral view).
FIGURE 11. *Pseudobarisomum holacanthi* (ventral view).
FIGURE 12. *Hexangitrema breviceca* (ventral view).
FIGURE 13. *Hexangitrema pricei*, excretory system in part.
FIGURE 14. *Hexangitrema pricei* (ventral view).

PLATE III

- FIGURE 15. *Schikhobalotrema manteri* (ventral view).
FIGURE 16. *Schikhobalotrema acuta* (ventral view).
FIGURE 17. *Schikhobalotrema pomacentri* (ventral view).
FIGURE 18. *Schikhobalotrema obtusa* (ventral view).
FIGURE 19. *Schikhobalotrema adbrachyura* (lateral view).
FIGURE 20. *Schikhobalotrema adbrachyura* (ventral view).
FIGURE 21. *Neozoogonus longicecus* (dorsal view).
FIGURE 22. *Neozoogonus malacanthi* (ventral view).
FIGURE 23. *Steganoderma atherinae* (ventral view).

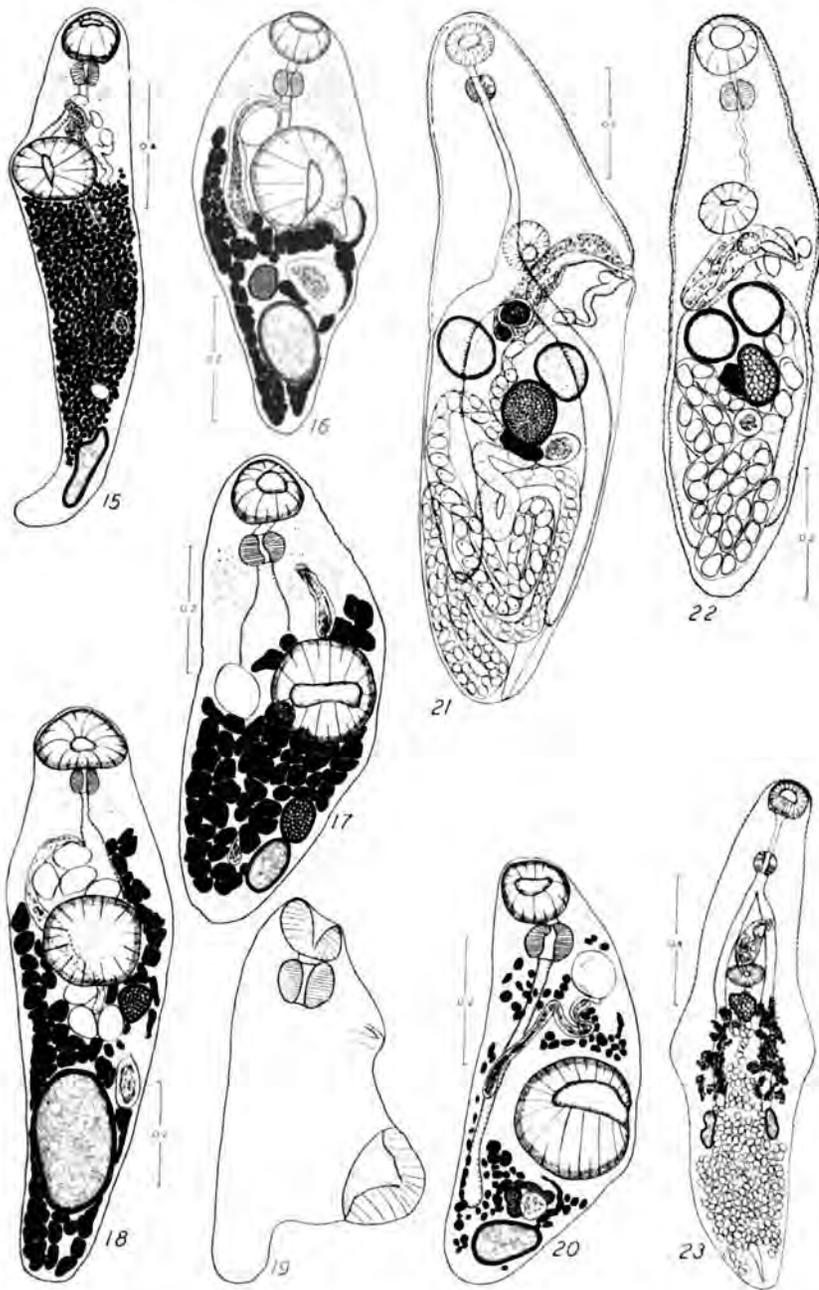


PLATE IV

FIGURE 24. *Diplanus anoplosus* (ventral view).

FIGURE 25. *Bivesicula hepsetiac* (ventral view), redrawn from Le Zotte, 1954.

FIGURE 26. *Megalophallus diodontis* (ventral view).

FIGURE 27. *Carneophallus lactophrysi* (ventral view).

FIGURE 28. *Siphodera vinaltedwardsii* (ventral view), redrawn from Cable and Hunninen, 1942.

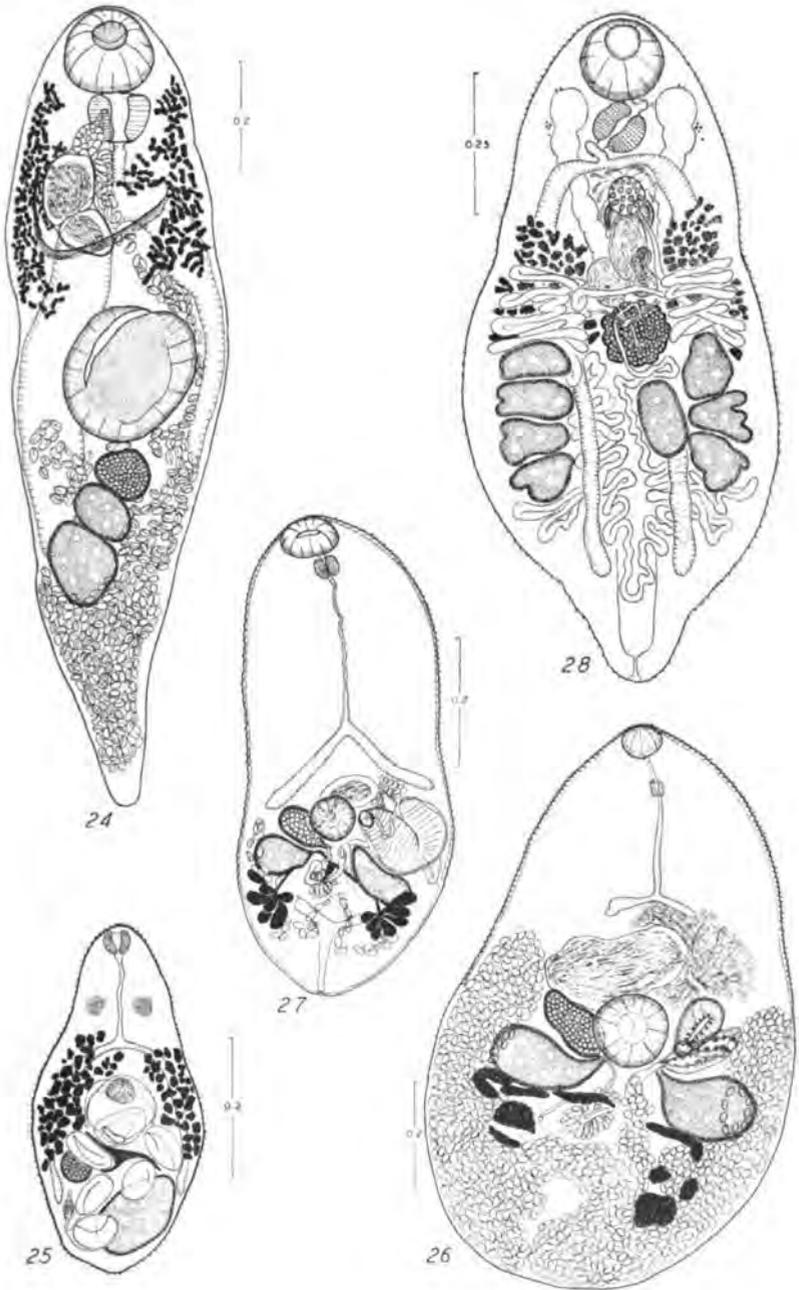


PLATE V

- FIGURE 29. *Paracryptogonimus neoamericanus* (ventral view).
FIGURE 30. *Paracryptogonimus centropomii* (ventral view).
FIGURE 31. *Metadena adglobosa* (ventral view).
FIGURE 32. Female complex of *Metadena adglobosa* (dorsal view).
FIGURE 33. Excretory system of *Metadena adglobosa*.
FIGURE 34. *Xystreltrum solidum* (ventral view).

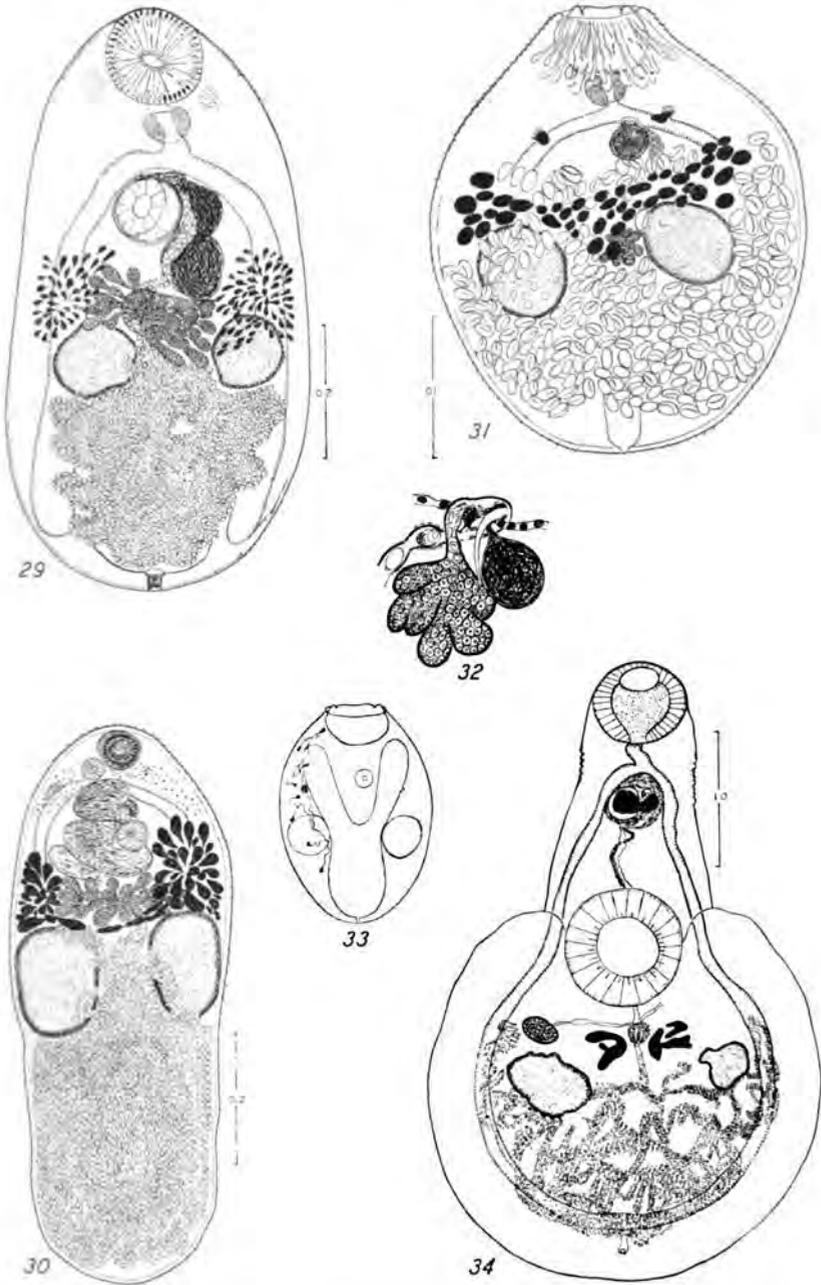


PLATE VI

- FIGURE 35. *Genolopa longicaudata* (ventral view).
FIGURE 36. *Genolopa ampullacea* (ventral view).
FIGURE 37. *Hurleytremaoides chaetodoni* (ventral view).
FIGURE 38. *Pseudohurleytrema eucinostomi* (ventral view).
FIGURE 39. *Postmonorchis orthopristis* (ventral view).
FIGURE 40. Excretory system of *Postmonorchis orthopristis*.
FIGURE 41. *Tergestia laticollis* (ventral view).

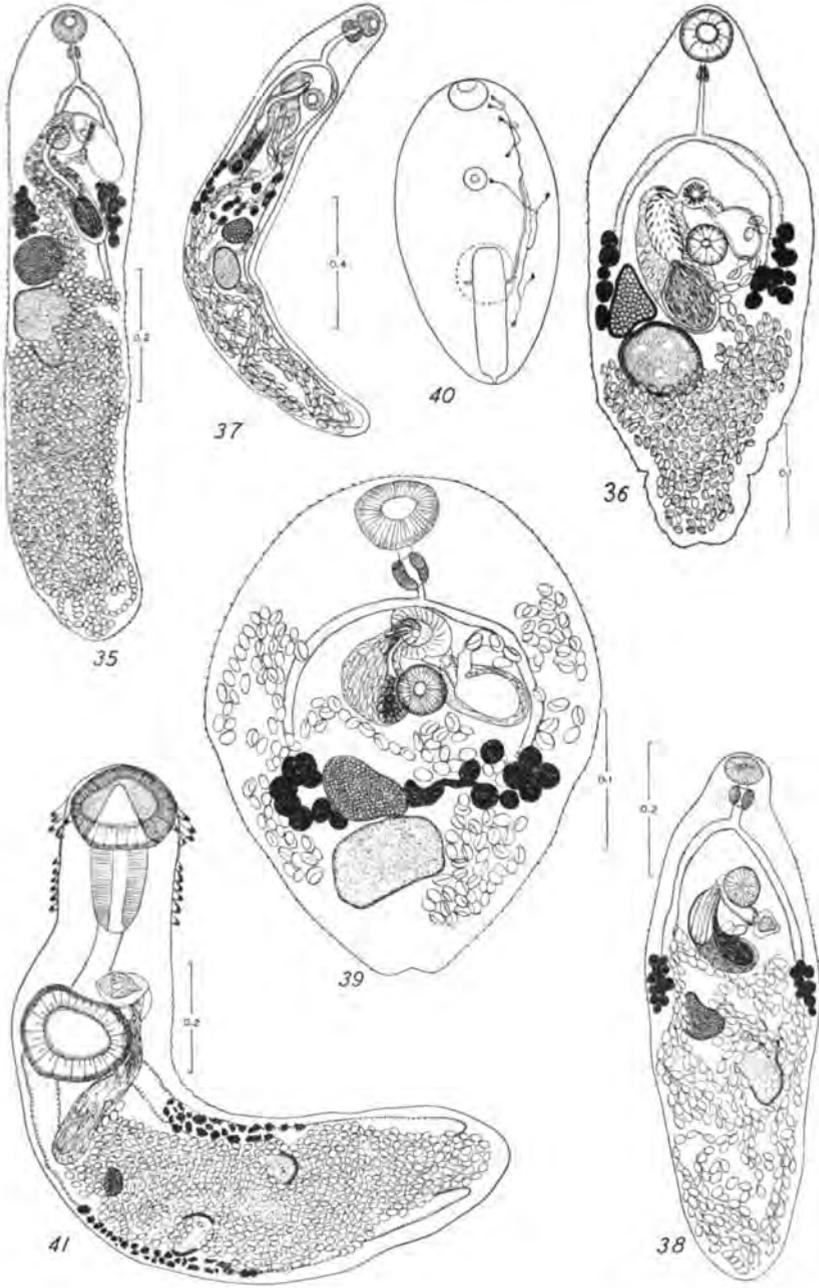


PLATE VII

- FIGURE 42. Excretory system of *T. laticollis*: (a) from *Selene vomer*; (b) from *Gerres cinereus*.
- FIGURE 43. *Tergestia pectinata* (ventral view).
- FIGURE 44. *Antorchis holacanthi* (ventral view).
- FIGURE 45. *Antorchis urna* (ventral view).
- FIGURE 46. Excretory system of *A. urna*.
- FIGURE 47. *Infundibulostomum spinatum* (ventral view).
- FIGURE 48. *Proctoeces lintoni* (slightly lateral view).
- FIGURE 49. *Proctoeces neomagnorus* (lateral view).

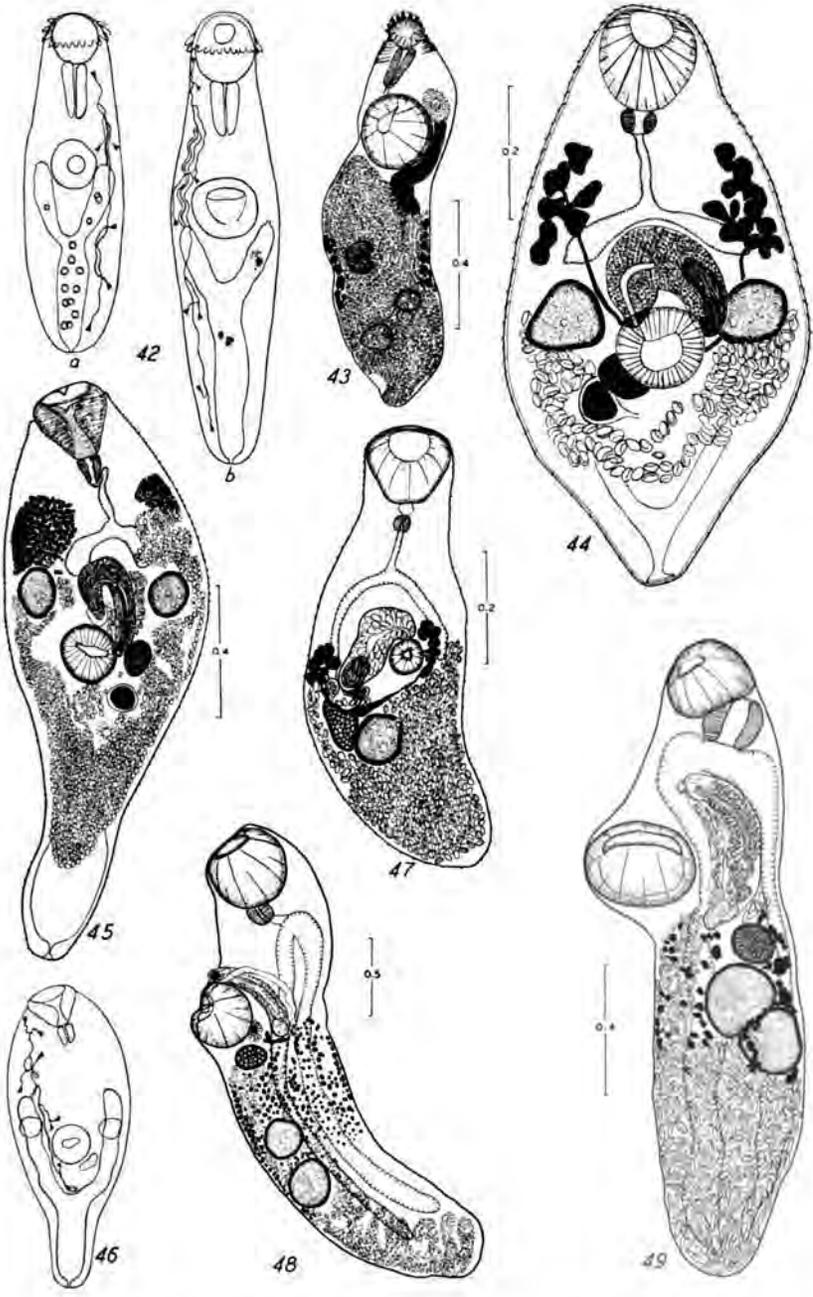


PLATE VIII

- FIGURE 50. *Stephanostomum coryphaenae* (ventral view).
FIGURE 51. Anterior end of *S. coryphaenae*.
FIGURE 52. *Stephanostomum dentatum* (ventral view).
FIGURE 53. Anterior end of *S. dentatum*.
FIGURE 54. *Stephanostomum casum* (ventral view).
FIGURE 55. Anterior end of *S. casum*.
FIGURE 56. *Stephanostomum sentium* (ventral view).
FIGURE 57. Anterior end of *S. sentium*.

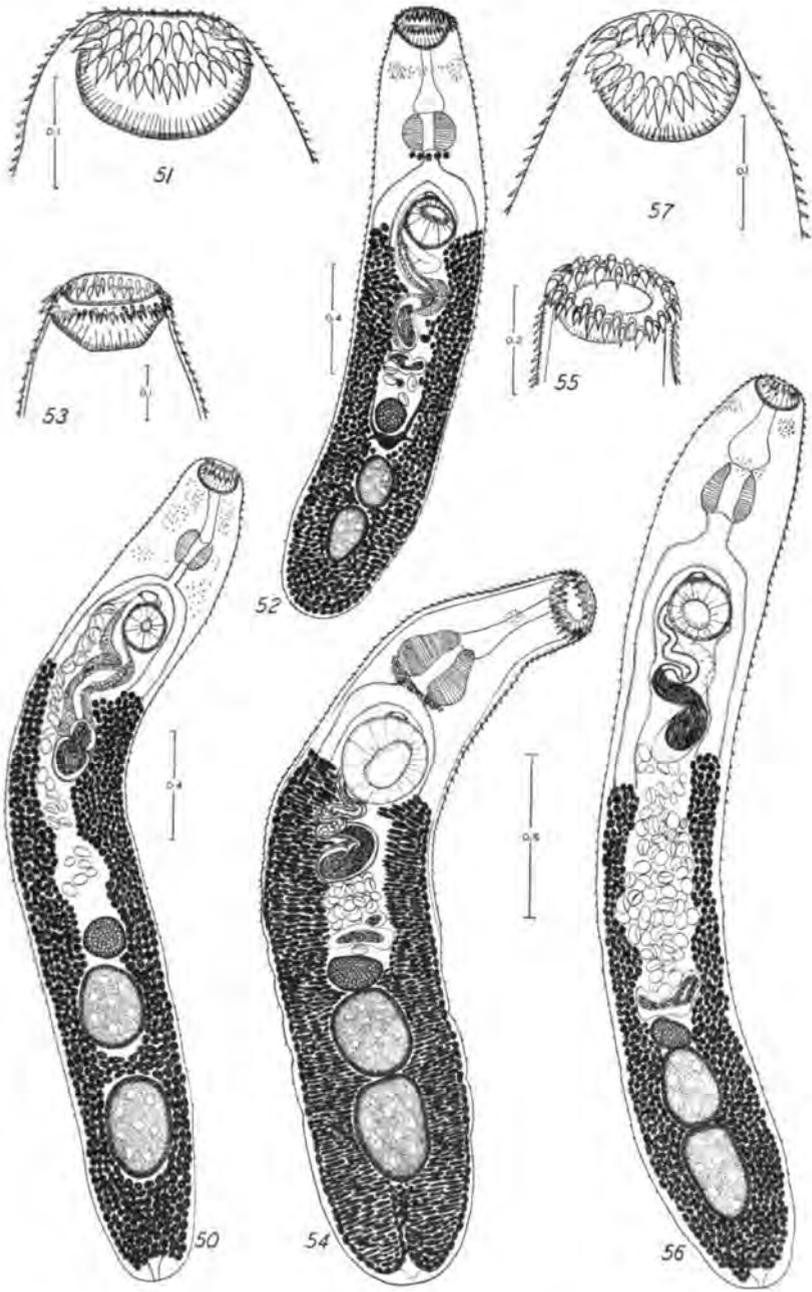


PLATE IX

- FIGURE 58. *Manteria brachydera* (ventral view).
FIGURE 59. Anterior end of *M. brachydera*.
FIGURE 60. Excretory system of *M. brachydera*.
FIGURE 61. Part of excretory pattern of *M. brachydera*.
FIGURE 62. *Allomegasolena spinata* (dorsal view).
FIGURE 63. Hermaphroditic pouch of *A. spinata*.

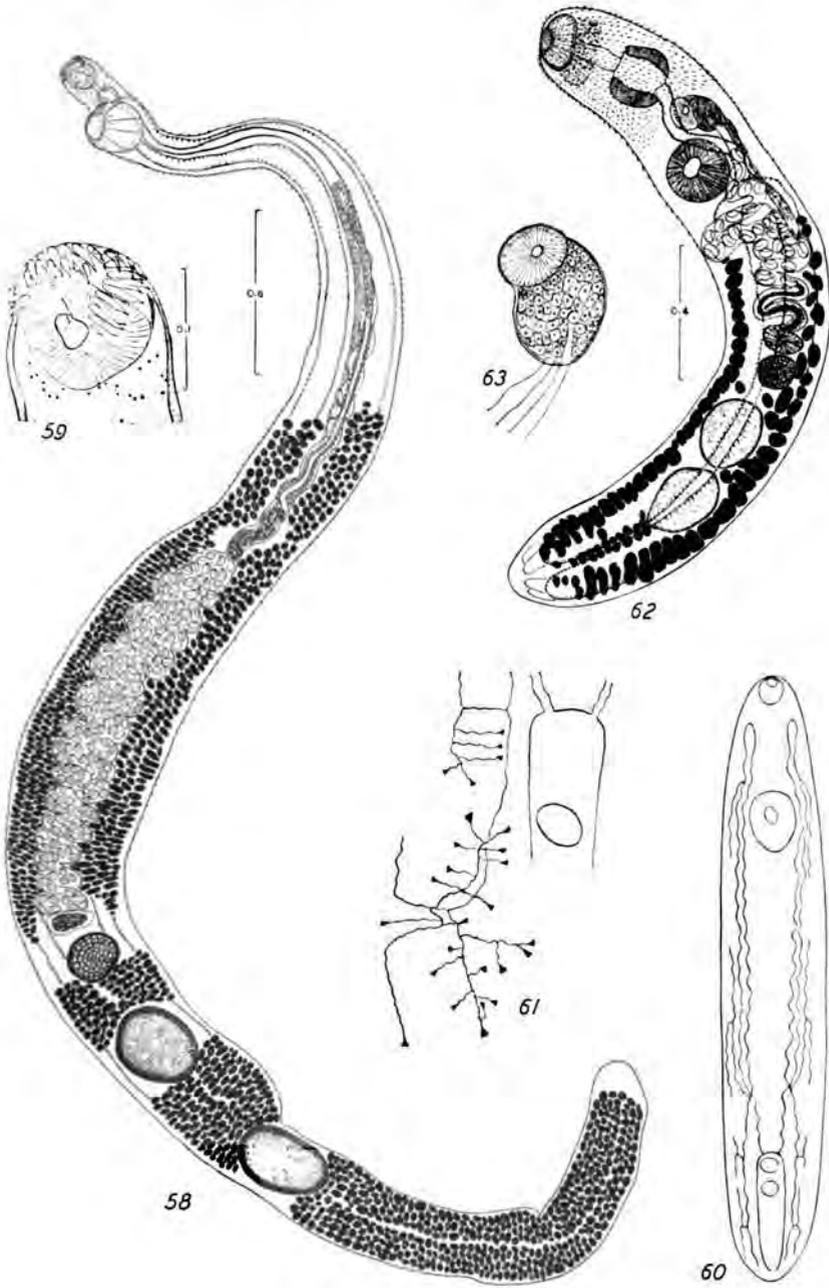


PLATE X

- FIGURE 64. *Allomegasolena attenuata* (ventral view).
FIGURE 65. *Hapladena acanthuri* (dorsal view).
FIGURE 66. *Neomegasolena chaelodipteri* (ventral view).
FIGURE 67. *Megapera gyrina* (ventral view).
FIGURE 68. *Megapera pseudura* (ventral view).
FIGURE 69. *Thysanopharynx elongatus* (ventral view).



64



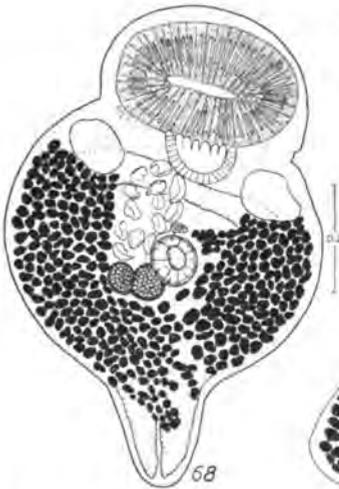
65



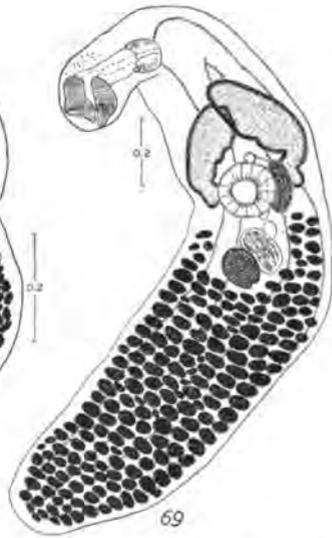
66



67



68



69

PLATE XI

FIGURE 70. *Opistholebes diodontis* (ventral view).

FIGURE 71. Excretory system of *O. diodontis*.

FIGURE 72. Giant flame cell of *O. diodontis*.

FIGURE 73. *Pachycreadium gastrocotylum* (ventral view).

FIGURE 74. *Pachycreadium crassigulum* (ventral view).

FIGURE 75. *Pinguitrema lobata* (ventral view).

FIGURE 76. (a) *Hamacreadium lintoni* (ventral view). (b) Cirrus sac of *H. lintoni*.

* Figures 70 to 72 redrawn from original data and figures of Cable, 1956a.

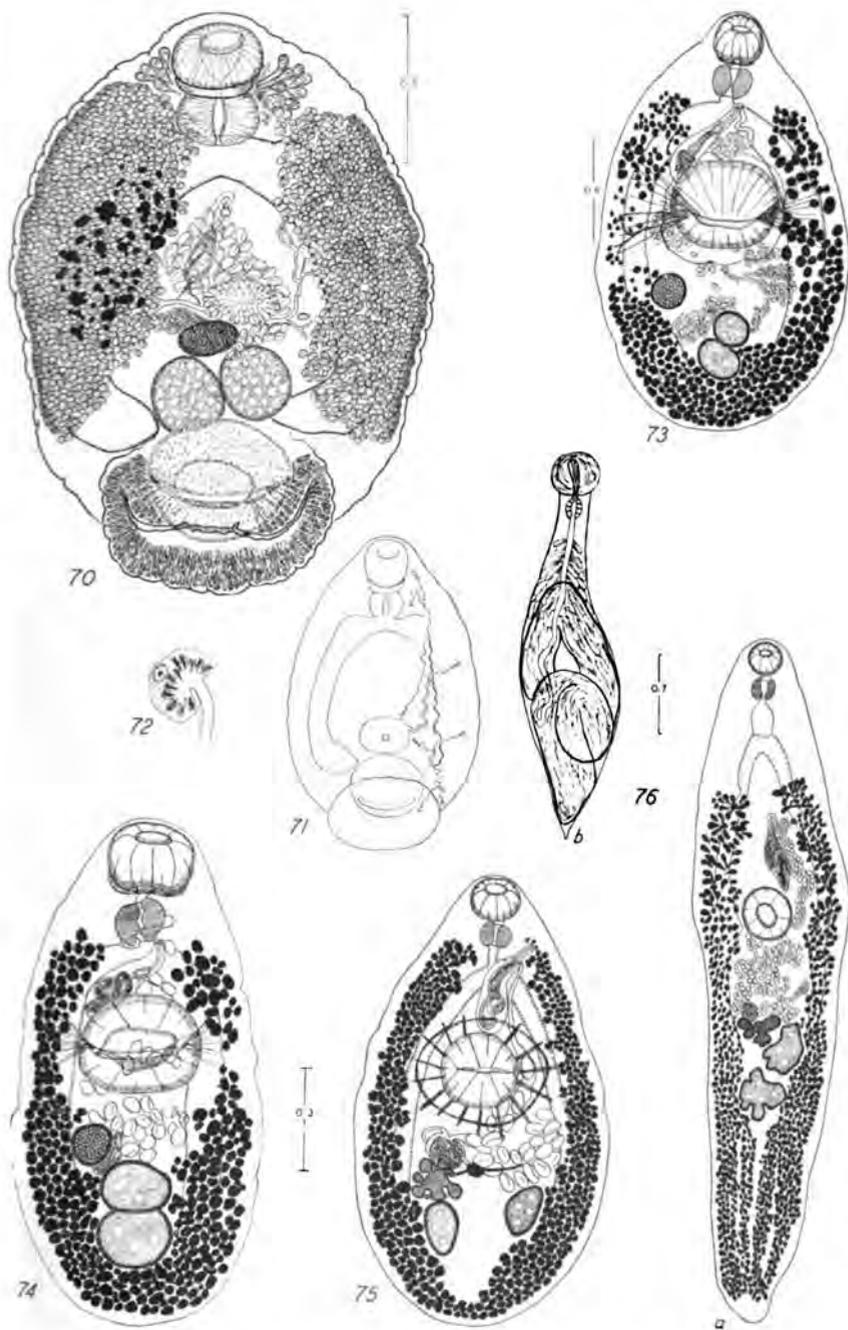


PLATE XII

- FIGURE 77. *Hamacreadium longisaccum* (ventral view).
FIGURE 78. *Hamacreadium mutabile* (ventral view).
FIGURE 79. *Pseudoplagioporus brevitellus* (dorsal view).
FIGURE 80. *Helicometrina nimia* (ventral view).
FIGURE 81. *Helicometrina trachinoti* (ventral view).
FIGURE 82. *Helicometrina mirzai* (ventral view).
FIGURE 83. *Helicometra equilata* (ventral view).
FIGURE 84. *Helicometra torta* (ventral view).
FIGURE 85. *Neohelicometra scorpaenae* (ventral view).
FIGURE 86. *Opecoeloides vitellosus* (ventral view).
FIGURE 87. Ventral sucker of *Opecoeloides elongatus*.

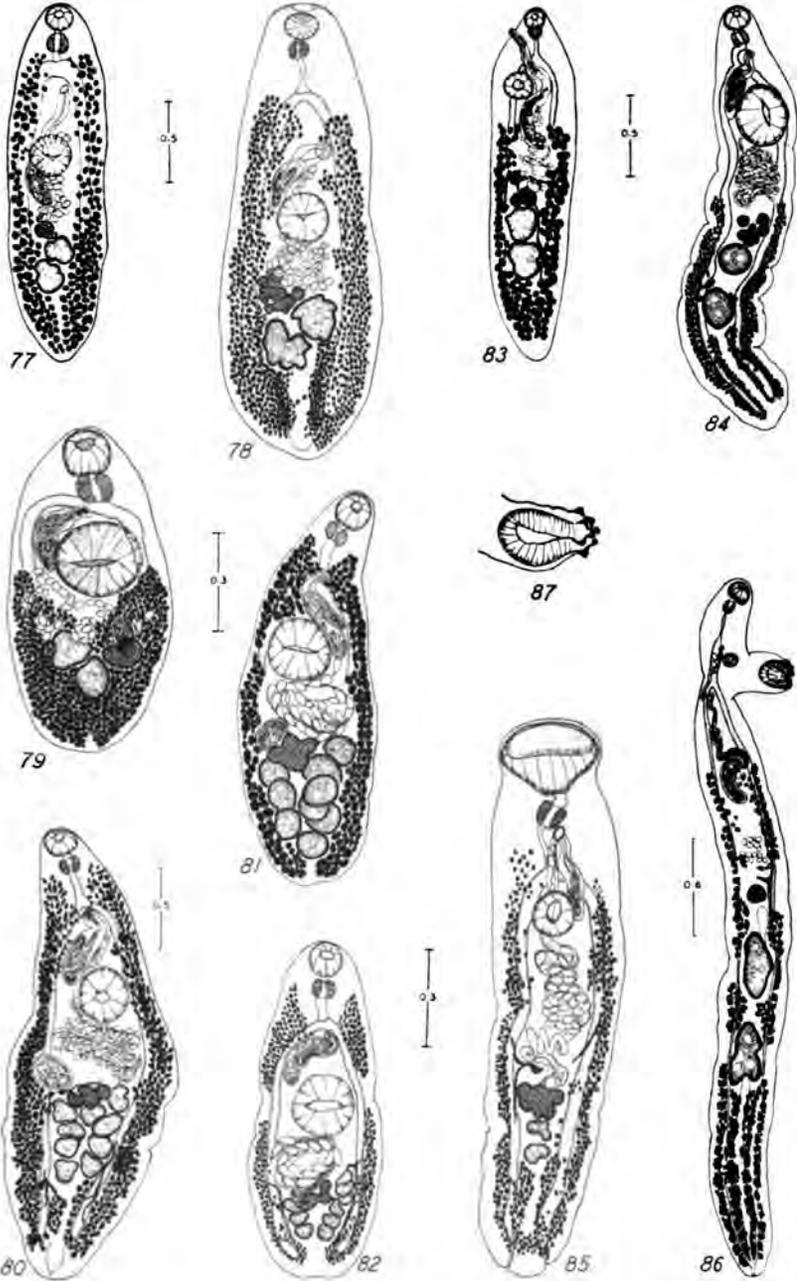


PLATE XIII

- FIGURE 88. *Opecoeloides elongatus* (ventral view).
FIGURE 89. *Opecoeloides* sp. (ventral view).
FIGURE 90. *Opecoeloides brachyteleus* (ventral view).
FIGURE 91. *Opecoeloides* (?) sp. (ventral view).
FIGURE 92. *Pseudopecoeloides equesi* (ventral view).
FIGURE 93. *Pseudopecoelus barkeri* (ventral view).
FIGURE 94. *Pseudopecoelus tortugae* (ventral view).
FIGURE 95. *Horatrema crassum* (dorsal view).

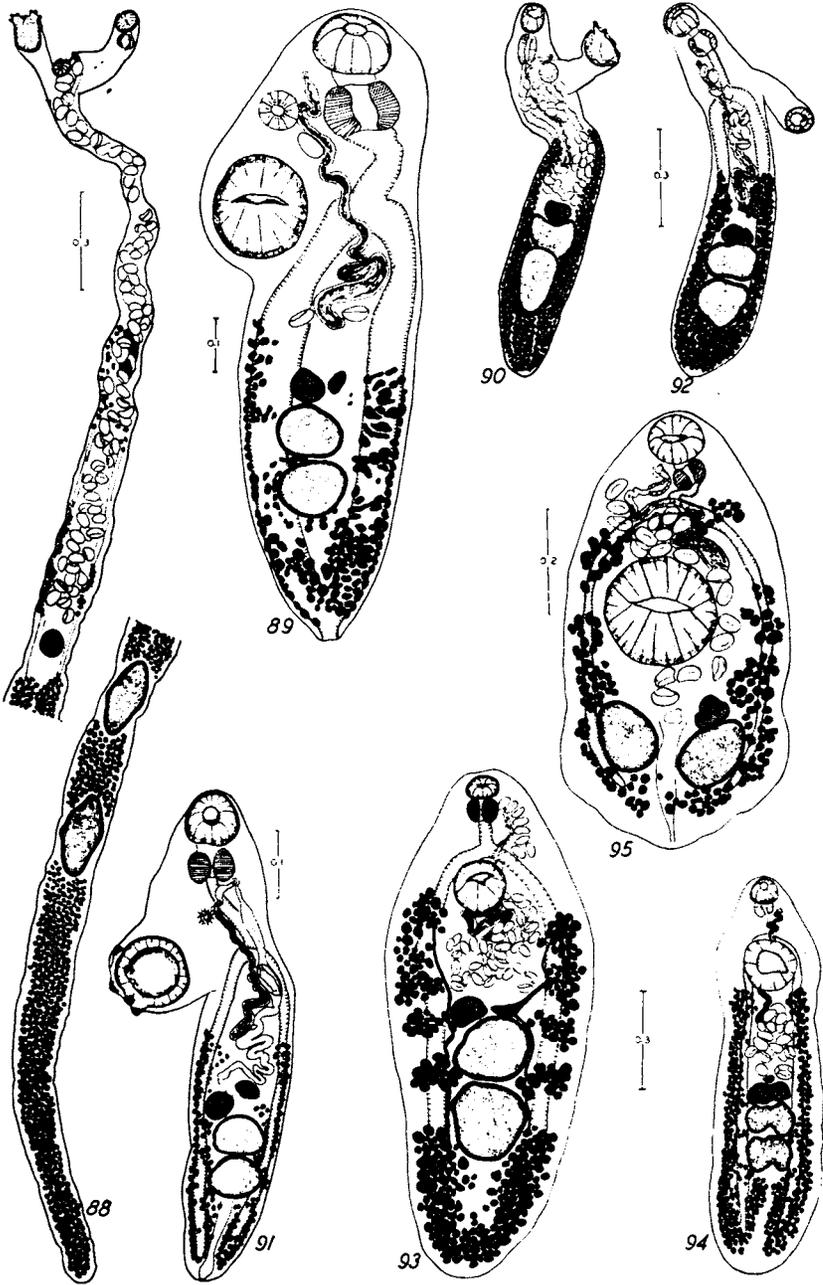


PLATE XIV

- FIGURE 96. *Homalometron elongatum* (ventral view).
FIGURE 97. *Homalometron foliatum* (ventral view).
FIGURE 98. *Neoapocreadium angustum* (ventral view).
FIGURE 99. *Neoapocreadium coili* (ventral view).
FIGURE 100. *Postporus epinepheli* (ventral view).
FIGURE 101. *Apocreadium balistis* (ventral view).
FIGURE 102. *Apocreadium mexicanum* (ventral view).
FIGURE 103. *Multitestis blennis* (ventral view).

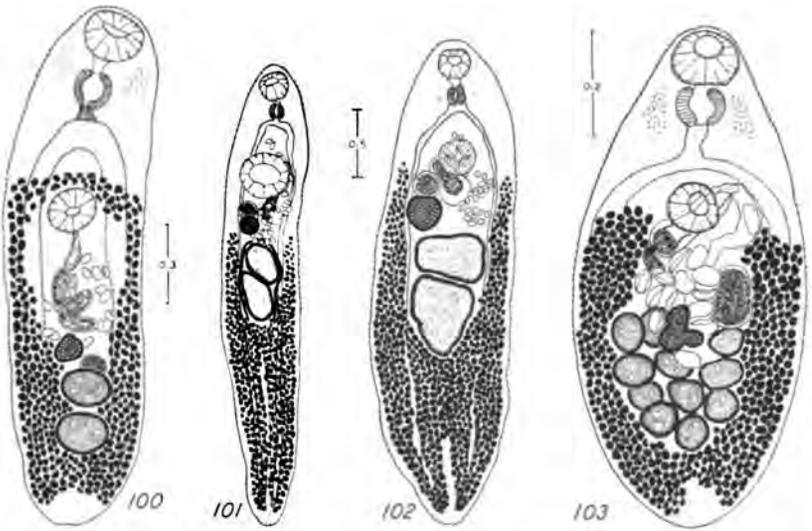
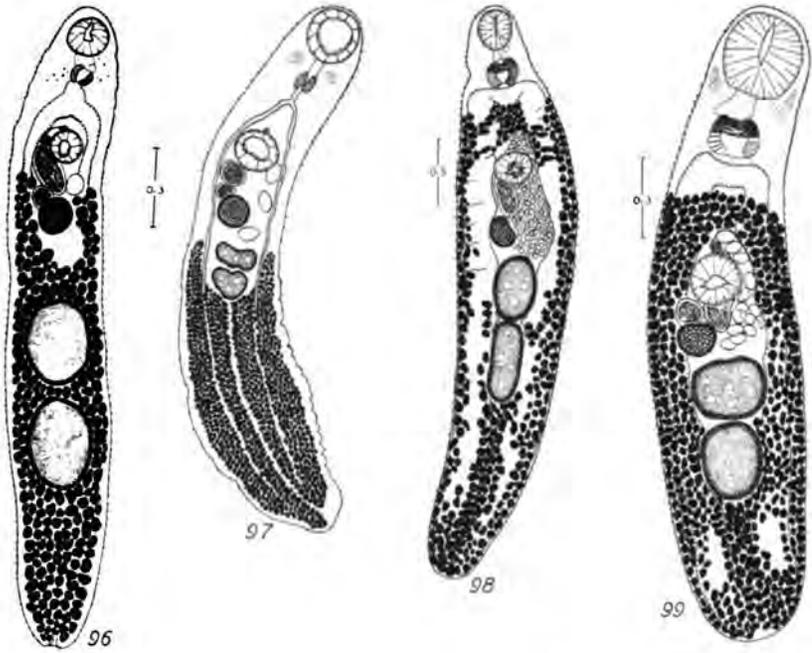
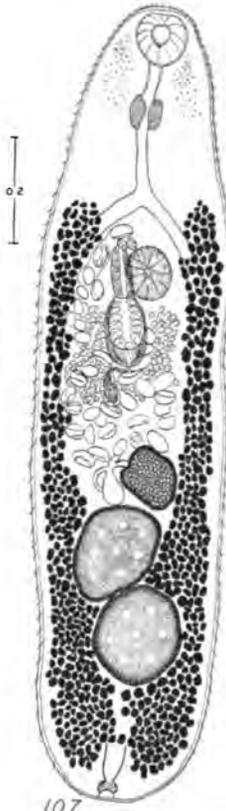


PLATE XV

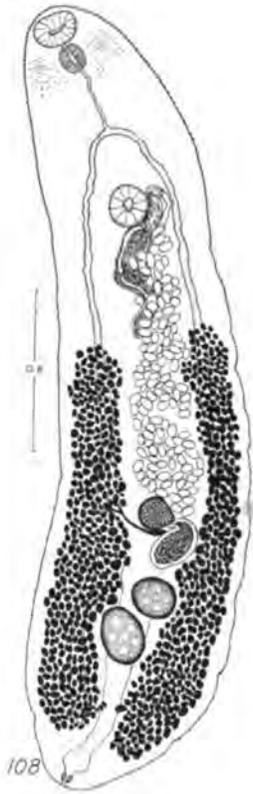
- FIGURE 104. *Multitestis inconstans* (dorsal view).
FIGURE 105. *Lepocreadium trulla* (ventral view).
FIGURE 106. *Lepocreadium* sp. (ventral view).
FIGURE 107. *Neolepidapedon trachinoti* (dorsal view).
FIGURE 108. *Neolepidapedon epinepheli* (ventral view).



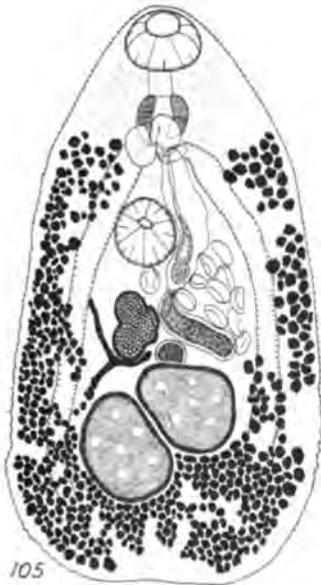
104



107



108



105



106

PLATE XVI

- FIGURE 109. *Neolepidapedon equilatsum* (ventral view).
FIGURE 110. *Neolepidapedon mycteropercae* (ventral view).
FIGURE 111. *Lepidapedon holocentri* (ventral view).
FIGURE 112. *Myoxenous lachnolaimi* (dorsal view).
FIGURE 113. *Dermadena lactophrysi* (ventral view).
FIGURE 114. Excretory system of *D. lactophrysi*.
FIGURE 115. *Pseudocreadium* sp. (ventral view).
FIGURE 116. Excretory system of *Pseudocreadium* sp.

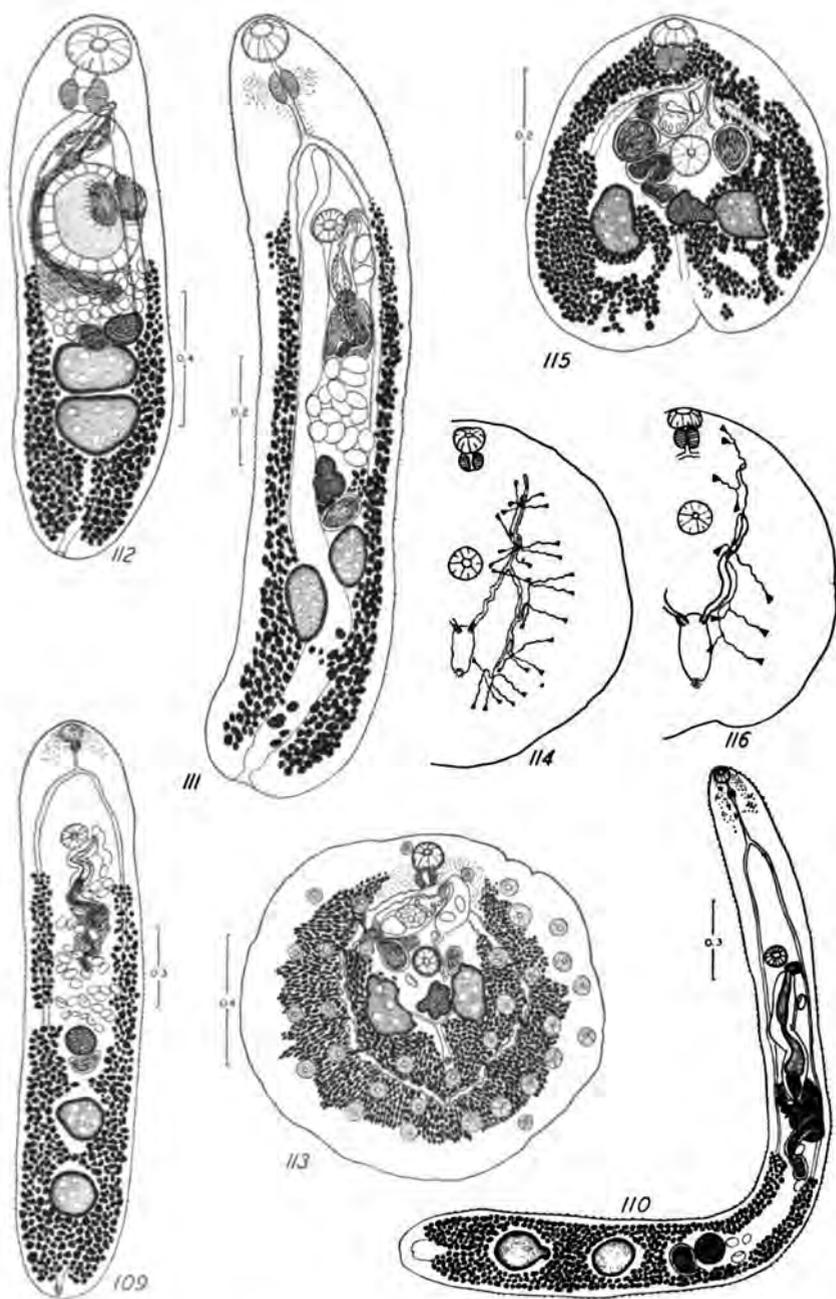


PLATE XVII

- FIGURE 117. *Tetrochetus aluterae* (ventral view).
FIGURE 118. *Bilecithaster ovalis* (ventral view).
FIGURE 119. *Hysterolecitha rosea* (ventral view).
FIGURE 120. *Leurodera decora* (ventral view).
FIGURE 121. *Dichadena acuta* (ventral view).

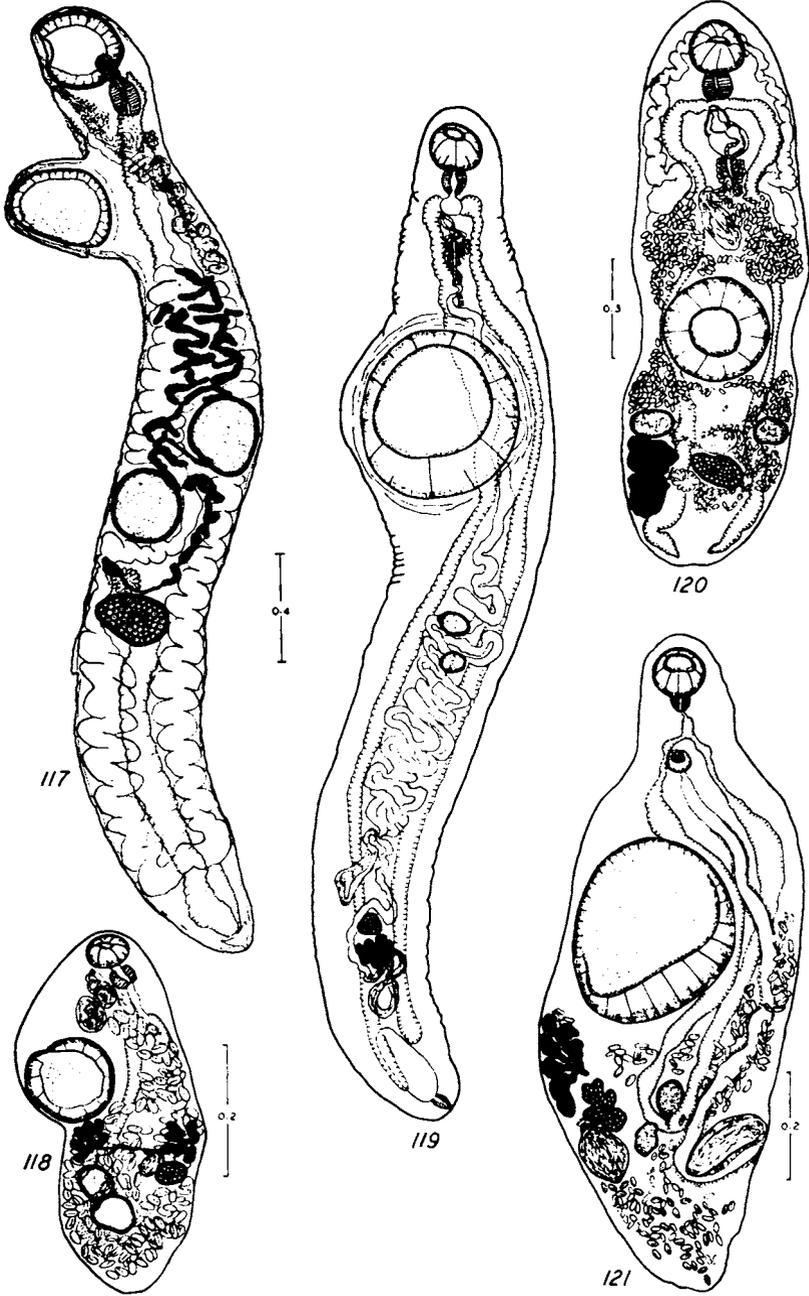


PLATE XVIII

- FIGURE 122. *Theletrum fustiforme* (ventral view).
FIGURE 123. *Neogenolinea opisthonemae* (ventral view).
FIGURE 124. *Macradena acanthuri* (ventral view).
FIGURE 125. *Aponurus elongatus* (ventral view).

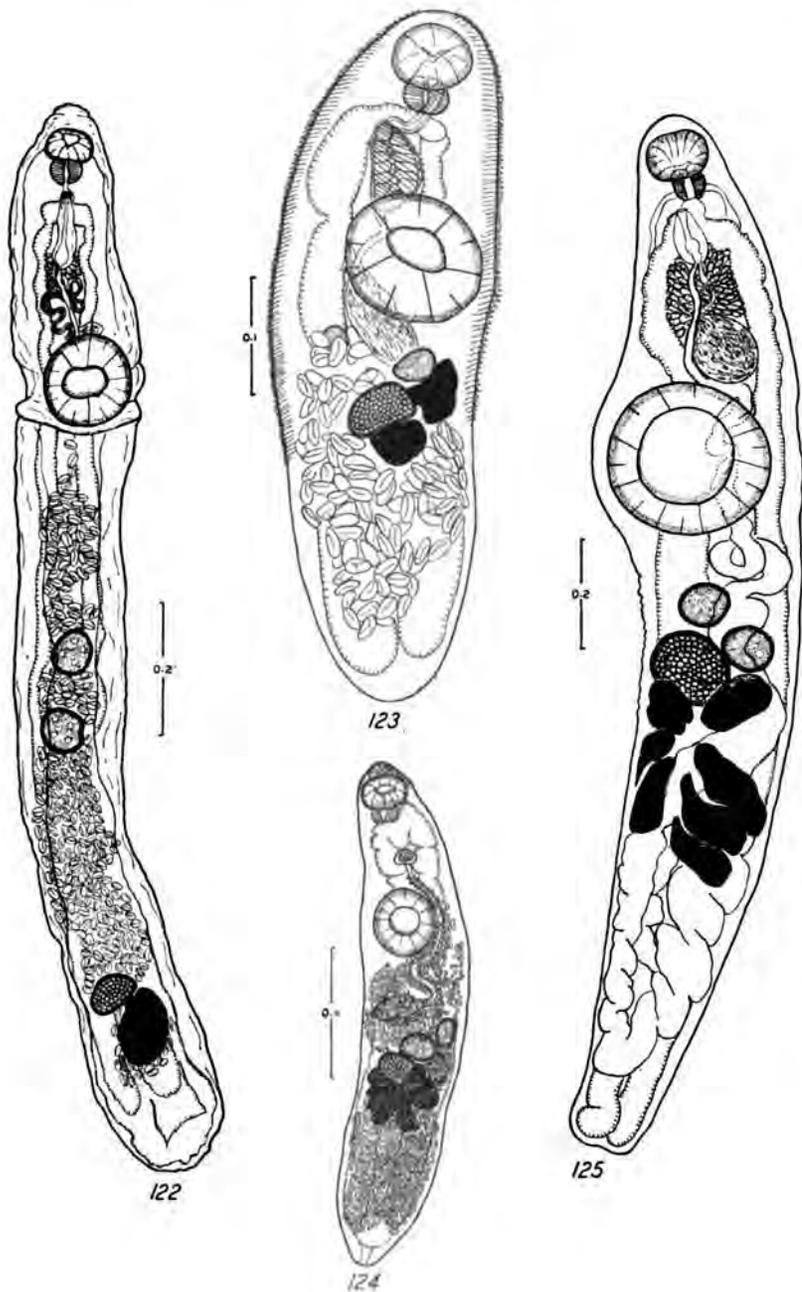
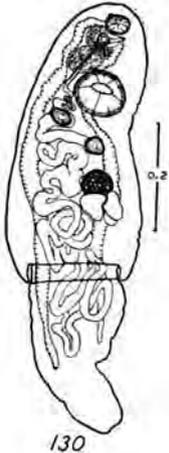
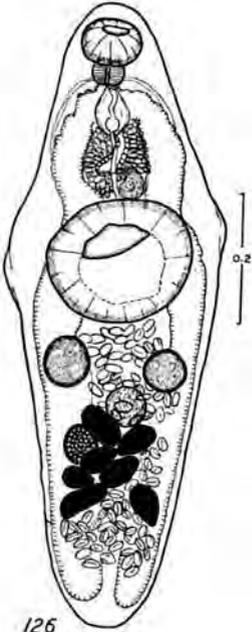


PLATE XIX

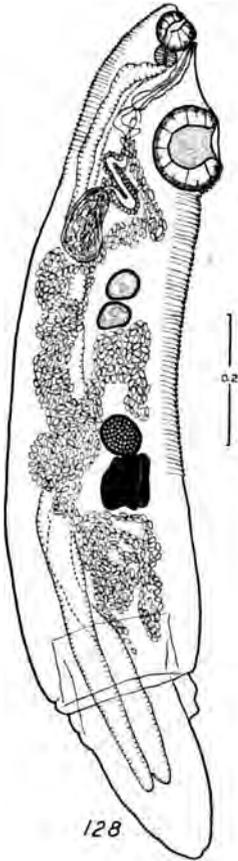
- FIGURE 126. *Aponurus symmetrorchis* (ventral view).
FIGURE 127. *Pareclenurus chloroscombri* (ventral view).
FIGURE 128. *Parahemius merus* (lateral view).
FIGURE 129. *Sterrhurus susiformis* (ventral view).
FIGURE 130. *Sterrhurus floridensis* (ventral view).
FIGURE 131. *Sterrhurus monticellii* (ventral view).



126

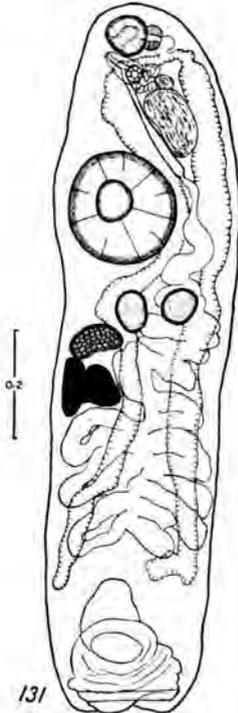
129

130



127

128



131

PLATE XX

FIGURE 132. *Sterrhurus monicellii* (ventral view).

FIGURE 133. *Sterrhurus microcercus* (ventral view).

FIGURE 134. *Lecithochirium parvum* (ventral view).

FIGURE 135. *Dinurus breviductus* (ventral view), complete vitellaria not shown.

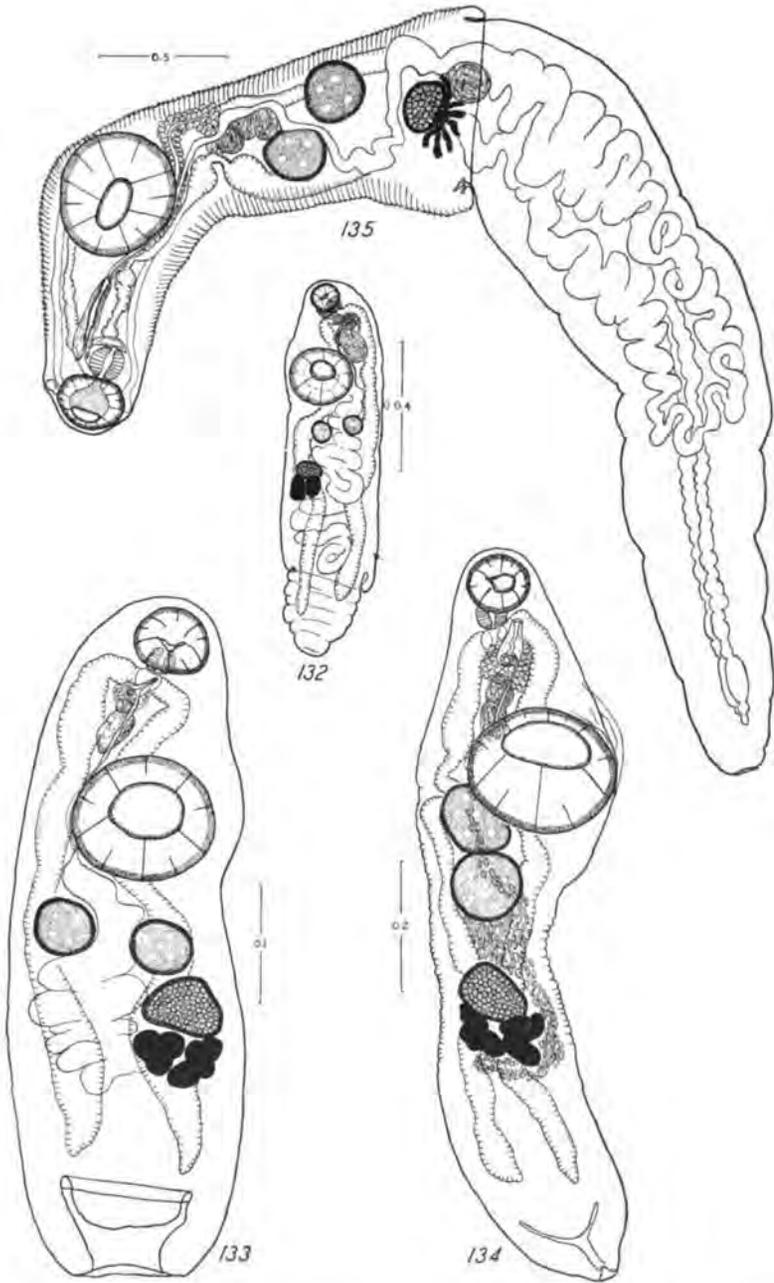


PLATE XXI

FIGURE 136. *Dinurus barbatus* (ventral view).

FIGURE 137. *Dinurus tornatus* (ventral view), complete coils of vitellaria not shown.

FIGURE 138. *Tubulovesicula lindbergi* (ventral view), uterus and vitellaria not shown.

FIGURE 139. *Hirudinella ventricosa*, immature (ventral view).

